
Rethinking the Effectiveness of Public Protected Areas in Southwestern China

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Abstract: *It is internationally recognized that conservation policies should respect indigenous cultures and consider the livelihoods of people affected by conservation restrictions. Countering this are concerns that human occupation and use of natural reserves is incompatible with conservation aims. But in China today the continued use and management of natural areas by local communities is likely to deliver better conservation outcomes than the current drive to establish public protected areas. The effectiveness of many protected areas in China is compromised by institutional conflicts, lack of ongoing financial and technical support, confusion between the objectives of generating revenue and conservation, dubious scientific definitions, lack of community trust in policies, and obscure user rights and land tenures. Southwestern China—one of the most biologically and ethnologically diverse areas on Earth—is a good illustration of a place where culture and biological diversity are closely linked. The indigenous people in this area have shown that local livelihood practices can be advantageous for the long-term maintenance of conservation goals. Rather than creating new protected areas, we argue that China is better advised to support ongoing sustainable use of natural areas by the people who have lived and nurtured these environments for generations.*

Keywords: biodiversity, community conservation, ecosystem services, forest management, indigenous knowledge

Repensando la Efectividad de Áreas Protegidas Públicas en el Suroeste de China

Resumen: *Se reconoce internacionalmente que las políticas de conservación deben respetar las culturas indígenas y considerar la forma de vida de gente afectada por restricciones de la conservación. En contraste con esto, hay opiniones de que la ocupación y uso de reservas naturales por humanos es incompatible con los objetivos de conservación. Pero es probable que el uso continuo y gestión de áreas naturales por comunidades locales en China tenga mejores resultados de conservación que la corriente actual para establecer áreas protegidas públicas. La efectividad de muchas áreas protegidas en China está comprometida por conflictos institucionales, falta de continuidad en el financiamiento y apoyo técnico, confusión entre los objetivos de conservación y de generación de ganancias, definiciones científicas dudosas, falta de confianza en las políticas por parte de las comunidades y derechos de usuarios y de tenencia de tierra poco claros. El suroeste de China—una de las áreas de la Tierra más diversas biológica y etnológicamente—es una buena ilustración de un lugar donde la diversidad cultural está estrechamente relacionada con la diversidad biológica. Los habitantes nativos de esta área han mostrado que las prácticas cotidianas locales pueden ser ventajosas para el mantenimiento a largo plazo de las metas de conservación. En lugar de crear nuevas áreas protegidas, argumentamos que es mejor que China apoye el uso sustentable de áreas naturales por gente que ha vivido y se ha nutrido de estos ambientes por generaciones.*

Palabras Clave: biodiversidad, conocimiento indígena, conservación comunitaria, gestión de bosques, servicios ambientales

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Introduction

Modern China has been influenced by foreign conservation concepts and has followed the public protected-area approach. Proposed protected areas are assessed on scientific criteria of ecological and national significance (Jim & Xu 2004). Although some multiple uses are allowed in fringe areas, these protected areas are primarily supposed to be zones with little or no human activity (Li & Han 2001; PATF 2004). In recent years the number of protected areas in China has risen dramatically.

In addition to increasing protected areas, China has initiated enormous environmental rehabilitation programs. These include large revegetation projects to combat desertification in the western and northwestern regions and schemes to sedentarize nomadic herders in Tibet, Qinghai, and southwestern China (Miao & West 2004; Liu & Diamond 2005). In response to downstream flooding in 1998, China also introduced large-scale regulatory measures to protect watersheds (namely, the National Forest Protection Program [NFPP], which incorporates logging bans and reforestation projects, and the Sloping Land Conversion Program [SLCP] that aims to replace farms with forest on mountain slopes). The scale of these schemes is astounding. The SLCP is budgeted at over US\$40 billion, affects more than 15 million farmers across 25 provinces, and plans to convert 14.67 million ha of cropland to forests by 2010 (Xu et al. 2004).

Although this rising conservation trend is welcome, there has been debate as to its effectiveness and concern that China may be establishing "paper parks" rather than achieving sustainable conservation outcomes (Harkness 1998; Liu et al. 2003; PATF 2004). Similarly, the NFPP and SCLP have been criticized for their monolithic approach, particularly in light of the diversity of landscapes and ecosystems affected (Xu et al. 2004). One reason for these concerns is that environmental programs may be politicized and ignore the concerns of local people, who are often deleteriously affected. Many of the conservation zones are in remote or wilderness areas, which means conservation activities often impinge on the traditional lands of poor rural communities. In China in 1997 there were an estimated 30 million poor people living in and around China's nature reserves (Harkness 1998). Given the recent expansion of protected areas, this number is now likely to be considerably higher. Moreover, despite being directly affected, local people are generally excluded from conservation and resource management decision making. The designation of an area for protection can even exacerbate habitat destruction by disenfranchised local people (Su 2002).

Chinese authorities are making seminal moves to give local people greater representation in land-use decision making. The introduction of the Village Organic Law in 1998 enables the local election of village councils. Although local people may have some legal access rights,

they usually lack ways to benefit from these rights (Xu & Ribot 2004). These issues are compounded by a continuing lack of clarity over forest definitions and land tenures and the overriding priority given to national environmental projects over local land uses. It is into this confused and evolving system, laden with hangovers from recent history, that conservation planning advocates and researchers must operate in China.

In other parts of the world there are compelling arguments that the presence of human communities within sensitive areas is incompatible with viable long-term conservation (e.g., Redford & Sanderson 2000; Terborgh 2000, 2005). In southwestern China, however, we argue that many landscapes have been maintained and/or shaped by generations of human activity. The current emphasis on protected areas in China highlights the contradictions between official (often static and simplified) and vernacular (dynamic, fluid, and diverse) identifications of biodiversity, land use, and relations between humans and nature (Sturgeon 2004; Xu 2006). We contend that in many cases in China the displacement of people is not only unethical, but it does little to meet conservation aims.

Overview of Conservation in China

Environmental protection in China dates back at least to the Qin Dynasty (221–207 BCE) when mountain areas were preserved as imperial hunting reserves and temple grounds were protected (Edmonds 1994). The modern concept of public protected areas was introduced relatively recently. In 1956 the State Forestry Department implemented The Roles of the Natural Forest Logging Ban Area (Nature Reserve), and, consequently, the Dinghu Shan Nature Reserve was established in Guangdong Province—the first official protected area in China (Jim & Xu 2004).

These new conservation policies were short lived. Political ideology took a drastic shift with the Great Leap Forward in 1958, and further political chaos ensued during the Cultural Revolution (1965–1975). Rather than implementation of conservation, this period saw extensive environmental degradation resulting from the creation of enormous—often ill-conceived—water control and industrial and agricultural projects. Moreover, the concurrent persecution of intellectuals, suppression of traditional ethnic cultures and religious institutions, and breakdown in social order took a heavy toll on modern Chinese society, on the environment, and on human-ecosystem relationships (Shapiro 2001; Xu 2006).

Over recent decades China has increasingly acknowledged the importance of protected areas for scientific investigation and ecological services. Consequently, the number of new nature reserves has increased dramatically

Table 1. Establishment of nature reserves in China (SEPA 2005).

| <i>Year</i> | <i>No. of nature reserves</i> | <i>Protected area (1000 ha)</i> | <i>Average size of reserve (1000 ha)</i> | <i>Percentage of total area of China</i> |
|-------------|-------------------------------|---------------------------------|--|--|
| 1956 | 1 | 1 | 1 | |
| 1965 | 19 | 649 | 34.2 | 0.07 |
| 1978 | 34 | 1,265 | 37.2 | 0.13 |
| 1982 | 119 | 4,082 | 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 | 8.80 |
| 2000 | 1227 | 98,208 | 80.0 | 9.85 |
| 2001 | 1551 | 129,830 | 83.7 | 12.90 |
| 2002 | 1757 | 132,945 | 75.7 | 13.20 |
| 2003 | 1999 | 143,980 | 72.0 | 14.40 |
| 2004 | 2194 | 148,226 | 67.6 | 14.80 |

since the 1980s. By 2005 China had established 2194 nature reserves with a total area of 148,226,000 ha, accounting for 14.8% of China's territory (Table 1) and exceeding the world average of 10%. This trend appears set to continue. In December 2001 the State Forestry Administration (SFA) implemented the Wildlife Conservation and Nature Reserve Construction Project, which aims to establish 2500 nature reserves covering 172.8 million ha (18% of China's land area) by 2050.

A new conservation approach in China is also being introduced through ecological function conservation areas. These management zones often overlie existing reserves and cover large areas that include settlements and a wide range of human activities. The aim is to provide coherent guidance to land use across certain critical ecological zones (PATF 2004); however, land users are still constrained by protected areas.

Regulating and Defining Protected Areas in China

Over the last 50 years, the regulation and demarcation of protected areas in China has changed. Prior to 1979 protected areas were designated centrally with minimum participation from lower-level governments in a straightforward process that aimed to reduce logging and hunting in high-value natural areas. This was followed by a period of deregulation and decentralization from 1979 to 1991 in which there was little relevant legislation and poor management (Jim & Xu 2004). Nevertheless, in 1991 the central government enacted statutory procedures to encourage establishment of protected areas at county, provincial, and national levels. Theoretically, administrative status is tied to the degree of disturbance and ecological value (i.e., a site with high disturbance and no flagship species

would be designated at county level, whereas a relatively undisturbed site of national importance would be designated at the national level) (Jim & Xu 2004). Moreover, a protected area may be upgraded if the site is nominated by the relevant tier of government.

The majority of Chinese protected areas (circa 2200) are nature reserves that are managed in accordance with the Regulations on Nature Reserves. Nevertheless, protected areas also include approximately 500 scenic interest areas (often referred to as national parks), which are managed by the Ministry of Construction, and over 1400 forest parks, which are the responsibility of the SFA. In principle the State Environmental Protection Administration (SEPA) is responsible for the overall integrated management of conservation zones. Nevertheless, each ministerial sector such as forestry, agriculture, land and resources, water resources, oceans, and construction are responsible for protected areas within their territories. Moreover, there is no comprehensive law that applies to all types of protected areas, and although protected areas are supposed to comply with the World Conservation Union (IUCN) categories I–IV, there is great variation in the actual on-the-ground protection (Li & Han 2001; PATF 2004).

In China 10 different ministries or administrations now manage protected areas (Fig. 1), and during the turbulence of recent times the roles and responsibilities of government departments have been constantly redefined. In the last decade, forestry—a crucial element of conservation in China—has undergone a transformation from resource acquisition to environmental protection, overlapping with newly developing environmental protection and reserve management agencies (Harkness 1998; Li & Han 2001; Liu et al. 2003). Chinese government departments struggle with a sense of identity and responsibility

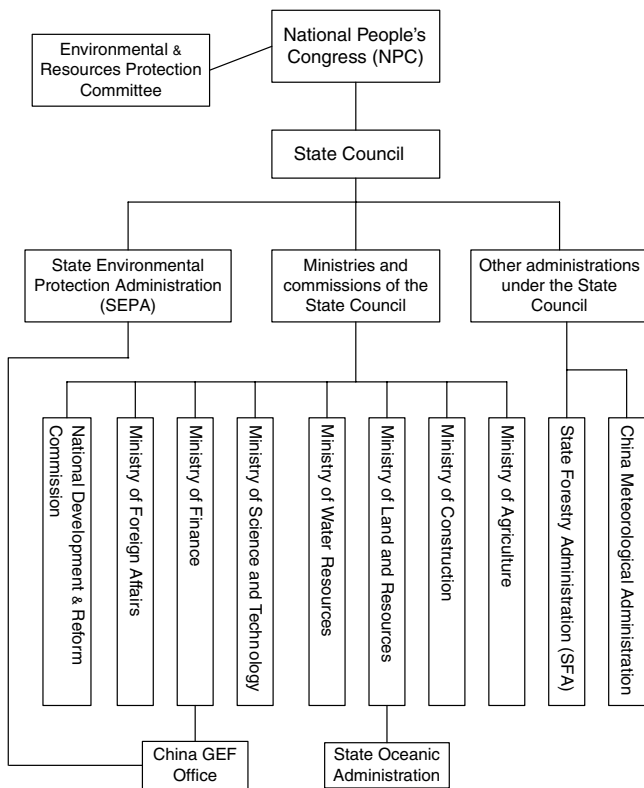


Figure 1. China's environmental administration system.

for mandatory and discretionary powers, often leading to conflicting values between protected-area decision makers (Ervin 2003). This situation has been further complicated by the recent creation of elected village councils, whose role in land-use management remains unclear (Xu & Ribot 2004). Moreover, existing regulations allow for the degazettement or downgrading of nature reserves. Partly because of this, more powerful agencies can override or negatively affect protected areas with impunity (PATF 2004). Overarching this complex administrative situation is the long-standing Chinese desire to develop and control peripheral territories. In many cases the importance of protected areas ranks well below the need to control national interests such as military sites, fuel pipelines, power grids, and transport networks.

The Chinese government has often been more concerned with the numbers and total area of reserves rather than their effectiveness. Reserves are demarcated according to hierarchical rules, often without much consideration of their long-term viability (Liu et al. 2003). Important criteria for the establishment of nature reserves include high biodiversity, species richness, unique ecosystems, and high endemism. New protected areas are proposed by researchers or government agencies, but local people are rarely included in assessment, planning, demarcation, or management decisions. 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 (Harkness 1998), and many reserves are too small to sustain ecosystem functions (Liu et al. 2003).

Moreover, current protected-area regulations provide strict definitions that are unrealistic in China, so in reality almost no protected areas conform to them. For example, nature reserves may have three separate management zones: a core area, where no human use is permitted; a buffer zone, where some collection, measurements, management, and scientific research are permitted; and an experimental zone, where scientific experimentation, public education, surveying, tourism, and raising of rare and endangered species are permitted. Nevertheless, a recent report (PATF 2004) notes that mapped zones are rarely marked in the field and often completely ignored in practice. This report also says that there is hardly a protected area in China in which the experimental zone does not contain human settlements, farming, and/or widespread unsustainable harvesting of resources.

Conservation Funding

Protected areas are funded by a variety of mechanisms. National reserves receive funding from ministries for infrastructure construction, but provincial reserves only receive infrequent allocations for specific projects. For all protected areas the salaries and operational costs are generally paid by provincial or county budgets. Hence, protected-area designations can be susceptible to fiscal and political agendas (i.e., upgrading areas to national level to boost infrastructure funding) (Jim & Xu 2004). Herein also lies a contradiction: although the central government is setting target quotas for the numbers of protected areas, the bulk of protected area funding comes from provincial and county sources. Unfortunately, it is often the economically poor provinces and counties that contain the best natural areas for biodiversity (PATF 2004).

Insufficient government funding for the operation of protected areas can result in increased revenue-raising activities within reserves, including tourism development and the use of natural resources (Harkness 1998; PATF 2004). Exploitation of protected areas by tourism operators, often with state concessions, is a common phenomenon, but local people generally receive few benefits (Li & Han 2001; Hillman 2003). The problem is exacerbated by the fact that government officials often have interests in companies that hold tourism concessions and/or damage the environment, so it is difficult for authorities to enforce conservation policies (Liu & Diamond 2005). In addition, increases in wildlife populations have led to more conflicts between animals and local people (e.g., black bears [*Selenarctos thibetanus*

G. Cuvier] and wolves [*Canis lupus* L.] in the southwest, tigers [*Panthera tigris altaica* Temminck] in the northeast, and Tibetan antelope [*Pantholops hodgsonii* Abel] in the west). Although regulations include compensation to local people for wildlife damage, there is insufficient funding.

Obscure Rights and Definitions

Another major problem plaguing conservation policy in China is the uncertainty over forest ownership and usufruct. Legally, there are two types of forest ownership in China: state-owned and collectively owned. The meaning of the term *collective forest* is complex and unclear. Collective forests imply ownership and the government has devolved land titles back to traditional owners or villages, but in many cases the usufruct and transfer rights of collective forests are still effectively government controlled. (For a detailed discussion of this issue see Miao and West [2004]). There are 89.7 million ha of collective forest, accounting for 58.4% of the total, but no nature reserves are under collective ownership.

Moreover, the definition of *forest* is murky. Strictly speaking, forest in China is now defined as land having $\geq 20\%$ tree canopy cover (Miao & West 2004), but the term *forest land* includes any land that may be deemed forest, as opposed to other categories, such as wetland, farmland, urban, and so forth. According to the Fifth National Forest Resource Inventory (1994–1998), there are over 263.3 million ha of designated forest land, of which 158.9 million ha (16.6% of China) are actually forested.

Impacts of Public Protected Areas on Local People

For many communities the establishment of protected areas has restricted traditional access to natural resources and has even resulted in the resettlement or displacement of people. Adding to these people's grievances is the fact that many reserves were established that incorporated land that had been allocated to households under the Contract Responsibility System in the early 1980s (Miao & West 2004). Indeed, governments have often underestimated the costs and impacts that nature reserves have on local populations. Local people are now demanding fair compensation for existing assets, the cost of resettlement, foregone rights, negative livelihood impacts, and even redemarcation of boundary. There are cases in which people are being charged for the right to continue traditional practices after the establishment of reserves (e.g., the cultivation of cardamom) (Jiang & Ou 1998). Uncertainty also exists for those who live inside protected areas and are awaiting a resettlement decision that will be predicated on available government finance.

Insufficient financial support for conservation, particularly at county and provincial levels, can create circumstances where protected areas actually degrade ecosystems because local people, fearing impending loss of access, will abandon sustainable traditional practices. For instance, by 1996 the Nuozadu Nature Reserve in southern Yunnan (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 (NTFP) (FCCDP 1998). Similar examples of counterproductive conservation outcomes exist in Sichuan, where high-quality panda (*Ailuropoda melanoleuca* David) habitats were destroyed at a faster rate after the establishment of reserves than before (Liu et al. 2001), and in northern Yunnan, where villagers rushed to exploit or destroy resources before access was denied (Harkness 1998; Su 2002). Indeed, the biggest immediate threat to biodiversity conservation and protected areas in China is now considered to be illegal agriculture, hunting, and collection of NTFP and wood (Ervin 2003; Xu & Wilkes 2004). These threats are increased by improving road access and inadequate policing of environmental protection. These problems highlight the need to encourage responsible stewardship by existing communities.

Linking Cultural and Biological Diversity in Southwestern China

The value of biodiversity can be different for different actors. Some may consider that biodiversity managed for local human benefits is less valuable than "wilderness" (Oelschlaeger 1991; Callicott & Nelson 1998). Nevertheless, it is frequently overlooked that these so-called wild ecosystems are often the outcome of long periods of human intervention and management (Redford & Padoch 1992; Toledo 2000). China, as the most populated country in the world, has a long tradition of human intervention in wild and frontier forest regions (Menziez 1992; Elvin 1998).

Rather than broader scientific concerns, local valuation of biodiversity is more focused on functional purposes, such as plants for food and medicines, trees and forests for cultural services (e.g., sacred groves and forests), and habitats for ecological services (Table 2). Ecosystem services include provisioning services, such as food, water, timber, and fiber; regulating services, such as the regulation of climate, floods, disease, wastes and water quality; cultural services, such as recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling (MA 2005).

Moves to protect biodiversity from humans highlight one of the central dilemmas facing conservation planners in China (and in other nations): people may be part of the ecosystems that land-use managers are trying to conserve.

Table 2. Conservation perspectives of the Chinese government versus the community.

| <i>Conservation issue</i> | <i>State perception</i> | <i>Community perception</i> |
|-------------------------------|---|--|
| Nature | wilderness | people as part of nature |
| Biodiversity | all living organisms at genetic, species, and ecosystem level | mountains, water, plants, animals have spiritual and material life; life is reincarnated (e.g., Tibetan cultural belief) |
| Places and space | natural habitat, human-affected areas, biodiversity hotspots | people and habitat interrelated, culture in nature and nature in culture, all biodiversity and habitats equally important |
| Causes of biodiversity loss | overpopulation, bad land-use practices (e.g., shifting cultivation) | livelihood needs, unstable policies, extraction by outsiders |
| Perception of local people | threat, subjects of study | part of ecosystem, strive to use and nurture biodiversity and landscapes |
| Human impacts on biodiversity | always negative | essential for creation of habitats for other species (crops, useful plants, animals), regulated management in time and space, mitigation measures (e.g., sanctions), people nurture nature, and nature nurtures people |
| Scale of conservation | the bigger, the better | functional and adapted to cultural landscape, supportive of ecosystem services, often small or complex |
| Conservation solutions | exclusionary protected areas, resettled local villagers, ex situ conservation | sustainable use, social fencing, communication between humans and nature through religious rituals |
| Value of biodiversity | wild biodiversity of high value | ecological and cultural services, production, and livelihoods of equal importance to wild biodiversity |

For example, the definition of a protected area adopted by the World Conservation Union (IUCN 1994) and currently in use in most countries is an area “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).

Not only are there ethical and legal prerogatives to preserve traditional cultures, but there are also further pragmatic reasons for China to look toward cultural conservation. Cultural diversity often goes hand in hand with the long-term preservation of biodiversity. The biodiversity of shifting agricultural systems can be higher than that of many reserves (Harkness 1998). Similarly, burning restrictions are degrading rangelands and increasing weed species in southwestern China (Winkler 2003; Willson 2006). Moreover, the concurrent restrictions on burning and promotion of afforestation may be counterproductive because the loss of grazing lands places more grazing pressure on young forest plantations. So, rather than prescription, perhaps governments would be better advised to develop consultative fire management and monitoring with local people. Current policies give farmers little incentive to cooperate with the state.

Community Management of Resources in Yunnan

The links between cultural and biological diversity are well illustrated in Yunnan, a culturally and biologically diverse province that is now exposed to the competing

pressures of rapid development and conservation management. As of 2005 Yunnan had established 198 nature reserves, which totaled more than 3.55 million ha (i.e., 9% of the province). Despite all these conservation efforts, however, the state has never had effective management control over forests, land, and water in the peripheral areas of Yunnan. Rather, indigenous people administered these lands and resources through traditional methods.

Yunnan is home to diverse indigenous cultures; it contains 25 officially recognized ethnic minority groups comprising more than 14 million people. Indigenous people have practiced complex land-use systems, such as agropastoralism among Tibetans, shifting cultivation among the Lisu and Jinuo, terraced paddy cultivation by the Hani, hunting and gathering among the Kucong (Lahu) and Dulong, and intensive lowland paddy cultivation among Dai and Bai people. Human use has clearly modified these environments, and use of wild species can even affect ecosystems (e.g., intensive collection of snow lotus [*Saussurea laniceps* Hand.-Mazz.] in northern Yunnan is dwarfing the wild population [Law & Salick 2005]). But, generally the traditional agricultural practices in Yunnan have nurtured the diverse landscapes, maintained biodiversity, and enhanced agrobiodiversity (Xu et al. 2005).

Mosaic Landscapes

Many of the customary institutions that operated in the past are still functioning in Yunnan today. In the north-west long-term protection of the sacred Mount Kawa

Karpo area by Tibetan Buddhists has preserved a region that is ecologically and ethnobotanically unique (Anderson et al. 2005). The shifting cultivation methods of the Hani also enhance diversity through a mosaic of forest types (Xu et al. 1999).

Indeed, shifting agriculture has been well documented since the Song Dynasty (CE 960–1279) (Yin 2001); it was once widespread across tropical and subtropical southern and southwestern China, and practiced by more than 16 ethnic groups in Yunnan alone. In this region several million farmers used sophisticated agricultural systems, including periodic rotation and fallowing, permanent farming, natural regeneration, and tree planting. The Dai people commonly cultivated 315 species in agroecosystems, and local people in Xishuangbanna managed more than 100 timber species in tropical forests (Yu et al. 1985). A wide range of agroforestry systems is documented in Yunnan totaling at least 220 associations or combinations of multiple species (Guo & Padoch 1995).

Furthermore, indigenous people have long traditions of cultivating valuable plant species and NTFP: the Jinuo and Hani peoples grow tea (*Camellia japonica* L. var. *asamica* [Masters] Kitam); the Hani grow rattan (*Calamus* spp.); Miao cultivate Chinese fir (*Cunninghamia lanceolata* [Lambert] Hook); the Yao, Hani, and Jinuo peoples cultivate *Baphicacanthus cusia* (Nees) Bremek for both dye and medicinal purposes; and species of cardamom can be found at low elevation in Xishuangbanna (*Amomum villosum* Lour.) and at high elevation in Honghe (*A. tsao-ko* Crevost). Farmers can even provide favorable microenvironments that increase the diversity of bird species (Wang & Young 2003).

Ecological Services: Headwater Forests

Traditional practices that protect forests in headwaters can be found in almost all ethnic cultures in Yunnan. Forest ecosystems provide invaluable ecological services for downstream populations, supplying water for drinking and irrigation. These headwater forests, together with sacred forests, are perhaps the least human-manipulated ecosystems in southwestern China. More than 15 nature reserves in Yunnan originated from areas protected as watersheds or headwater forests.

Over hundreds of years in southern Yunnan, the upland and lowland communities have developed complex social networks and relationships for both ecological and economic reasons. The uplands supplied dependable and good-quality water, timber, and NTFP. In addition upland populations provided a source of labor, for either cash or labor exchanges. In return lowlands provided food, salts, agricultural tools, market information, and technology for those living in the uplands (Coward 2000).

Indigenous people in Yunnan have shown that local livelihood practices can be advantageous for the long-term maintenance of conservation goals because (1) conservation is sustainable due to the active participation of resident peoples, (2) the costs of conservation are reduced, (3) their culture and local livelihoods are linked, (4) they use indigenous knowledge, practices, and innovations, and (5) local institutions and governance are strengthened.

Unique Problems in China's Protected Areas

Debate following the fifth World Parks Congress typifies the divergent views between those who believe humans can be a part of conservation areas and the proponents of people-free parks. For example, Terborgh (2004) laments the trend toward the creation of "soft" protected areas (IUCN categories V & VI) and away from "hard" protected areas (IUCN categories I–IV) and fears dubious short-term gains for rural poor at the expense of conservation. But this view is rebutted by those who consider inclusive community management a pragmatic and ethical response (e.g., Andrade 2005). Most of these debates are based on experiences in the Neotropics, and although these issues are clearly relevant to protected-area management in China there are important differences in the Chinese situation that tips the balance toward inclusive conservation management.

First, the public mistrusts government. People in most societies are skeptical and cynical of governments, but the lack of public trust in government land-use policies and tenure insecurity is particularly acute in rural China. Throughout China's turbulent history, displacement and resettlement of indigenous people has been among the state's oldest, continuous land-use policies (Harrell 1995; Elvin 1998; Xu 2006). So to many observers of modern China, establishing protected areas and removing local peoples is the latest example of the state's attempts to control indigenous populations in terms of their property rights and social and ecological interactions.

Second, although there are ecologically sensitive areas (e.g., panda habitat, threatened species wetlands), where human exclusion is warranted, in many cases the justification for people-free parks is less compelling. Landscapes in many protected areas are not pristine: they have long been affected by humans and are perhaps best described as cultural landscapes. Similarly, large tracts of secondary forests (postlogging and areas reclaimed from traditional agriculture and rangelands) have been included in protected areas in southwestern China. The ecological status and biodiversity value of these areas is questionable (Rozelle et al. 2003; Willson 2006), and rather than being protected they could well be managed as multiple use resources.

Third, whereas the spread of new settlers is a major threat to protected areas and unprotected forested lands in other parts of the world, in southwestern China protected areas are usually established where the land has been used by humans for generations. The population is still increasing in China, and the government's encouragement of urban consolidation is exacerbating long-term biodiversity threats because richer urban households consume large amounts of resources (Liu & Diamond 2005). This is not to ignore the fact that some rural communities have managed their resources badly, but many recent examples of poor management by local communities can be linked to drastic policy fluctuations that have led to insecurity over resource access rights (Su 2002; Xu & Ribot 2004), competition from large-scale enterprises, and infrastructure development (Xu & Wilkes 2004).

Fourth, the monopolized government control and complex administration of protected areas in China means that conservation values may be compromised. There is little scrutiny of government—or personal—conflicts of interest, and the process of allocating concessions to operate in reserves is opaque. Meanwhile, resource demands are driving the development of power and water transfer schemes in sensitive environments (e.g., development of the upper Yangtze, Nu, and Mekong rivers [Dore & Yu 2004]) and mining operations in protected areas (e.g., in Shangri-la and Diqing prefectures, Yunnan).

Community Conservation Alternatives to Protected Areas

Although it is easy to advocate for a conservation policy that benefits local people and the environment, it is more problematic to formulate and implement it, particularly in a society such as China. Below, we outline some possibilities that would help local people optimize their use of resources and meet broader conservation objectives.

Securing Ecosystem Goods and Services Locally

Protected areas provide a variety of goods and services to society at large, such as watershed protection, biological resources, and opportunities for education, research, and recreation. But the primary beneficiaries of protected areas should be the people living in or near these areas. Mechanisms to achieve this could include preferential access to licenses for tourism enterprises and related goods and services. To favor local people openly in this way challenges existing power relationships and runs contrary to free-market competition; however, Chinese policy is more pragmatic than democratic (e.g., ethnic minorities and rural people are exempted from the one-child policy). Similarly, the protection of local cultures, art forms, and products need clear legal protection to ensure that

ethnic groups have access to derived benefits. A requirement to disclose the provenance of souvenir art items or performances may be one way this can be addressed. The government's readiness and ability to make and enforce decisions affecting rural livelihoods is evidenced by the recent abolition of historic agricultural taxes and the concurrent increase in capital-gains taxes on urban real estate.

There are also areas of international trade that can have profound effects on smallholders' niche products. For example, the European honey market is restricted to honey from one European bee species (*Apis mellifera*). This directive bars trade in honey derived from indigenous Himalayan bees (Asian hive bee [*Apis cerana*], Giant honeybees [*Apis dorsata*], Himalayan cliff bees [*Apis laboriosa*], and Dwarf honeybees [*Apis florea*]), depriving poor beekeepers market access and discouraging the conservation of local wild honeybees and their natural habitats (Ahmad & Joshi 2005). Pressure through international trade negotiations to remove restrictions of this kind of nontariff barrier would offer new opportunities to generate income for rural people in a way that would favor conservation.

Secured Access and Collective Institutions

Ownership of land and resources is vital for responsible land management because it strengthens a community's long-term, cultural attachment to such areas. Any talk of conservation management in China invariably returns to the thorny question of collective forests—they are a fundamentally important part of the diverse landscapes (accounting for 58.4% of the nation's total forested lands) and illustrate ongoing uncertainty over land tenure and resource access. Collective ownership in China is still poorly defined, and it is not clear who represents local communities and how decisions are made (Miao & West 2004). Higher levels of government still intervene in community decisions and forest resource management. For instance, timber collection for personal use or marketing from contracted collective forests requires a quota permit from the township and final approval from the county Forestry Bureau (Xu & Ribot 2004). The introduction of direct village elections in 1998 might be an opportunity to enhance accountability in local communities, but transferring power without accountable representation is dangerous for forest resource management, and establishing accountable representation without power is meaningless (Ribot 2002).

The confusion surrounding collective forest rights has been compounded by the commercialization of NTFP. New institutions are emerging that are redefining access to NTFP within and across villages, leading to potential confusion and conflicts. In northwestern Yunnan the commodification of matsutake mushrooms (*Tricholoma*

spp.) has led to a differentiation between forest land tenure and NTFP tenure on the same land (Yeh 2000).

How should local knowledge of forestry, resource use, and management practices be integrated into decision making? What channels of representation can guarantee, or at least help, local views influence the design of forest management policy? First, forestry should be regarded as a social as well as technical issue that involves interdisciplinary research and includes the collaboration of local communities in decision making. Second, scientists should interpret indigenous knowledge, communicating with local people, and providing relevant information for decision makers. Third, local people should have real representation through locally 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 SFA is to design a system that changes the role of forestry agencies from daily managers to monitors. In terms of tangible policy outcomes, this may involve giving local communities greater access to high-value forest and monitoring these forests to ensure sustainable practices.

Community Education

Conservation advocates need to articulate the link between human cultural diversity and biodiversity in China. Part of the function of a protected area should be to promote an appropriate understanding of, and respect for, local people's cultural values among visitors and the wider public. For example, the initial impression of shifting agriculture may be of deforestation, but if this system were to be described in terms of its overall agrobiodiversity and sustainability, a different view may emerge.

Nevertheless, the expansion of market economies and the commercialization of culture and nature are having an impact within local communities. Younger generations who are being educated in formal schools and taking jobs in the cities, often forget the cultural beliefs and indigenous knowledge practiced by their parents and grandparents. For those who remain, protected areas should support traditional local educational systems to help communicate nature-related cultural values from older to younger generations. Other relevant issues are a greater integration of women into conservation (the outmigration of male labor for off-farm jobs leaves women *de facto* managers of natural resources and agriculture) and conflict resolution within communities.

Access to knowledge of legal rights and responsibilities and to science is critical for contemporary conservation planning. This sort of information can be introduced via community-based education in basic legal rights and conservation practices. Rather than excluding people, conservation advocates and policy makers should be supporting the technical training of local community members (Salas et al. 2003). These initiatives can be bolstered

by involving conservation groups in raising awareness of conservation rights and obligations. At present there are about 6000 foreign sociolegal and conservation organizations operating in China (Wu 2005) and emerging internal nongovernmental organizations that could be partners in such enterprises.

Conservation Concessions

Contractual partnerships between government and nongovernment actors to manage state-owned lands for conservation are being adopted around the world (Bray et al. 2003). The state can hand over small reserves to local communities as pilot projects while management plans and monitoring indicators are developed and facilitated by third parties, such as local nongovernmental organizations. Presently, these concepts are under discussion at policy-making levels in China; the acid test will be in the enforcement and transparency of the legal rights and obligations for both parties.

Conclusions

Human exclusion may be the appropriate conservation solution for ecologically unique and undisturbed habitats, but in China most landscapes have been used for generations. So, rather than rushing to lock away large areas without ongoing technical or financial support and management, the immediate challenge should be to ensure that sustainable practices are encouraged and biodiversity is at least stabilized.

Today, a number of factors combine to hamper effective conservation in Chinese protected areas: the spatial overlap of people and biodiversity; lack of funding for management of nature reserves and for the resettlement and/or compensation of displaced people; obscure tenures and user rights; administrative complexity and conflicts; and the dangers of linking funding with levels of protection that compromise financial needs and environmental aims.

In China local communities have received little financial and technical support for conservation. The officially imposed dichotomy of nature and culture has eroded indigenous cultures and knowledge of the sustainable use of resources and affected biodiversity by reducing agrobiodiversity and forest quality. Furthermore, the uncertainty created by frequent upheavals of land ownership and user rights has left local communities mistrustful of the motives of government—hardly the sort of environment to foster responsible, far-sighted resource management by local users.

China has the ability to implement massive and broad-reaching policy changes overnight. It must now temper this power with a willingness to work toward more consultative and site-specific conservation outcomes. In the

short-to-medium term, community management of ecologically important areas may well be the only viable way to achieve the Chinese government's oft-stated aim of creating a harmonious society that maintains cultural and biological diversity.

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Literature Cited

- Ahmad, E., and S. R. Joshi. 2005. Bringing organic honey of indigenous bee origin to the European markets. *ICIMOD Newsletter* 48:13–14.
- Anderson, D. M., J. Salick, R. K. Moseley, and X. K. Ou. 2005. Conserving the sacred medicine mountains: a vegetation analysis of Tibetan sacred sites in Northwest Yunnan. *Biodiversity and Conservation* 14:3065–3091.
- Andrade, G. I. 2005. Science and society at the World Parks Congress. *Conservation Biology* 19:4–5.
- Bray, D. B., L. Merino-Pérez, P. Negreros-Castillo, G. Segura-Warnholz, J. Torres-Rojo, and H. F. M. Vester. 2003. Mexico's community managed forests as a Global model for sustainable landscapes. *Conservation Biology* 17:672–677.
- Callicott, J. B., and M. P. Nelson, editors. 1998. *The great new wilderness debate*. University of Georgia Press, Athens, Georgia.
- Coward, W. C. E., Jr. 2000. Culture, biodiversity and assets: some basic ideas. Pages 6–13 in J. Xu, editor. *Links between cultures and biodiversity: proceedings of the Cultures and biodiversity congress 2000*. Yunnan Sciences and Technology Press, Kunming, China.
- Dore, J., and X. Yu. 2004. Yunnan hydropower expansion: update on China's energy industry reforms and the Nu, Lancang and Jinsha hydropower dams. Working paper from Chiang Mai University's Unit for Social and Environmental Research, and Green Watershed. Chiang Mai University, Thailand.
- Edmonds, R. L. 1994. *Patterns of China's lost harmony: a survey of the country's environmental degradation and protection*. Routledge, London.
- Elvin, M. 1998. The environmental legacy of Imperial China. *The China Quarterly* 156:733–756.
- Ervin, J. 2003. Rapid assessment of protected area management effectiveness in four countries. *BioScience* 53:833–841.
- FCCDP (Forest Conservation and Community Development Project). 1998. *Forest conservation and community development project rapid rural appraisal report: Nuozadu Nature Reserve and its surrounding communities*. FCCDP, Kunming, China.
- Guo, H., and C. Padoch. 1995. Patterns and management of agroforestry systems in Yunnan: an approach to upland rural development. *Global Environmental Change* 5:273–279.
- Harkness, J. 1998. Recent trends in forestry and conservation of biodiversity in China. *The China Quarterly* 156:911–934.
- Harrell, S. 1995. *Cultural encounters on ethnic frontiers*. University of Washington Press, Seattle.
- Hillman, B. 2003. The poor in paradise: tourism development and rural poverty in China's Shangri-La. Pages 545–553 in J. Xu and S. Mikesell, editors. *Landscapes of diversity: proceedings of the III symposium on montane mainland South East Asia (MMSEA)*. Yunnan Sciences and Technology Press, Kunming, China.
- IUCN (World Conservation Union). 1994. *Guidelines for protected areas management categories*. IUCN, Cambridge, United Kingdom.
- Jiang, H., and X. Ou. 1998. *Biodiversity conservation and sustainable development in the biosphere reserves*. Yunnan University Press, Kunming, China.
- Jim, C. Y., and S. S. W. Xu. 2004. Recent protected-area designation in China: an evaluation of administrative and statutory procedures. *The Geographical Journal* 170:39–50.
- Law, W., and J. Salick. 2005. Human-induced dwarfing of Himalayan snow lotus, *Saussurea laniceps* (Asteraceae). *Proceedings of the National Academy of Sciences* 102:10218–10220.
- Li, W., and N. Han. 2001. Ecotourism management in China's nature reserves. *Ambio* 30:62–63.
- Liu, J., and J. Diamond. 2005. China's environment in a globalizing world. *Nature* 435:1179–1186.
- 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.
- Liu, J., Z. Ouyang, S. L. Pimm, P. H. Raven, X. Wang, H. Miao, and N. Han. 2003. Protecting China's biodiversity. *Science* 300:1240–1241.
- MA (Millennium Ecosystem Assessment). 2005. *Ecosystems and human well-being: biodiversity synthesis*. World Resource Institute, Washington, D.C.
- Menzies, N. K. 1992. Strategic space: exclusion and inclusion in wildland policies in Late Imperial, China. *Modern Asian Studies* 26:719–733.
- Miao, G. P., and R. A. West. 2004. Chinese collective forestlands: contributions and constraints. *International Forestry Review* 6:282–298.
- Oelschlaeger, M. 1991. *The idea of wilderness: from prehistory to the age of ecology*. Yale University Press, New Haven, Connecticut.
- PATF (Protected Area Task Force). 2004. *Protected Area Task Force report to the China Council for International Cooperation on Environment and Development (CCICED). Evaluation on and policy recommendations to the protected area system of China*. State Environmental Protection Administration, Beijing.
- Redford, K. H., and C. Padoch. 1992. *Conservation of Neotropical forests. Working from traditional resource use*. Columbia University Press, New York.
- Redford, K. H., and S. E. Sanderson. 2000. Extracting humans from nature. *Conservation Biology* 14:1362–1364.
- Ribot, J. C. 2002. *Democratic decentralization of natural resources: institutionalizing popular participation*. World Resource Institute, Washington, D.C.
- Rozelle, S., J. Huang, and V. Benziger. 2003. *Forest exploitation and protection in reform China: assessing the impacts of policy and economic growth*. Pages 109–134 in W. Hyde, B. Belcher and J. Xu, editors. *China's forests, global lessons from market reforms. Resources for the Future*, Washington, D.C.
- Salas, M., J. Xu, and T. Tillmann. 2003. *Participatory technology development: linking indigenous knowledge and biodiversity for sustainable livelihoods*. Yunnan Science and Technology Press, Kunming, China.
- Shapiro, J. 2001. *Mao's war against nature. Politics and the environment in revolutionary China*. Cambridge University Press, Cambridge, United Kingdom.
- Sturgeon, J. C. 2004. Post-socialist property rights for Akha in China: what is at stake? *Conservation and Society* 2:137–161.
- Su, Y. 2002. A case study from Yulong Village in Lijiang County's Baisha Township. *Conflict and conflict management: a new approach to*

- conflict management in the forests of southwest China. People's Press, Beijing (in Chinese).
- Terborgh, J. 2000. The fate of tropical forests: a matter of stewardship. *Conservation Biology* **14**:1358–1361.
- Terborgh, J. 2004. Reflections of a scientist on the World Parks Congress. *Conservation Biology* **18**:619–620.
- Terborgh, J. 2005. Science and society at the World Parks Congress. *Conservation Biology* **19**:5–6.
- Toledo, V. M. 2000. Biodiversity and indigenous peoples. Pages 451–463 in *Encyclopedia of biodiversity*. Volume 3. Academic Press, San Diego, California.
- 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**:231–243.
- Willson, A. 2006. Forest conversion and land use changes in rural north-west Yunnan, China: implications for the 'big picture.' *Mountain Research and Development* **26**:227–236.
- Winkler, D. 2003. Forest use and implications of the 1998 logging ban in the Tibetan Prefectures of Sichuan: case study on forestry, reforestation and NTFP in Litang County, Ganzi Tap, China. *Informatore Botanico Italiano* **35**:116–125.
- Wu, Z. 2005. NGOs—providing a link. *Beijing Review* 30 June:18–21.
- Xu, J. C. 2006. The political, social and ecological transformation of a landscape: the case of rubber in Xishuangbanna, China. *Mountain Research and Development* **26**:254–262.
- Xu, J. C., J. Fox, X. Lu, N. Podger, S. Leisz, and X. Ai. 1999. Effects of swidden cultivation, population growth, and state policies on land cover in Yunnan, China. *Mountain Research and Development* **19**:123–132.
- Xu, J. C., E. Ma, D. Tashi, Y. Fu, Z. Lu, and D. Melick. 2005. Integrating indigenous and sacred knowledge for conservation: cultures and landscapes in southwest China. *Ecology and Society* **10**: <http://www.ecologyandsociety.org/vol10/iss2/art7/>.
- Xu, J. C., and J. Ribot. 2004. Decentralization and accountability in forest management: case from Yunnan, Southwest China. *The European Journal of Development Research* **14**:153–173.
- Xu, J. C., and A. Wilkes. 2004. Biodiversity impact analysis in northwest Yunnan, China. *Biodiversity and Conservation* **13**:959–983.
- Xu, Z. G., M. T. Bennett, R. Tao, and J. T. Xu. 2004. China's sloping land conversion programme four years on: current situation and pending issues. *International Forestry Review* **6**:317–326.
- 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, Kunming, China.
- Yu, P. H., Z. F. Xu, and Y. L. Huang. 1985. Survey on traditional cultivated plants in Xishuangbanna. *Acta Botanica Yunnanica* **7**:169–186 (in Chinese with English abstract).

