COLLABORATING INSTITUTIONS

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Center for International Forestry Research (http://www.cifor.cgiar.org): The Center for International Forestry Research (CIFOR), based in Bogor, Indonesia, was established in 1993 as a part of the Consultative Group on International Agricultural Research (CGIAR) in response to global concerns about the social, environmental, and economic consequences of forest loss and degradation. CIFOR research produces knowledge and methods needed to improve the wellbeing of forest-dependent people and to help tropical countries manage their forests wisely for sustained benefits. This research is conducted in more than two dozen countries, in partnership with numerous partners. Since it was founded, CIFOR has also played a central role in influencing global and national forestry policies.

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WHO DRIVES CONSERVATION IN CHINA?

A CASE STUDY IN PROTECTED AREAS IN YUNNAN, SOUTHWEST CHINA

By Jianchu Xu

Who Drives Conservation in China? A Case Study in Protected Areas in Yunnan, Southwest China

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INTRODUCTION

The purpose of this paper is to examine the expansion of public protected areas in China and its impacts on indigenous people's rights and access to territory resources and biodiversity for their material, economic, ecological and spiritual functionality. The paper also examines differences between state and local perspectives of conservation, assesses the impacts of conventional public protected area approaches – focusing particularly on the case of the southwestern province of Yunnan. The paper concludes by describing an alternative approach to achieve conservation goals, that which respects and empowers communities.

The norm of nations was to possess a distinct and significant geographical dimension not only in the state-building process but also later on extended into administration, as well as resource management and biodiversity conservation. This analysis examines how government forest agencies and local governments in China negotiate and demarcate boundaries for protected areas, how they balance state norms of biodiversity conservation and administration of protected areas in the context of local customs, usages, and identities, in which to further explore State simplification of identification of biodiversity, land use practices and interaction between people and nature. Placement through allocation of land tenure and displacement through resettlement of people in another place, or sedentarization, as the attempt to fix indigenous people in place and practices, are perhaps the oldest continuous project of the State. The establishment of protected areas is good example of a state project to locate, fix, identify, order, and monitor indigenous populations, property and social and environmental interactions.

This report demonstrates that mobility is of intrinsic importance and an instrumental process for indigenous people to access resources, land, information, technology and power. Mobile people are not likely to be hegemonic or territorial and their practices tend not do long-term damage to the environment. In some cases, such mobile peoples are continually being relocated and forced to reestablish their livelihoods as a consequence of state actions (e.g. poor farmers in low productivity areas during the "People's Commune", chaos during the Cultural Revolution, heavy taxes on state land, who flee to the frontier and situated wild forestlands).

There is growing international and national awareness and identification of public land important for biodiversity conservation and ecosystem services, contributing to the growing conflict between public environmental goals and the rights of indigenous peoples who often live in the world's biodiversity hotspots. There has been a dramatic increase in the establishment of public protected areas over the last several decades and this expansion has often come at the expense of indigenous and other community rights.

Increasingly, indigenous people's access to natural resources and land use practices are regarded as an inextricable part of their human rights. Therefore it is necessary to develop political systems that protect indigenous people's resource rights. In 2003, a new generation of Chinese leadership proposed the "Scientific Perspective of Development" which emphasized people-centered sustainable development.

This paper examines people-centered sustainable development in China and focuses particularly on the Province of Yunnan – one of the most biologically and ethnographically diverse areas on earth, where an inextricable link manifests between cultural, linguistic and biological diversity that emerges from historic ties to landscape. However the case of Yunnan happens in other parts of China. The paper begins with an overview of the status of the system of public protected areas in China, its targets for expansion, means for protection, and experience to date. The paper assesses the impacts of this expansion on local livelihoods and potential compensation for local communities. It also illustrates community driven conservation practices and their potential to be an equally effective conservation strategy as the protected area model.

In addition to examining the legal and social dimensions of this problem, the paper examines the empirical evidence of whether public goals for biodiversity protection are better achieved under public, private, or collective forest tenure. The paper concludes with recommendations for further research and reflection for China's policymakers and international, national, and provincial environmental groups and community advocates.

CONSERVATION IN CHINA: A HISTORICAL OVERVIEW

HISTORY

Chinese civilization originated in the area between the Wei and Yellow Rivers. The rich and fine soils of this loess plateau allowed agriculture to support a relatively dense population. On the other hand, human settlement, intensive agriculture, and growing demands for fuel and construction have been blamed for soil erosion and environmental degradation on the Loess Plateau, the area through which the upstream reaches of the Yellow River flow. In this region forest cover has dropped from an estimated 53% to 8% in the last 4,000 years. The intensity of the deforestation has been increasing especially since the 14th century (Edmonds 1994). The Book of Odes (*Shi Jing*. BC 1000 - BC 600) is the earliest reference to Chinese knowledge of 'forestry', which recorded that the Loess Plateau was originally covered by extensive forest destroyed by the spread of agriculture (Menzies 1992a). Mencius (372 BC - 289 BC), an early Chinese philosopher, commented on environmental relationships and stressed the importance of not over-hunting animals or over-cutting forests. As well, his philosophies warned of the dangers of opening uncultivated land and tampering with nature.

Although China had a philosophy of harmony with nature, there was also frequent deforestation that happened over various periods of Chinese history, transforming the environment significantly. The present denuded landscape of China is generally seen as the outcome of millennia of deforestation for agriculture and forest products; practices linked to population growth and state interest (Menzies, 1992a). Agriculture has been the philosophical and economic foundation of the Chinese State since earliest times. Non-agricultural resources like wildlands or forest frontiers have been neglected and viewed primarily as uncultivated agricultural land. Unoccupied wildlands also represented a threat, as hostile groups could use these areas. The central State encouraged agricultural settlement and economic development in strategic wildlands as a national policy of pacification. The State implemented a system of self-supporting agricultural colonies (*tun tian*) in frontier administration of southwest and northwest China during the Ming and Ming dynasties (Menzies 1992b). Large-scale deforestation resulted in tree plantations to supply timber. The earliest agroforestry reports date from the 12th century and describe the cultivation of *Cunninghamia lanceolata* in combination with food crops to meet the growing industrial timber demand of the cities (Menzies, 1988).

Protected areas or reserves can be found in imperial records dating from the Qin and Han dynasties up until the most recent Qing dynasty. Historical examples include mountain areas that were closed to be used as imperial hunting preserves and temple grounds (after the introduction of the Buddhism during the reign of the Han Emperor Ming Di (AD 58-AD75, the monasteries acquired forestlands as gifts or as Imperial grants in the case of sacred mountains of Hengshan and Wutaishan) or as grave sites (in the case of Taishan).

The present-day protected area conservation model originates from European models of forest reserves and royal game preserves (Pretty 2002). Its modern form has also been heavily influenced by the national park system created in the United States in the late 19th century (Molnar *et al* 2004). This model divides the landscape into distinct categories: natural habitats, and human created productive habitats. Biodiversity is protected inside natural habitats in which human activities are restricted and excluded. The productive habitats are either private or collective property, while protected areas are state-owned and managed, where traditional uses and access are denied.

XXX? has identified 25 global 'biodiversity hotspots', with areas totaling approximately 12% of the Earth's terrestrial surface, that are rich with endemic species and particularly threatened by human activities. It was estimated that in 1995 more than 1.1 billion people, nearly 20% of world's population, were living within these identified biodiversity hotspots. The population growth rate from 1995 to 2000 in the biodiversity hotspots was 1.8%– per year, substantially greater than the population growth rate for the world as a whole (1.3% per year) and for developing countries (1.6% per year) (Cincotta *et al.* 2000).

Although China has a long history of environmental protection, the concept of the nature reserve was introduced in the early twentieth century. Immediately after the founding of the People's Republic of China, many foreign educated scientists returned to China. At the third meeting of the No.1 People's Congress (April 1956), approved Proposal 12, in which some natural forests were designated logging ban areas, thus creating nature reserves. In the same year, the seventh meeting of the Forestry Department passed "The Draft Roles of the Natural Forest Logging Ban Area (Nature Reserve)". Dinghushan Nature Reserve was established in 1956 according to international standards and practices for protected areas. The political ideology shift during the Great Leap Forward in 1958 and the political chaos during the Cultural Revolution (1965-1975) slowed the implementation and establishment of new nature reserves.

With the open door policy and economic reform in China, research and government groups increasingly acknowledged the importance of public protected areas for scientific investigation and ecological services. There were even foreign study tours to learn from international experiences such as the Yellowstone National Park in United States. The rate at which new public nature reserves were established accelerated in the 1980s and continued through the 1990s. By 2002, China had established a total of 1575 nature reserves with a total area of 1,330,000 km², accounting for 13.2% of China's total territory and more than world average of 10%. More than half of the nature reserves were established in the 1990s (see Table 1).

Table 1: Existing and proposed national-level nature reserves

	No	Present size (ha)	Proposed size (ha)	Newly expansion (ha)
EXTENSION OF EXISTING NATIONAL NATURE RESERVES	22	4,736,079	6,331,464	1,595,384
Upgrading to national-level nature reserves	35	37,369,391	38,938,301	1,568,910
New site for national nature reserves	26			5,150,207
Total		**42,105,470**	**45,269,765**	**8,314,501**

According to the statistical results of the 5th national forest resource inventory (1994- 1998), there is over 263.3 million hectares of designated forestland, of which 158.9 million hectares is forested and forest coverage 16.55%. According to law, there are two types of forest ownership in China: state-owned and collectively owned forests. Collective forests represent more than half of China's forestland area. There are 89.7 million hectares of collective forest area, accounting for 58.4% of the total forested land. Although more than half of all forestland is under collective ownership (including private contracts), there are no nature reserves that are under collective ownership.

On December 21, 2001, the State Forestry Administration (SFA) implemented a nationwide long-term project called Wildlife Conservation and Nature Reserve Construction Project (WCNRCP). By the end of the project in 2050, China will have 2500 nature reserves with a total protected area of 172.8 million hectares, accounting for 18% of China's land area.

However, the government has been more concerned with the number of nature reserves and their total area rather than the effectiveness of the newly established reserves at achieving their goals. The proposals for new protected areas come from researchers or government agencies and there is a general lack of inclusion of indigenous people in assessment, planning, demarcation, and management, which often leads to conflicts between protected areas and local communities. Besides rich biodiversity, including species richness, unique ecosystems, and high endemism, the contiguity and size of an area is an important criterion in the application process for the establishment of a new nature reserve, particularly at the national level. There have been cases in which local forest agencies have demarcated potential nature reserves on a map without going into the field to assess tenure.

Insufficient government funding for the operation of nature reserves has resulted in an increasing number of activities to generate income, such as tourism development. Over-exploitation of protected areas by eco-tourism operators is a common phenomenon. Both private companies and protection agencies operate in the eco-tourism industry. Massive tourism development has put increased pressure on conservation. On the other hand, traditional activities like hunting and collecting in the nature reserves is now restricted. Indigenous people receive few benefits from the exploitation of nature and biodiversity by developing tourism. The number of conflicts between wildlife and local people are increasing due to an increasing wildlife population. Current regulations have not adequately addressed compensation for local people negatively impacted by the nature reserves.

The following factors hamper the effective conservation of biodiversity in protected areas:

- The spatial overlap of people and biodiversity: a total of thirty million poor people were living in and around China's nature reserves according to a report from the State Forestry Administration in 1997 (Harkness, 1998).
- Lack of funding for (1) the resettlement of displaced people and (2) nature reserve management planning;
- Nature reserve staff has neither the incentive nor the capacity for implementing participatory management models.

STATE ENFORCEMENT AND CHALLENGES

Since 1978, China's transition from a centrally planned economy to a socialist market economy has triggered ecological, economic and socio-cultural consequences. A delicate balance between conservation and development is one of the major challenges facing decision-makers. Since 1992, the concept of sustainable development of the United Nations' Rio Declaration has been a major consideration of Chinese government policy. China revised its national policy of environmental protection and biodiversity conservation and has introduced several policies and laws emphasizing the importance of sustainable forestry management and biodiversity conservation:

- Forest Law of the People's Republic of China,
- Environmental Protection Law of the People's Republic of China,
- Wildlife Conservation Law of the People's Republic of China,
- Regulation of Wild Plants Protection of the People's Republic of China,
- Biodiversity Conservation Action Plan of China,
- Nature Reserve Regulation of People's Republic of China.

The Convention on Biological Diversity (CBD), of which China and 176 other nations are parties, defines a protected area as "a geographically defined area, which is designated or regulated and managed to achieve specific conservation objectives."

China has, however followed the public protected area model of conservation, in which rigid standards are implemented, flagship species identified, and key ecosystems, core areas, buffers, and experimental areas delimited. Once demarcated, all areas were appropriated by the state, if not already government-owned, formally becoming public property. Although limited activities are allowed in both buffer zones and experimental areas, local farmers' access to resources in the protected areas has been restricted, even though the land had previously been collectively owned. In extreme cases, local villagers or communities have been resettled outside of the reserve boundaries. The remoteness and poverty of the regions in which most protected areas are located, combined with the lack of any reliable outside funding, has posed a number of other dire consequences for biodiversity conservation (Harkness 1998).

The international framework for the legislation and policy of protected areas developed by IUCN, and currently in use in most countries of the world, defines a protected area as:

> An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural **and** associated cultural resources, and managed through legal or other effective means [emphasis added].

The IUCN international system of categories for protected area management contains six broad categories, ranging from strict protection to sustainable resource use. Whenever they overlap, indigenous and local people and their traditional use of natural and environmental resources are considered to be a key component in the comprehensive, sound management of protected areas. Development of protected area systems that appropriately incorporate local people's values, rights, interests, and roles is not a challenge unique to China; it is a challenge currently facing all countries of the world. This is reflected in the fact that the 176 countries party to the CBD have decided to develop guidelines to:

> …promote the effective participation of indigenous and local communities in decision-making, policy planning and development and implementation of the conservation and sustainable use of biological diversity at international, regional, sub-regional, national and local levels, including (…) the designation and management of protected areas.

STATE VERSUS LOCAL VISION OF BIODIVERSITY AND CONSERVATION

YUNNAN: AN INEXTRICABLE LINK BETWEEN CULTURAL AND BIOLOGICAL DIVERSITY

Yunnan is located in the eastern Himalayan Region of Southwest China. The province has a wide range of elevation, from the highest peak (6740 m a.s.l.) in the alpine temperate zone to sub-tropical valleys as low as 76 m a.s.l. The 'roof' of Southeast China includes the headwaters of the Yangtze, Salween, Irrawaddy, Mekong, Red, and Pearl Rivers. Yunnan's ecosystems are therefore not only important to mountain people but also to lowland people, as well as a large number of stakeholders in the downstream regions in Burma, Laos, Vietnam, and Thailand.

Yunnan's uplands have historically been home to diverse indigenous cultures, with 25 officially recognized ethnicities counting more than 14 million people. Indigenous people have practiced complex land use systems, such as agro-pastoralism among Tibetans, shifting cultivation among the Lisu and Jinuo, terraced paddy cultivation of the Hani, hunting and gathering among the Kucong (Lahu) and Dulong, and intensive lowland paddy cultivation among Dai and Bai people. The place based human and environment interaction eventually becomes a dynamic and complex nexus. In the larger valleys, intensive rice-based agriculture can support larger settlements, which are often foci of political and economic power. A web of social networks through migration, trade and other customary institutions connected the uplands and lowlands. Each ethnic group has developed a sophisticated human-nature nexus, which serves as a node of social networks.

Yunnan has about 17,000 flowering plant species (62.9% of China's native species), 793 bird species (63.7%), and 300 mammal species (51.1%). About half of the endangered species in China are protected in 120 nature reserves, which cover 6.5% of Yunnan's land area. Biodiversity is conventionally defined as diversity in habitats, genetics, and species. Biodiversity is not just a property of natural ecosystems but also a product of the interaction of socio-cultural and biophysical systems (Pei & Sajise, 1993) and is therefore linked to indigenous knowledge and cultural diversity that emerges from historic ties to landscape. For instance, shifting cultivation may actually increase, rather than reduce, the diversity of habitats and species in the landscape (Xu *et al*, 1997). Biodiversity has economic, cultural and ecological functions, and thus can be managed through a variety of social institutions. Increasingly, conservation specialists recognize the importance of social factors in biological resource management and the protection of biodiversity.

STATE AND LOCAL VISION OF NATURE AND BIODIVERSITY

Biodiversity, as defined by biologists, refers to genetic, species and ecosystem diversity of organisms. The biodiversity recognized internationally, such as rare and endangered species on the IUCN list or in national red books, flagship species, and critical ecosystems, have higher conservation values. Establishing nature reserves or biodiversity reserves, which are similar to zoos, botanical gardens, or parks, are a main approach to maintaining the diversity of species. The traditional belief is that nature is a static collection of entities apart from human activities. There is growing interest in 'wilderness areas', where nature is seen primarily as processes protected from human interference (Cooper, 2000). Therefore attempting to 'fix' human activities in a defined area [their residence, their movement, their classification, their property] or displacing those people and their activities to another location (Sahlins & Scott 2001) are also applicable to conservation. The great achievement in biodiversity conservation is therefore to establish more demarcated biodiversity 'hotspots' or 'reserves' with standardized practices. The purpose of state-backed conservation has been to transform capacity and diverse and dynamic forest ecosystems, of which local people are part, into well-controlled forests without human interaction and intervention.

The value of biodiversity can be different for different actors. Some may consider that biodiversity managed for human benefits, particularly for local livelihoods, cultural and ecological services are low value, whereas 'wilderness' is high value. It is often overlooked that these 'wild' ecosystems are in fact the outcome of long periods of human intervention and management (Redford, and Padoch 1992, Toledo, 1998). China, as one of the most populated countries in the world, has a long tradition of human intervention in 'wild' and frontier forest regions (Menzies, 1992).

Local identification of biodiversity is more for functional purposes, such as plants for food and medicinal purposes, trees and forests for cultural services (e.g. sacred groves and forests), forest and habitats for ecological services (e.g. water supply and soil erosion control). Biodiversity in nature can be nurtured and enhanced by human activities (see Box 1) and be the product of the interaction between people and ecosystem systems.

Box 1 -- Bird Diversity in Swidden Agroecosystems of Xishuangbanna, Yunnan, China

The authors took a comparative look at the relationship between human-altered landscapes and bird diversity in two mountainous swidden agriculture sites in Xishuangbanna by applying line-transect identification surveys. At the first site, Hani people in Mengsong practice more traditional swidden agriculture in mosaic landscapes. At the second site, the Jinuo swidden cultivators on the other hand have practiced more sedentary agriculture due to established nature reserves nearby. The survey was conducted at two sites and in four different habitats: 6-year swidden-fallow fields; traditional economic forests; monsoon evergreen broadleaf forests; and montane rainforests. The survey compared the species diversity, richness (family, genus, species), co-occurrence (family, genus, species), characterization of migratory status, and feeding habits. The forest landscape in the Jinuo ethnic region is quickly transforming due to changing agricultural practices, and as a result bird diversity and richness are declining. Meanwhile in the Hani ethnic region (Mengsong), with a stable form of traditional swidden agriculture, they are maintaining a high diversity and richness of birds. The greatest differences in bird diversity between the two sites occurred in the traditional economic forests and the 6-year fallow fields where the Hani region had a much greater richness and diversity.

Source: Wang and Young (2003).

On the other hand, indigenous practices are guided by their epistemology and are essential to the interrelationship of nature and culture and to enhance biological diversity. The cultural beliefs, customary institutions and indigenous people reflect the epistemology. For example, in Tibetan culture, there is no beginning and end for life; life is a cycle and non-material. Humans must cultivate wisdom and the behavior of a person determines his or her next life. People are intractably a part of nature and a part of biodiversity. Belief in reincarnation has played a major role in the preservation of plants, animals, and the environment in Tibetan culture. The swidden cultivators such as Hani people have intimate knowledge about the successive vegetation of swidden-fallow fields (temporal knowledge), as well as micro-sites across the landscape (spatial knowledge). The rotation of various sites and changes in land cover over time enables indigenous people to envision the landscape as an extensive setting with multiple possible trajectories for future use (Sturgeon 2004).

Table 2: State-Driven versus Community-Driven Conservation

	State-driven	Community-driven
Perception of nature	Wilderness	People are part of nature
Biodiversity	All living organisms at genetic, species and ecosystem level	• Mountains, water, plants and animals have their own spiritual and material life • Reincarnation of life, e.g.,Tibetan belief
Places and space	• Natural habitat and human created non-habitat • Biodiversity hotspots	• Interrelated between people and habitat • Culture in nature and nature in culture • All biodiversity and habitats are equally important
Diagnosis of biodiversity loss	• Overpopulation • Bad land use practices, e.g. shifting cultivation	• Livelihood needs • Unstable policies • Extraction by outsiders
Perception of local people	• People are the threat • Subjects of study	• Citizens • Enhancing biodiversity
Human impacts to biodiversity	Always negative	• Essential to create habitats for other species (crops, useful plants, animals) • Regulated management (time and space) • Mitigation measures, e.g. sanction • People nurture nature, nature nurtures people
Size of conservation	The bigger, the better	Small, associated habitats
Conservation solutions	• Exclusionary protected areas • Placement of species/habitats • Resettled local villagers	• Sustainable use • Social fencing • Communication between man and nature through religious rituals
Value of biodiversity	Wild biodiversity is high value	Value of biodiversity for ecological and cultural services, production, and livelihoods are equally important

COMPLEMENT OR CONTRADICTION IN CONSERVATION

Culture-based practices of conservation in Yunnan

a. Cultural Beliefs in Conservation

In Yunnan, different ethnic groups regard many landscapes, including forests and the biodiversity contained within, as sacred. Examples include the Dai people in Xishuangbanna (Pei 1985, Liu et al, 2002), the Yi people in Chuxiong and other parts of southwest China (Liu et al, 2000, Ma, 2003), the Tibetan people in Deqin (Guo, 2000), the Bai people in Dali, and the Naxi people in Lijiang (Pei and Luo 2000). The sacred landscapes refer to places (mountains, hills, lakes, rivers, temples, shrines, etc.), objects (religious sculpture, stones, painting, hierograms, costumes), life forms (animals, plants, and forests), and imaged super-natures. Therefore, sacred spaces are contextualized by the way they are expressed through "material culture". Physically, a sacred space can vary from a few square meters to hundreds of square kilometers, such as many sacred mountains. Mt. Khabrdjarpo in Deqin, Mt. Laojunshan in Lijiang, Mt. Jizushan in Dali, Mt. Zixishan in Chuxiong, Mt. Xilongshan in Honghe, and as many as hundreds of 'hollyhills' in Xishuangbanna. Sacred sites may hold significance for one household, a community, or multiple communities, one ethnic group, or common religious practices across ethnic groups. The sacred places or sites are perceived to be the source of powerful forces, energy and wisdom. Sacred landscapes are maintained through practicing religious rituals and ceremonies and from participation of a specific cultural group. Although there is no exact figure of the total area of sacred landscapes, estimates are about 2% of the total provincial land area. The government has already incorporated most sacred mountains into the protected area system.

b. Sanctioning of Resources and Sustainable Use

In practice, the government never had effective control over and efficient management of forests, land, and water in the peripheral areas of Yunnan. Rather, indigenous people administered these lands and resources through their own methods. The customary institutions that were developed dealt effectively with the diversity of communities and the dynamic nature of the environmental and forest resources. Recent field investigations have given insight into the various types of customary institutions that operated in the past and have shown that many are still functioning today (see Box 2).

Indigenous people have their own diverse and adaptive knowledge about biodiversity and environment that mediates their relationship with the local environment. The adaptive nature of this knowledge is reflected in the emerging institutions that govern interactions between people, knowledge, and environment. The commercialization of non-timber forest products (NTFPs) in northwest Yunnan has not only put pressure on the species in the ecosystems, but also challenged traditional property rights, as illustrated by Yeh (2000) in her matsutake mushroom study (see Box 3).

Box 2 – Hani Swidden Cultivators and Their Sanctioning of Resources in Mengsong, Xishuangbanna

Hani people, who traditionally practices swidden agriculture, moved into the Mengsong area in the middle of the 18th century and have been learning how best to use their natural resources since then. The forest cover is very stable, dropping only 1 % from 51% in the 1960s to 50% in mid 1990s. In Mengsong people use the varied natural habitat for a number of activities – limited wet-rice production, home gardens, jungle tea gardens, swidden fields, and several types of forests (*sanqpaqbalwal* – community- protected rattan forest, *pucanq* – village scenic forest for fencing the village as protection from forest fire, *gaomail-sanqhav* – watershed forest to safeguard the water supply, *laoqbiml* cemetery forest for dead ancestors, *milsanl-sanqqu* forest for mother earth, and different sacred spaces for ghostsand supernatural beliefs. Current government policies emphasize individual ownership of agricultural lands, better management of forests by households, communities and the state, and production for markets. Remarkably, through all of the events leading to the present, some customary institutions have persisted in Mengsong and are still at work organizing access and use of the local forests and other lands. Customary laws play an important role for governing access to forest resources in Mengsong. Spatial zoning for different resources and land use is traditionally practiced by *Hani* people for designating forestland for swidden fields, pastureland, watersheds, and resource sanctuaries. The *Hani* have a rather complex system of social governance with regard to those that break the law. The perpetrator pays either in money or in goods (e.g. pigs), according to the type of crime committed. One ancient customary practice is community ownership and management of a rattan forest – a practice that may be a continuation of arrangements imposed by the dominant Dai ethnic group at the time of Mengsong's founding. For instance, customary law prohibits rattan collection from community-protected rattan forests (*sanqpaqbalwal*) and the illegal collection of one rattan cane would presently bring a fine of 50 Chinese yuan or in the past a payment of one pig and one bottle of wine.

Source: Xu et al. (1999).

Box 3 – Commercialization and Sustainable Harvest of Matsutake Mushrooms

Matsutakes (*Tricholoma matsutake*) have been a prized edible mushroom in Japan since ancient times, but the past few decades have seen a dramatic increase in both price and demand. This has driven the Japanese to search for new locations, which now include China, Korea, Canada, the United States, Mexico, and Morocco. In the early 1980's, Japanese companies began working with several import-export companies in Yunnan to locate areas with suitable ecological habitats and search local villages for matsutakes. Commercialization of large-scale fresh matsutakes had not appeared until 1986. Since then, several hundred tons of matsutakes are transported, largely from remote mountains of Diqing in northwest Yunnan, to Japan each year. ypically each collector earns 2000-3000 RMB per season, which runs between July and October. The forestlands in China are either state-owned or collectively owned. Collective forests can be "privatized" and managed by a household or individual. However state policy about property rights may be much less detailed than the customary institutions, which regulate access to a particular resource in a particular place. State policy does not reflect the emerging market for high-value NTFPs like matsutake mushrooms. So far, forest property rights are defined primarily in terms of trees rather than NTFPs. Claims and counter-claims about access to matsutake-producing forests are not only affected by but also shape local understandings of nationally defined property rights. For example, conflicts over access to matsutakes have called into question the meaning of "collective" forests: how much power does the village have to exclude others from its collective forestland? Because matsutakes are generally collected in pine-oak collective forests, most conflicts arise there. However, matsutakes also grow in the lower regions of some state forests and conflicts can arise where a state forest lies between two or more village collective forests. Two forestry policies implemented in 1981-83 (*liangshan daohu* and *linye sanding*) were meant to have allocated and leased collective forests to individual households as "freehold hill land" (*ziliushan*) and "contract hill land" (*zerenshan*). However, these policies were not uniformly implemented in Diqing, where some villages still have not divided their collective forests. Even in villages which have allocated forest to each family as freehold and contract hill land, the boundaries between household plots are not in effect for matsutake (and other NTFP) collection; within the village, all residents may harvest from any part of the collective forest. In other words, the commodification of the matsutake has led to a differentiation between tree tenure and NTFP tenure on the same land. Therefore new institutions are emerging and redefining access to matsutake mushrooms within villages and across villages. *Source: Yeh (2000).*

c. Agroforestry mosaic landscapes

Based on China's long recorded history, many scholars argue that China has few, if any, "virgin," "primordial," or "gallery" forests. Chinese forests are human-manipulated ecosystems, which have been cut, used, managed, and regenerated over time again and again. The anthropologist Yin Shaoting (2001) found that swidden agriculture has been well documented since the Song Dynasty (AD960-1279). It was once widespread across tropical and sub-tropical southern and southwest China, and practiced by over 16 ethnic groups in Yunnan. A total of several million swidden cultivators practice a sophisticated agricultural system, including the following management systems: nomadic, semi-nomadic, periodic rotation and permanent farming, short cultivation and short fallow, short cultivation and long fallow, long cultivation and long fallow, natural regeneration, and tree planning. . The Dai people commonly cultivate 315 species in agroecosystems (Yu, 1985). Local people in Xishuangbanna manage more than 100 timber species in tropical forests (Yu, 1985). A total of 220 associates belonging to 82 forms of 4 major types of agroforestry systems are documented in Yunnan (Guo and Padoch, 1995). The indigenous people in Yunnan have a long tradition of cultivating plants: the Jinuo and Hani peoples grow tea; the Hani grow rattan; and the Yao and Jinuo peoples cultivate plants for dyes and medicinal purposes (*Baphicacanthus cusia*). As well, cardamom species can be found at low altitude in Xishuangbanna (*Amomum villosum*) and at high altitude in Honghe(*A. kao-kou*). There is substantial evidence supporting indigenous communities, including swidden cultivators, nomadic pastoralists, agricultural farmers, ability to manage mosaic landscapes to be compatible with biodiversity conservation, and even providing favorable micro-environments for certain species.

d. Ecological services: the case of headwater forests

Forest ecosystems in mountainous areas provide invaluable ecological services for downstream populations, including local communities. Indigenous people from mountainous regions often have profound traditional ecological knowledge of the forest-water relationship. Traditional practices that protect forests in headwaters can be found in almost all ethnic cultures in Yunnan. Southwest China, particularly Yunnan Province, is the source of headwaters and major tributaries leading into several major rivers, which reach and have impacts on the lives of more than 600 million people in Mainland Southeast Asia. The headwaters of the Yangtze, Salween, Irrawaddy, Mekong, Black, Red, and Pearl Rivers are located within Yunnan Province. The mountainous terrain has helped form the many catchments in Yunnan that contribute to the major rivers and various tributaries. The mountain communities are peripheral but connected (Coward, 2000). Over hundreds of years, the upland and lowland communities have developed complicated social networks and relationships for both ecological and economic reasons. The lowland peoples had long been concerned about land-use practices and ecological services. The uplands provided dependable and quality water supplies, as well as timber and other non-timber forest products. In return, lowlands provided food, salts, agricultural tools, market information, and technology for those living in the uplands. Upland populations provided a source of labor, both seasonal and year-round, for either cash or labor exchanges. Customary institutions representing both the upland and lowland peoples protected the ecological health of the headwaters. For example, the Dai in Xishuangbanna have played important roles in organizing social institutions in the uplands and establishing ecological and economic relationships between valley inhabitants and upland shifting cultivators at landscape level (Coward, 2002). Those headwater forests, together with sacred forests, are perhaps the least human dominated ecosystems in southwest China. At the community level, the Hani

Hani people of southeast Yunnan have for centuries managed their land, creating three distinct landscapes: terraced fields, settled villages, and headwater forests. Each village manages the surrounding headwater forests, which range in size from several hectares to hundreds of hectares and vary in distance from the village. The headwater forests serve as green reservoirs in the mosaic mountain landscapes. The irrigation networks not only connect forest and village, but also social relationships and the ethnic identity of the Hani people. In fact, more than 15 nature reserves in Yunnan originated or were protected as watersheds or headwater forests. Those forests are crucial water sources for drinking water and irrigation for downstream populations.

The indigenous epistemology, ecological knowledge, and customary institutions have challenged the current bio-centric approach to biodiversity conservation, which is based on the separation of human activity and nature and the isolation of ecological services from species conservation. Blaming indigenous people and their traditional methods of resource use as a threat to biodiversity is common in scientific studies and policy.

Discovery and Protection of Biodiversity in Yunnan

Biodiversity is conventionally interpreted as diversity in genetics, species, and ecosystem. In Yunnan, the plant and animal kingdom are well represented. There are about 14, 000 flowering plant species (half of those in China), about 767 bird species (66%), and 248 mammal species (56%). Biodiversity is a property of natural ecosystems (Pei & Sajise, 1993). It is a product of the interaction of both the social and bio-physical systems and is also linked to indigenous knowledge and cultural diversity. The functional roles of biodiversity have economic, cultural and ecological aspects.

Early last century, both European and American botanists, zoologists, and missionaries, such as George Forrest (1905-1932), Frank Kingdon Ward (1911-1921), Heinrich Handel-Mazzetti (1914-1917), Yvette Borup Andrews & Roy Chapman Andrews (1916-1917), as well as famous explorer Joseph Rock (1922-1949), who lived in Yunnan, southwest China for decades (Moseley, 2004), discovered Yunnan to be a place of great biodiversity.. As Chinese scholars and scientists fled into Yunnan from inland China to avoid the war, they discovered not only new species, but also the vast knowledge of indigenous people for using those species. Local people often served as field guides for those scientists and scholars. Three botanic gardens (Kunming, Lijiang[1] and Xishuangbanna) were established immediately after the founding of the People's Republic of China for the collection and domestication of plant resources.

Despite local conservation through resource use practices, cultural beliefs, and resource sanctions, the Yunnan Provincial Forestry Department proposed implementing a logging ban or forest 'reserve' in 6 areas of the province in 1956, in response to a national policy for resource protection. In 1958, the Kunming-based Chinese Academy of Sciences developed a proposal that called for the establishment of 24 nature reservesexplaining the purposes, functions, and methods of the reserves. Although the proposal itself was approved at the county, prefecture, and provincial levels of government, nothing resulted. Subsequent policies, like the Great Leap Forward (1958), the Upland Development for Food Self-sufficiency (1970s) (Xu *et al*, 1999), and state-driven logging operations (1970s into 1980s) (Xu and

[1] Lijiang Botanic Garden was abandoned during the 1960s and is presently in the process of re-construction.

Ribot 2004), contributed to widespread deforestation in Yunnan. In a study exploring chains leading to biodiversity losses in northwest Yunnan, it was found that logging followed by monoculture forest plantations, cash crop plantations, and livestock grazing contributed significantly to past species losses, while at present, national policy changes and market-driven demand for forest products pose the largest threat to biodiversity (Xu and Wilkes, 2004).

The actual establishment of nature reserves on the ground materialized after the national conference on nature reserve in 1980. A total of 34 nature reserves were established in late 1981 in Yunnan. By the end of July 2001, Yunnan had established 120 nature reserves with a total of more than 2.5 million hectares and accounting for 6.5% of the provincial land area. Ten of these are national level nature reserves (1,208,783 ha, accounting for 47.4%), 45 are provincial reserves (1,117,879 ha, accounting for 43.9%), and 65 are local and prefecture reserves (222,525 ha, accounting for 8.7%). The Yunnan Nature Reserve Development Plan (1998-2010) aims to create a total of 179 nature reserves, with a total area of approximately 3.4 million hectares and accounting for 8% of the provincial land area.

Forest tenure reform in Yunnan began in March 1981, when the state issued its 'decision on some issues concerning forest protection and forestry development', otherwise known as the 'Forestry Three Fixes'. The objective of this reform was to shift forest management from the state to local communities and individuals. It provided for both private and collectively held plots to be leased to individual households. This was the first time in Yunnan's history that local communities received certificates of forestland ownership as well participation in decision-making. As a result of the implementation of this policy, 13.97 million hectares of land were transferred from state to local management. This includes 4.84 million hectares of individually held forest (mostly degraded), 6.33 million hectares of contracted (that is, leased) forestlands, 0.86 million hectares of fallow fields previously used for shifting cultivation, and 1.94 million hectares of rangelands [Yunnan Forest Department, 1984:270-71]. After two decades, forests cover a total of almost 12.9 million hectares (33%) of land, of which 3.35 million hectares (26%) are state forests and 9.52 million hectares (74%) are collective forests.

Given the poverty and resource dependence of local people in most areas with nature reserves, people often resist the establishment of reserves by further damaging the ecosystems in question. For example when collective forestlands of Yuhu village were incorporated into the Yulongxueshan Nature Reserve in Lijiang, northwest Yunnan, farmers responded by cutting down trees that they had previously managed on a sustainable basis. Work teams had to be stationed in the village to prevent further damage and carry out propaganda work (Harkness, 1998). Despite the defiance of Yuhu residents, there is more happening than simple resistance. Institutionally, setting up forest reserves in Yunnan has facilitated resource degradation by replacing relatively effective community management institutions (*xianggui minyue*) with extremely weak state ownership and management, creating a *de facto* open access area and inviting over-use. Lacking strong coercive powers, reserve managers depend largely on public education campaigns to discourage local people from illegal extractive activities. These efforts are undermined by the reserves' own income-generating activities, especially when fishing, logging, land and tourism development rights are contracted out to third parties.

IMPACTS OF THE PUBLIC PROTECTED AREA APPROACH IN YUNNAN

The establishment of protected areas has significantly restricted traditional access to forests and other natural resources. Some protected areas have even resulted in a complete loss of livelihoods for local people, often resulting in their resettlement or displacement (see Box 4).

Box 4 -- Nuozadu Provincial Nature Reserve

Nuozadu Nature Reserve was proposed in the early 1980s and formally established in 1996 with a total area of 21,679 hectares (100º22'18"E-100º33'36"E to 22º30'13" N-22º46'03"N, which is divided by the Mekong River into east and west sections. The east section was demarcated with 250 border posts. The aims of the reserve are to conserve tropical monsoon rainforest ecosystems, tree ferns, wild water buffalo (*Bos gaurus*), and elephants (*Elephas maximus*). The establishment of the nature reserve impacted 36 natural villages of 8 administrative villages with a population of 8981 (1828 households). Eight of the villages are located completely within the borders of the nature reserve, 11 villages are partially inside the nature reserve, and the other 17 villages traditionally accessed resources within the nature reserve. According to a field survey, local villagers had traditionally collected 782 tons of bamboo shoots, tapping 133.7 tons of pine turpentine, 7.1 tons of mushrooms, 8.6 tons of medicinal plants. A total area of 4,565 hectares of collectively owned land, including 3,308 hectares of collective forests and 822 hectares of farmland, to which the villagers were supposed to have full access, was included in the nature reserve. It is reported that collective forests compose two-thirds of the total protected area.

The managers of the nature reserve want to relocate the villagers out of the protected area but they do not have sufficient funds in the budget. With new dam construction along the Mekong River, the Resettlement Bureau funded their resettlement with 500 yuan (about 60USD) per capita, 303 yuan (37USD)/m^2 per house, 3000 yuan/mu (5490USD/ha) for farmland. However villagers complained that the compensation is insufficient for reestablishment of residence and livelihood in the new environment.

Source: FCCDP (1998).

Due to the large expansion of protected areas and limited financial resources, conservation authorities have often underestimated the cost and impacts on livelihoods that restricting access to nature reserves has on local people. Little data exists that estimates the repercussions on settlements that become the unwilling hosts of displaced populations. More demands are being made for fair compensation, not only for existing assets and the cost of resettlement, but for foregone rights and negative livelihood impacts. As well, uncertainty exists for those local people, who live inside a protected area, but for whom a resettlement decision has yet to be made. The government has neither finances nor locations to resettle them presently. Additionally, these people have limited access to rural development investments, such as road construction, telecommunications, and electricity. Rather they often depend on government grain relief programs.

Box 5 -- Displacement of Five Cillages in Gaoligongshan National Nature Reserve (North Section)

A total population of 6,337 resides in the natural villages (1,562 households) that are in and around the protected area in Lushui County of Nujiang Precture. Of this population, there are five natural villages, 52 households, and a population of 252 that live inside the nature reserve. Due to restrictions on land use, villagers had an annual income of less than 40USD/capita. About 60% of households had a food shortage for 2-3 months of the year. In order to resettle these households, the government invested 28,000USD (about 110USD/capita) and allocated 67.2 hectares of farmland (0.27ha/capita).

Source: FCCDP (2000).

Based on field interviews with local villagers in Nuozadu Nature Reserve, the following impacts of establishing reserves are the most critical on local livelihoods: a) prohibition of tree harvesting for cultivating mushrooms, previously a major source of income; b) restricted access to NTFPs in the buffer zones and no access in the core reserve areas; c) restricted grazing; d) no hunting; e) increasing wildlife damage to crops and livestock; f) poor investment in infrastructure, including roads and telecommunications; g) restrictions on traditional land use practices, like shifting cultivation; h) fewer job opportunities due to dwindling outside investment; i) land tenure conflicts; and j) poor resettlement scheme.

Many protected areas were planned based on 1:50,000 topographical maps, without adequate field surveying and the participation of local communities. The reserves still have not had their lands adjudicated or demarcated. In fact, many reserves were established after the forest allocation policy implemented in 1982, therefore large designated collective forestlands have been demarcated into protected areas without proper compensation.

In Xishuangbanna, planting cardamom (*A. villosum*) in the tropical forests at low elevation is a traditional practice. Approximately 220 hectares of cardamom are located inside the protected areas, and they contribute an income of US$420/household for 882 families in the Mengyang section of Xishuangbanna Reserve alone (Jiang and Ou,1998). A similar practice for planting cardamom (*A. kao-kou*) at high elevation can be found in Jinping Fenshuiling Reserve of Honghe Prefecture. In comparison, to restrict understory planting in Xishuangbanna, the reserve staff in Jinping charge 10RMB/mu (about US$19/ha) to local villagers as an ecological compensation fund for over 200 hectares of cardamom inside protected areas after 1997.

However, insufficient financial support and human resources for conservation, particularly at local and provincial levels, have left a de facto management vacuum. For instance, in 1996 during a field assessment as part of the Dutch-supported Forestry Conservation and Community Development Project, the author noted that the Nuozadu Nature Reserve, proposed in the early 1980s, had lost almost half its forest cover due to poor management, open access farming, and illegal extraction of timber and non-timber forest products.. As well, in numerous cases the rate at which high-quality panda habitat was being destroyed in Sichuan, southwest China was faster after the establishment of reserves (1974-1997) than before (1965-1974) (Liu et al. 2001).

COMMUNITY-DRIVEN CONSERVATION ALTERNATIVE

In Yunnan, good practices of community-driven conservation can be found across the province, operating at various scales. Indigenous initiatives for conservation and sustainable use of biodiversity are adapted to changing environment, populations, politics, markets, and climatic shifts, to further enhance their forest-based livelihoods and complex agroforestry landscape, and strengthen their cultural identity and innovative capabilities. These examples are proven for their advantage and effectiveness in conservation: a) sustainability of conservation due to the active participation of resident peoples; b) reducing the costs of conservation; c) link to their culture and local livelihoods; d) use of indigenous knowledge, practices and innovations; and e) strengthened local institutions and governance.

The links between cultures and biodiversity in Yunnan is an immediately striking reality. However a simple appreciation of community-driven practices and initiatives is not sufficient. There is call to enable the political environment. The Cultures and Biodiversity Congress 2000 was held July 20-30, 2000 in Yunnan, with active participation from research professionals, NGOs, activists, decision-makers, and indigenous representatives from all over the world. The outcome of this conference, the Yunnan Initiative, calls attention to the large uncertainties that local (and indigenous) cultures face as they strive to use, nurture, and sustain the diverse landscapes in which they live and on which they depend. Among the most powerful contemporary forces that influence both local cultures and biodiversity are various government policies and the expansion of regional, national and international markets. One of the working groups focused on nature reserves and local communities (Xu 2000).

COLLECTIVE FORESTS: A BATTLEFIELD

China's constitution and Forest Law distinguishes between state forests (*guoyoulin*) and collective forests (*jitilin*). As mentioned earlier, collective owned forestlands accounts for 58.4% of total forested lands in China. Yunnan has a total of 9.5 million hectares of collective forestlands, which accounts for 74% of the province's total forested land areas. The scale of collective forest size is critical for conserving biodiversity and providing environmental goods and services for local, national and even international populations.

However the issue of collective forests has been a battlefield for the State and communities for decades. After the founding of the People's Republic of China, the 'collectivisation' process was initiated between 1952 and 1956. Most farmlands and forestlands were collectivized. Decisions about land use and forest management were meant to be made collectively at the community level. However, communities were obligated to comply with directives and fulfill quotas allocated by higher level governments. It was not until the introduction of the Household Responsibility System in 1978 for farmland and two policies for forestry between 1981-83 (*liangshan daohu* and *linye sanding*) that some collective forestlands were allocated and leased to individual households as "freehold hill land" (*ziliushan*) and "contract hill land" (*zerenshan*). Since then most forestlands have been mapped and certificates issued for collective forestlands, including "freehold hill land" (*ziliushan*) and "contract hill land" (*zerenshan*). Further forestry reformshave decentralized the power of some aspects of forestry management to the village-level. However, this decentralization has so far failed to give local communities adequate control over forest resources for harvesting and marketing valuable timber resources. In response to instable policies and incomplete forest rights, villagers harvested trees from their contracted forestlands as soon as they had the chance, resulting in deforestation in some areas of Yunnan in the mid-1980s.

Generally, insufficient powers have been decentralized, village-level institutions are not sufficiently accountable to the public, and some of the reforms designed to protect forest resources have had a negative impact on rural livelihoods. For instance, the central government promulgated the Natural Forest Protection Program (NFPP) after tragic floods in Yangtze River in 1998. One component of the NFPP was a logging ban, which was also extended to collective forestlands (Xu and Ribot, 2004). Collective ownership in China is still a poorly defined concept. It is not clear who represents local communities and how decisions are made. Higher-level government still intervenes in community

decisions and forest resource management. For example, harvesting trees from collective forestland for house construction requires a quota permit from the township and final approval from the county forestry bureau. In 1993, the provincial government decided to lease both state and collective degraded forestlands –known as 'wastelands' –to private individuals or institutions for reforestation. Due to frequent government intervention and a lack of transparency in the granting of forestland leases, the policy granting degraded forestlands to private individuals and institutions was abandoned after more conflicts occurred. Introducing direct elections of village heads according to the Village Organic Law in China might be an opportunity to enhance accountability in local communities. Again, transferring power without accountable representation is dangerous and establishing accountable representation without power is empty. The potential of decentralization to be efficient depends on the creation of democratic local institutions with significant discretionary power (Ribot 2002).

LINKS BETWEEN CULTURAL AND BIOLOGICAL DIVERSITY

Rather than being ancient natural forests that need protection, China's forests belong not to nature alone, but to culture as well. The remaining natural ecosystems in China are in fact the result of many generations of human domestication, cultivation and manipulation in a historical spatial and temporal scale. The holistic culture in nature and nature in culture approach calls for pluralism in ecology and conservation, with a strong focus on indigenous knowledge and cosmovision in the course of promoting integrated biodiversity conservation and endogenous livelihood development. It challenges conservation practitioners to integrate technical solutions with the indigenous ways of perceiving reality and relationship between human and nature.

Community-driven conservation is a useful approach for conserving biological and cultural diversity, and therefore can play a critical role in the establishment and strengthening of local sustainable livelihoods. The development of an integrated, comprehensive management strategy is essential to ensure that ecological, socio-economic, and cultural objectives are compatible and sustainable. In the context of the multi-cultural environment of Yunnan, where traditional cultures have evolved in intimate association with nature and biodiversity, protected areas should be: a) sensitive and respectful of cultural values; b) respectful of local peoples' rights and needs related to lands, waters, and natural resources; c) inclusive of local strategies and systems for protecting biodiversity and natural resources; d) accountable to development objectives at the national, regional, and local levels; and e) part of a larger national and international strategy for the protection of cultural and biological diversity. Belief systems and cultural practices have provided conservation strategies for the management of local resources, such as sacred forests, waters, ritual places, and plant and animal species. Potentially these local practices could enhance and/or contribute to biodiversity conservation. As a consequence, traditional practices must be better understood and respected by all, and incorporated as much as possible into the design and management of protected areas. However, communities are not homogeneous units, and gender and age differences need to be considered when examining local practices.

SECURING ECOSYSTEM GOODS AND SERVICES LOCALLY

Besides securing access to traditional lands and resources by local people, protected areas are meant to provide a variety of goods and services to the society at large, such as watershed protection; biological (including genetic) resources; and opportunities for education, research, and recreation. Protected areas should be designed and managed in ways that ensure that local people are primary beneficiaries of related goods and services. This is especially critical when local communities are facing economic and/or social marginalization. In addition, appropriate compensation measures should be implemented whenever protected areas adversely impact local people's livelihoods. Tourism activities associated with protected areas can be an important source of revenue and a useful tool for the stimulation of local economies. Tourism in protected areas should primarily benefit local people living in or near these areas. However, the rapid infusion of money and different cultures into a community can disrupt traditional values creating a variety of conflicts within the community. Thus, tourism activities should be organized and managed in ways that are consistent with, and respectful of, both cultural and biological characteristics specific to a protected area. The inclusion of local people in the planning process for tourism development and in the implementation of tourism activities will yield long-term results that are more harmonious with the goals of protecting cultural and biological diversity.

INDIGENOUS MANAGEMENT PRACTICES

Protected area management plans and practices can significantly benefit from understanding traditional systems for biodiversity conservation. Site-specific ecological, socio-economic, and cultural factors need to be incorporated in the development of local protected area management and action plans that are consistent with the broader, regional conservation and development objectives. When developing and implementing management tools, such as zonation, land-use and species-use regulations, and biodiversity monitoring, indigenous knowledge should be incorporated in such a manner that traditional practices and customary land and resource management practices are strengthened in ways consistent with biodiversity conservation objectives.

SECURED ACCESS AND INSTITUTION

Secure access by local people to lands and resources for traditional uses can enhance and support sustainability and conservation as it strengthens their long-term, cultural attachment to such areas. In fact, there are examples where unclear land tenure rights have promoted poor management practices resulting in the loss of biodiversity. Therefore, the development and management of protected areas must include a consideration of livelihood security for local people by protecting their access to lands and resources in ways that are compatible with the specific conservation goals and objectives of the protected area involved. In protected areas established partially or totally on lands traditionally used by local communities, management responsibilities should be devolved to, or at least shared with, these communities and their institutions and organizations. Government agencies should be dynamic and flexible so as to adapt effectively to the variety of needs and considerations that may arise at specific sites. Policies and practices must be consistent among different branches and levels of government. In this context, customary institutions of local people should be strengthened through specific, culturally

context, customary institutions of local people should be strengthened through specific, culturally appropriate capacity-building measures. Local and area-specific planning and implementation bodies with governing power involving the local communities need to be established. The need for protected areas to become increasingly more self-sufficient is generally recognized. Even so, income-generating activities should not become the primary management objective since such a narrow focus may conflict with conservation strategies. However, variations among different protected areas should be expected, and appropriate mechanisms for fair and equitable sharing of benefits among protected area sites may need to be developed.

COMMUNITY-BASED EDUCATION

The expansion of market economies and the commercialization of culture is having an impact on many cultural traditions within local communities. A significant consequence of this changing context is the loss of inter-generational transfer of traditional knowledge related to conservation beliefs and practices. This situation will likely cause internal conflicts within communities that they have not experienced historically. More and more, the younger generation is being educated in formal schools and engaging in seasonal off-farm jobs in the cities. The competing interests, social values, knowledge systems and access to natural resources have increased conflicts in resource management, which further threaten biodiversity. There is a need for resources to support technical training of communities in biodiversity tools of science and a redefinition of scientific investigation as a "civic science" or community based science (Bäckstrand, 2004). There is also a need to have alternative approaches for Participatory Technology Development (PTD) to bridge the gap between scientific knowledge and local knowledge systems (Salas, Xu and Tillmann 2003). The process is a long-term interaction between outsiders and local people, with the aim of generating innovations based on indigenous knowledge and cultures to develop sustainable livelihood systems. It involves and links the power and capacities of resource management with the interests and knowledge of local communities.

Successful management strategies for protected areas will depend on ensuring the inter-generational transfer of traditional ecological knowledge; better understanding and integration of women into conservation planning; and, when it occurs, the management of conflict within communities. Traditional lands and resources have been fundamental sources of knowledge and cultural development for local people. Protected areas should support local, traditional educational systems by providing them with opportunities and tools for communicating nature-related cultural values to younger generations. They also should promote an appropriate understanding of, and respect for, local people's cultural values among visitors and the larger public. Providing sufficient and accurate information to visitors and the public about the biological and cultural values of the protected areas must become a management priority for such lands. Local staff should be trained to effectively interact with visitors about these important issues.

CONSERVATION CONCESSION

A conservation concession is a contractual partnership between the government and a non-government actor – an institution, a NGO, a community, even a private corporation whereby the non-government actor manages state-owned lands for purposes of ecosystem services and biodiversity conservation. This emerging approach is being increasingly adopted in North America, Central America, South America, New Zealand and Indonesia. The state can hand over small protected areas that have both local ecological and cultural services to local communities as a pilot phase. Meanwhile management plan and monitoring indicators for those conservation concession areas should be developed. Third parties, like local NGOs, can provide facilitation and monitoring for such concessions. Following success of the pilot phase, the initiative should be furthered developed into a Chinese conservation concession law.

CONCLUSION

After decades of conservation efforts focused on establishing public protected areas and nature reserves based on the biodiversity 'hotspots' approach, there are sufficient examples to evaluate the effectiveness of this approach at local, national and international levels. This approach might gain public attention but fail to meet the conservation objectives in practice. Local communities have received little financial and technical support for conservation. The uncertainty of collective forest ownership and access has put local livelihoods at risk. The dichotomy of nature and culture has eroded not only the indigenous knowledge for sustainable use and management of biodiversity, but also biological diversity itself, such as agrobioidversity and its functional role in ecosystems. The community-driven conservation model, in which small farmers and local communities manage for wild biodiversity, agrobiodiversity, habitats, and ecosystem function, seeks conservation pluralism and focuses on indigenous knowledge, practices, and innovations while promoting integrated biodiversity conservation and endogenous livelihood development. The objective of indigenous people is to "optimize the use" of these forests and natural resources and to "maintain the functional role" of nature and ecosystems for multiple values and uses and various scales, including the conservation of habitat and endangered species. Local conservation practices are part of a system of management that is part and parcel of a complex worldview of local people that integrates landscape into local cosmology, providing the foundations of an ethics of management and use for the local populations. The importance of integrating local views into higher scale decisions is multiple. The key is for policy makers to design policies that enable local people to optimize their use of resources at the same time that it allows higher scale understanding to inform policy making. It also creates the space for local people to engage in forestry and therefore work with, rather than against, the objectives of those operating and making policy at higher levels. China, as one of the world's most populated and ancient countries, has a long tradition for managing forestlands and conserving biodiversity. China's forests belong not to nature alone, but to culture as well. The remaining natural ecosystems in China are in fact the result of hundreds of years of interaction between people and nature in a historical spatial and temporal scale.

How is local knowledge of forestry, resource use, and management practices to be integrated into decision making? What channels of representation can guarantee or at least help local views to influence the design of forest management policy? First, forestry should be regarded as a social rather than technical issue, involving interdisciplinary research and intersectoral collaboration as political participation of local communities in decision-making. Second, scientists should serve as brokers for interpreting indigenous knowledge, communicating with local people, and providing credible, salient, and legitimate knowledge for decision-makers. Third, local people should have real representation through local elected officials at the administrative village level. Fourth, it is essential to develop a legal framework for collective and even private ownership of protected areas. The challenge for the State Forestry Administration is to design a system that enables local knowledge and local aspirations to be represented in decision-making and change the role of forestry agencies from daily mangers to monitors.

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REFERENCES

Bäckstrand, K. 2004. Civic Science for Sustainability: Reframing the Role of Scientific Experts, Policy-makers and Citizens in Environmental Governance. In: Frank Biermann, Sabine Campe, Klaus Jacob, eds. 2004. Proceedings of the 2002 Berlin Conference on the Human Dimensions of Global Environmental Change "Knowledge for the Sustainability Transition. The Challenge for Social Science", Global Governance Project: Amsterdam, Berlin, Potsdam and Oldenburg. pp. 165-174.

Cincotta, R.P., J. Wisnewski & R. Engelman. 2000. Human population in the biodiversity hotspots. Nature 404:990 – 992

Coward, W.C.E. Jr. (2000). *Culture, Biodiversity & Assets: Some basic ideas. In*: Xu Jianchu (ed), *Links between Cultures and Biodiversity: Proceedings of the Cultures and Biodiversity Congress 2000, 20-30 July, Yunnan, China.* Yunnan Sciences and Technology Press, pp:6-13

Coward, W.C.E. Jr. 2002. Tai Polities and the Uplands. Unpublished MS.

Nigel S. Cooper, 2000. How natural is a nature reserve? an ideological study of British nature conservation landscapes. Biodiversity and Conservation, 9 (8): 1131-1152

Edmonds, R.L. (1994). Patterns of China's Lost Harmony: a survey of the country's environmental degradation and protection. Routledge, London and New York.

FCCDP project: Rapid Rural Appraisal Report: Nuozadu Nature Reserve and its surrounding communities. 1998. FCCDP, 2000. Integrated Management Plan: Gaoligongshan National Nature Reserve (North Section).

Guo H.J. and C. Padoch, 1995. Patterns and management of agroforestry systems in Yunnan: An approach to upland rural development. Global Environmental Change, 5(4): 273-279

Guo, J. 2000. A Mountain of Nature, also a Mountain of Divinity: Indigenous Knowledge about the Space of Mt. Khabrdjarpo. *In:* Xu Jianchu (ed), *Links between Cultures and Biodiversity: Proceedings of the Cultures and Biodiversity Congress 2000, 20-30 July, Yunnan, China.* Yunnan Sciences and Technology Press, pp:230-239.Harkness, J. 1998. Recent Trends in Forestry and Conservation of Biodiversity in China. China Quarterly: 156: 911-34.

Jiang, H.Q. and Ou X.K. (eds). 1998. Biodiversity conservation and sustainable development in the biosphere reserves. Kunming: Yunnan University Press.

Liu, A.Z, Pei, S.G. & Chen, S.Y. 2000. An investigation and study on the plant worship in Chuxiong, Yunnan. *Chinese Biodiversity* 8: 130-136 (in Chinese with English Abstract).

Liu, H.M., Xu, Z.F., Xu, Y.K. & Wang, J.X. 2002. Practice of conserving plant diversity through traditional beliefs: a case study in Xishuangbanna, southwest China. *Biodiversity and Conservation*, Vol. 11(4):705-713

Liu, J., M. Linderman, Z. Ouyang, L. An, J. Yang, and H. Zhang. 2001. Ecological degradation in protected areas: The case of Wolong Nature Reserve for giant pandas. Science 292:98-101.

Ma, E.Z. 2003. The Concept of Biodiversity and Environmental Protection Reflected in the Le E Ye Ti: a literature of Liangshan Yi Minority Nationality. *In:* Xu Jianchu and Stephen Mikesell (ed), *Landscapes of Diversity: Proceedings of the III Symposium on MMSEA, 25-28 August 2002, Lijiang, China.* Yunnan Sciences and Technology Press, pp: 437-440.

Menzies, N.K. 1988. Three Hundred Years of Taungya: A sustainable system of forestry in south China. Human Ecology, 16(4):361-454.

Menzies, N.K. 1992a. Sources of Demand and Cycles of Logging in Pre-modern China. In "Changing Paficific Forests: Historical perspectives on the Pacific basin forest economy", J. Dargaval & R.P. Tucker (eds). The Forest History Society, USA.

Moseley, R.K., 2004. Ninety Years of Landscape Change in the Tibetan Region of Yunnan, China, Geographical Journal (In Press).

Nicholas K. Menzies. 1992b: "Strategic Space: Exclusion and Inclusion in Wildland Policies in Late Imperial China". Modern Asian Studies 26 (4), 719 – 733

Pei, S.J. 1985. Some Effects of the Dai People's Cultural Beliefs and Practices on the Plant Environment of Xishuangbanna, Yunnan Province, Southwest China. *In:* K. L. Hutterer, A. T. Rambo, and G. Lovelace (eds.). *Cultural Values and Human Ecology in Southeast Asia*. . Paper No. 27: 321-339. Ann Arbor: University of Michigan.

Pei, S. J., and Sajise, P. E. Eds. 1994. "Regional study on biodiversity concepts, frameworks & methods," Proceedings of the Southeast Asian Universities Agroecosystem Network (SUAN) and Program on Environment (ENV), East-West Center Workshop, Xishuangbanna, Yunnan Province, P.R. China, October 24-30, 1993, Yunnan Science and Technology Press.

Pei, S.J. & Luo, P. 2000. Traditional Culture and Biodiversity Conservation in Yunnan. *In*: Xu Jianchu (ed), *Links between Cultures and Biodiversity: Proceedings of the Cultures and Biodiversity Congress 2000, 20-30 July, Yunnan, China.* Yunnan Sciences and Technology Press, pp: 143-153.

Pretty, Jules N. 2002. Agri-Culture; reconnecting people, land and nature. London: Earthscan Publications.

Ribot, J., 2002. Democratic Decentralization of Natural Resources: Institutionalizing popular participation. World Resource Institute.

Sturgeon, J.C. 2004. Post-socialist property rights for Akha in China: What is at stake? Conservation & Society, vol 2(1): 137-161

Wang, Z.J and S. S. Young. 2003. Differences in bird diversity between two swidden agricultural sites in mountainous terrain, Xishuangbanna, Yunnan, China. Biological Conservation, 110(2): 231-243

Xu Jianchu, Chen Sanyang, Pei Shengji, 1997, Swidden Agriculture in the Context of Political Economy in Pei S.J., Xu J.C. et al (eds), 1997, Collected Research Papers on Biodiversity in Swidden Agroecosystems in Xishuangbanna, Yunnan Education Publishing House (in Chinese). Pp. 155-164.

Xu Jianchu, Jefferson Fox, Lu Xing, Nancy Podger, Stephen Leisz & Ai Xihui. 1999. Effects of Swidden Cultivation, Population Growth, and State Policies on Land Cover in Yunnan, China. Mountain Research and Development 19(2): 123-132.

Xu Jianchu (ed), *Links between Cultures and Biodiversity: Proceedings of the Cultures and Biodiversity Congress 2000, 20-30 July, Yunnan, China.* Yunnan Sciences and Technology Press.

Xu Jianchu and Andreas Wilkes, 2003, Biodiversity Impact Analysis in Northwest Yunnan, China, Biodiversity and Conservation, Vol. 13(5), 2004, pp. 959-983.

Xu Jianchu and Jesse Ribot, 2004, Decentralization and Accountability in Forest Management: Case From Yunnan, Southwest China, The European Journal of Development Research, Vol14(1):153-173, 2004

Yeh, E.T., 2000. Forest Claims, Conflicts, and Commodification: The Political Ecology of Tibetan Mushroom-Harvesting Villages in Yunnan Province, China. The China Quarterly, 161:212-226.

Yin, S.T., 2001. People and Forests: Yunnan swidden agriculture in human-ecological perspective. Yunnan Education Publishing House, Kunming.

Yu, P.H., Xu Z.F., & Huang Y.L., Survey on traditional cultivated plants in Xishuangbanna, Acta Botanica Yunnanica, 7(2):169-186.

Table 3: Establishment of Nature Reserves in China

Year	No. of nature reserves	Protected area (1,000 ha)	Average size of reserve (1,000 ha)	Percent of total area
1956	1	1	1	
1965	19	649	34.2	0.07
1978	34	1265	37.2	0.13
1982	119	4082	34.3	0.40
1985	333	19,330	58.0	2.10
1987	481	23,700	49.3	2.47
1989	573	27,063	47.2	2.82
1990	606	40,000	66.0	4.00
1991	708	56,067	79.2	5.54
1993	763	66,184	86.7	6.80
1995	799	71,850	89.9	7.20
1997	926	76,979	83.1	7.64
1999	1146	88,152	76.9	8.8
2000	1227	98,208	80.0	9.85
2001	1551	129,830	83.7	12.9