National Park Development in China: Conservation or Commercialization?

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Abstract The rapid development of parks and ecotourism in China has attracted worldwide attention, not only for the beauty of the landscape that the parks are protecting but also for their abundant and often unique biodiversity. However, in some areas, the development of ecotourism has actually led to the degradation of local ecological, economic, and social systems. Using National Forest Parks for demonstration, this article analyzes the current political, institutional, legal, environmental, and economic issues concerning National Parks in China, and examines their potential future development. Although the intention of National Park systems in China is to raise environmental quality, and to protect biodiversity and social livelihoods, their success has varied. Future success will be measured by their capacity to reduce poverty, to promote long-term rehabilitation of wildlife habitats, and to simultaneously protect Chinese culture and biodiversity.

Keywords National Parks · Conservation · Natural resources · Degradation · Ecotourism · China

INTRODUCTION

The rapid development of the Chinese economy has created many challenges for the conservation of the country's endemic flora and fauna, rich biodiversity, and diverse ecological systems. In some of the most biologically diverse regions, such as Yunnan province, continued exploitation of natural resources presents a major threat to biodiversity (Yang et al. 2004). There is growing scientific and political recognition that China's wildlife and ecosystems need protection (e.g., State Forestry Administration 2010).

Since the early 1990s, the main state-owned forest areas—in China's Northeast and Inner Mongolia

regions—have been experiencing extreme resource depletion from over-cutting and misuse (Li and Chen 2007). Over-cutting is defined here as the harvesting of trees and other forest resources at a rate in excess of that forest's growth or replenishment. For example, the Heilongjiang State-owned Forest is estimated to have over-cut by 30% since 1958, with the result that by 1991, the annual log output was only 7.43 million m³, 64% of that in 1978 (State Forestry Administration 1999). The over-cutting also resulted in 1.21 million ha of depleted forest area that was eventually designated into 24 National Forest Parks. The issue of over-cutting became very public in 1998, when devastating floods affected many parts of China, prompting the imposition of a logging ban in natural forests in the headwaters of several rivers, and logging reductions in Northeast China (Wang et al. 2007). The creation of National Forest Parks in these areas soon followed, in the hope that such parks would lead to the rehabilitation of forests; limit the erosion and flooding associated with deforestation; and, at the same time, generate tourism revenue to compensate for reductions in timber harvest.

Since the first National Forest Park was established in China in 1982 [Zhangjiajie National Forest Park (Fig. 1)] various types of parks have been established, and their numbers have increased rapidly. Today, there are 1865 areas classified as National Parks based on the International Union for the Conservation of Nature (IUCN) Guidelines for Protected Area Management Categories (Commission on National Parks and Protected Areas and World Conservation Monitoring Centre 1994): briefly a “protected area managed mainly for ecosystem protection and recreation.” These parks, each organized under a range of different ministries and departments, have developed as a result of two dominant driving forces: (1) a growing middle class with an interest in nature-based tourism and

Fig. 1 Chart showing the increases in area and number of Forest Parks and National Forests Parks in China since the year 1982. Note that until 2000, most Forest Parks in China were managed at the

federal level, but since then local and provincial forest parks have arisen. *Inset* detail of increases before 1991

recreation and (2) concern over the depletion of natural resources and the need to set aside protected reserves. Although these two drivers could be complimentary (Rollins and Robinson 2002), in reality, economic objectives have tended to have priority over social and ecological ones. When conducted inappropriately, as is often the case in China, tourism in otherwise remote or protected areas can be a major cause of degradation to local ecological, economic, and social systems, rather than maintaining and balancing these elements as required by the principles of sustainability (Holling 2001; United Nations General Assembly 2005).

Although “ecotourism”—the “responsible travel to natural areas that conserves the environment and sustains the well-being of people” (Western 1993) is an end goal of National Park systems in China, in reality, as we will see from the following discussion, these goals are not always met. Instead, when referring to tourism activities in China’s National Parks, we use the terms “nature-based tourism,” “nature tourism” or simply “tourism,” to describe the visitation to natural areas with the goal of experiencing nature.

China’s 1865 National Parks include National Forest Parks, National Key Scenic Resorts, National Natural Reserves, National Geoparks, National Wetland Parks,

National Mining Parks, and National Water Reserve Parks (Table 1). National Forest Parks, a type of IUCN-defined National Park managed by the State Forestry Administration (SFA) (Table 1), cover approximately 11.4 million ha (Fig. 1). These parks are designed primarily to provide education and recreation opportunities for the public, often with an emphasis on the protection of esthetic quality rather than the protection of wildlife (Huang et al. 2008). National Natural Reserves, on the other hand, are intended to protect particular areas, and tourism is in theory strictly controlled (but often still present). China’s National Geoparks, National Wetland Parks, National Mining Parks, and National Water Reserve Parks have only existed since 2000, and most of them are still either under construction or are so-called “paper parks”—existing only in writing.

This article focuses on key issues related to the development of National Parks in China, with specific examples and data being drawn from China’s National Forest Parks. National Forest Parks represent the earliest and the most common type of National Parks in China (Table 1) and provide a basis to explore (1) the driving factors behind National Park development and management in China; (2) whether National Parks are meeting their aims; (3) whether these parks are achieving the principles of sustainability by incorporating and accommodating the

Table 1 China's system of National Parks as defined by IUCN Guidelines (Commission on National Parks and Protected Areas and World Conservation Monitoring Centre 1994)

Type	Number	Area (million ha)	Administered by
National Forest Park	731	11.54	State Forestry Administration
National Nature Reserve	247	77.01	State Forestry Administration
National Geopark	140	7.24 ^a	Ministry of Land Resources
National Wetland Park	100	3.6 ^a	State Forestry Administration
National Mining Park	125	N/A ^a	Ministry of Land Resources
National Key Scenic Resort	208	11.0	Ministry of Construction
National Water Reserve Park	314	N/A ^a	Ministry of Water Resources
Total	1865	110.39 ^a	

^a Parks are under construction and final area estimates were not yet available at the time of publication. N/A means there are no size estimates available

requirements of social, economic, and ecological systems; and (4) which policy or management reforms will ensure that parks conform with the principles of sustainability and conservation.

DRIVING FACTORS

Parks in China date back to the Qin Dynasty, i.e., more than 2000 years ago (Li 2002). However, such parks were mainly private “gardens” belonging to the nobility, temples, and burial sites. The first Chinese National Park formally designated for ecological protection was Zhangjiajie National Forest Park, established in 1982, almost a 100 years after Yellowstone National Park in the USA and Banff National Park in Canada. As a result of the rapid industrialization of China's landscape and rising standards of living over the last 30 years, the government has placed greater emphasis on creating parks to protect biodiversity, raise environmental quality, and improve social livelihoods.

There are two main drivers in the development of China's National Parks. Economic development has created a growing middle class with more vacation time and a growing interest in outdoor recreational opportunities (Liu 2007), and has also increased pressure on natural resources creating the need for conservation and ecological protection. National Forest Parks first emerged on the east coast of China, with 44% of those created between 1982 and 1990 being established in east coast provinces. The east coast is also where China's economy first opened to the world, with experiments in free market enterprise and subsequent economic growth facilitated by port access to the Pacific Ocean (primarily through what is now Shanghai), beginning in the Sung–Ming Dynasties (960–1523) (Hwang 1951).

More recently, an emerging middle class and holidaying students have created a new demand for outdoor recreation

(Li and Chen 2007), and tourism represents an important recreational activity with potential for helping meet the income needs of parks and reserves (Wang and Buckley 2010). The introduction of the five-day workweek in 1995, and the three “Golden Week” holidays during 1999–2007, substantially increased the need for outdoor recreation and nature tourism, as millions of Chinese with holiday time sought appropriate vacation venues (Liu 2007). Between 1994 and 2009, the total number of domestic visitors within China increased almost fourfold, from 524 million in 1994 to 1.9 billion in 2009, and revenues generated from this have increased simultaneously; from US $\$1.7 \times 10^9$ [Renminbi (RMB) 102.4×10^9 Yuan, based on the exchange rate in 1994] to US $\$117.1 \times 10^9$ (RMB 1018.4×10^9 Yuan) (Fig. 2). Fuzhou National Forest Park in South-eastern China (Fig. 3), for instance, saw annual income from ticket sales rise from US $\$14\,900$ (RMB 0.13 million Yuan) in 1993 to US $\$479\,300$ (RMB 4.17 million Yuan) in 2007—a trend of increased visitation with park age seen elsewhere (e.g., Finland (Neuvonen et al. 2010); and the US (Hanink and White 1999) that can be linked to increased public awareness of the park itself. An examination of the increase in ticket sales at Fuzhou National Forest Park since 1999 (Fig. 4) reveals that nearly half (48.8%) of those sales occurred during the months of the three Golden Weeks. This illustrates both the positive effects of more holiday time on park attendance, and the uneven distribution of visitors throughout the year, with under-utilization during off-peak periods.

The demand for outdoor recreation was initially met by tree farms along the east coast of China, managers of which responded by delineating some areas for sightseeing and recreation (Li and Chen 2007). As the concept of forest parks evolved primarily from tree farms, tourism was only a small part of the tree farms' multi-purpose management—a way to supplement harvesting income. Thus, the nature-based tourism started with only basic facilities and

Fig. 2 Chart showing the trend in the number domestic and foreign travelers to China, and the total revenue and employees (including those as tour guides) of Forest Parks in China since the year 2000. *Source:* National Bureau of Statistics of China (2009)

infrastructure, and little or no interpretation was provided to visitors.

However, since its inception, the National Forest Park system has become an important source of tourism for China. Visitors and revenue have increased by approximately 20% and 43.6% annually, respectively, since 2000 (Fig. 2). Even with the 2003 SARS outbreak, the number of visits still grew by 5.5% and revenue by 13.1%. In 2009, there were 333 million visits to National Forest Parks, accounting for 16% of the total number of tourists reported by China's tourism industry, and generating an estimated US $\$2.93 \times 10^9$ (RMB 25.5×10^9 Yuan) (National Bureau of Statistics of China 2009).

National, provincial, and local forest parks in China employed nearly a million people in 2009, creating 118 144 permanent positions (Fig. 2). Between 2001 and 2008, investments in National Forest Park development reached US $\$4.7 \times 10^9$, paying for 60 100 km of road networks, 40 500 beds, and basic forest fire protection facilities around tourism sites (State Forestry Administration 1993–2008). This development is estimated to have benefited 20 million

local farmers and 12 000 local villages. As a result, nature-based tourism has been credited with raising more than 4654 villages above the poverty level over the last 20 years (Xinhua News 2009). Despite these said economic and social benefits, China's Forest Parks often struggle to achieve their goals of conservation, which in turn can have long-term social and economic consequences for local communities.

AMBITIOUS PLANS

It is estimated that by 2050, the urban population in China will reach 1.1×10^9 , and outdoor recreation demand will grow proportionately (State Forestry Administration 2006): assuming factors, such as disposable income, leisure time, and vehicle ownership remaining proportionate within the growing Chinese population. In response to this demand, the SFA established more than 1000 Forest Parks during 2000–2008 (Fig. 1). The total area of forest parks has reached to 16.5 million ha, and several large national parks

Fig. 3 Map of China showing major urban centers (*capital letters and black stars*) and National Forest Parks (*red ovals*) discussed in this article

are currently under development (Fig. 3) including Tangwanghe National Park in Heilongjiang Province (China Ministry of Environmental Protection 2009); the China Central National Park in Shanxi; San Qing Shang National Park in Jiangxi; Tropical Rain Forest National Park in Hainan; the Great Shangri-la National Park in Yunnan Province, which will include Shangri-La–Pudacuo, Shangri-La–Mt. Meilixue, and Shangri-La–Grand Canyon; the Mt. Laojun National Park; and the Nujiang River National Park in the Three Parallel Rivers Region, and Yarlung Zangbo (Tsangpo) Grand Canyon National Park in Tibet—both near Shangri-La (Fig. 3) (State Forestry Administration 2010). The Shangri-La–Pudacuo National Park was launched in 2007 and is located in one of the most biologically diverse regions in the world. While the region comprises only 0.7% of China's land area, it contains more than 20% of the country's plant species, about one third of

its mammal and bird species, and almost 100 endemic species (Nature Conservancy 2007).

Other major park projects include the Xinjiang Uyghur Autonomous Region government's plan to build the Genanxi National Park in the next 10 years, which will be the biggest park in western China, covering 1 million ha (Sun et al. 2006), even larger than Yellowstone in USA. More than US \$137.5 million had been invested in this park's development by the time it was open partially to public in 2008 (Xinhua News 2008). The completion of the Tibet–Qinghai Railway in 2006, and the development of an extensive freeway network throughout China, will further facilitate the development of National Parks in western China.

While the increased demand for parks in China has largely been the result of an increased need for tourism venues from a growing population and increasing standard

Fig. 4 Monthly average entry ticket (1000 USD) sales in Fuzhou National Forest Park from 1999 to 2006. The three Golden weeks [May 1–7, Oct 1–7, and Chinese New Year (date varying annually, sometime in January and February)], are marked by ▼

of living (State Forestry Administration 2006), population growth also increases society's demand on natural resources and the land-base, making conservation and ecological protection more eminent requirements than ever.

GROWING PAINS

Although national park development strategies are intended to enhance ecological sustainability and raise local living standards, new problems have emerged. For example, some of the ecological damage associated with nature-based tourism in other parts of the world, such as soil and vegetation trampling, erosion, water pollution, litter, and wildlife disturbance (e.g., Sun and Walsh 1998; Wessels et al. 2003) are becoming a major concerns in China (e.g., Liu et al. 2001; Li et al. 2005; An et al. 2006). Tourists far outnumber the local residents during “high season” in some areas, which means resources and services are diverted from local communities, putting some areas at serious risk of ecosystem degradation.

Ostensibly, the goal of national parks is to protect natural beauty, biodiversity, and ecosystems, and to promote scientific research, education, and recreation (Commission on National Parks and Protected Areas and World Conservation Monitoring Centre 1994). However, pressure from the public for recreational venues and the attraction of tourist dollars for provincial administrations means that many national parks in China are focussing on social and economic benefits rather than the conservation of ecosystems. National parks have been categorized as

“self-funding organizations” (Li 2004), meaning that they are expected to generate revenue to support park operations, and to contribute to local economic development, major infrastructure development, poverty relief, local employment, and tourism. China's National Park managers are under increasing pressure to look for private sector funding to develop commercial and infrastructure projects, as in some parts of China, government support for parks continues to decline (Li 2004). Yet the development of the parks in China has been so rapid that there has been little planning to mitigate the ecological consequences of development.

Long-term planning processes, such as a scientific inventory of natural resources, classification of protected areas, and the development of monitoring systems (Chen and Zhao 2004), are lacking. Instead, park managers are improving tourism facilities and developing scenic areas with infrastructure, such as hotels, restaurants, summer resorts, department stores, and even landscaped gardens in protected areas. In some cases, sightseeing trails and commercial tourist facilities have been built through the center of protected areas within national forest parks, and the identification and enforcement of appropriate zoning in parks is an urgent priority (Liu and Li 2008). Examples include: new hotels and commercial retail outlets in the Wulingyuan area (a World Heritage Site) in Zhangjiajie National Forest Park, which generated a warning from the IUCN in 1998 (Zhang et al. 2004); the establishment of three cable cars through Mt. Tai [an UNESCO World (mixed) (Cultural and Natural Heritage Site)] (Fig. 5), which has permanently altered the landscape; and the

Fig. 5 Cable cars through Mt. Tai [Taishan (Fig. 1)]—a UNESCO World Mixed Natural and Cultural Heritage Site (photo by John L. Innes)

construction of a 325-m Sky Elevator on the side of a rock tower in Zhangjiajie National Forest Park (Fig. 6), which has allowed access to a previously secluded area. In 2003, UNESCO threatened to de-list the Three Parallel Rivers World Heritage area in the Nujiang River National Park if the local government proceeded with a plan to reduce the area of the park by 20% and to allow mining and dam development around the remaining area (Toy 2006). Such developments are often undertaken with no or minimal benefits to local people (Yuan et al. 2008).

Visitor over-crowding is another major issue, especially during the peak tourist season, when the number of visitors can surpass park capacity by a factor of 10 (Zhang et al. 2004). The implementation of a new national holiday policy effective from January 1, 2008 has relieved some of the domestic tourist pressure during the traditional Golden Week holidays. The May 1 Golden Week has been shortened to a one-day holiday, and instead an extra day has been added to three traditional festivals—the Qingmin Festival (Mourning Day), the Duanwu Festival (Dragon Boat Festival), and the Zhongqiu Festival (Moon Festival).

The new policy has created two Golden Weeks and five long weekends annually. However, it is too early to evaluate how well the new holiday policy will alleviate visitor pressure in the parks and the results of previous evaluations have been mixed (Zhang 2009; Wang 2009).

Large scale construction of man-made landscapes and recreation facilities, roads, water lines, communications, and power transmission systems have resulted in serious damage to natural landscapes (e.g., Zhou and Yu 2004). Ma (2008) pointed out that because of over-exploitation, 20% of targeted protection areas have been destroyed, 11% of natural reserves have been severely degraded, and 44% of National Parks face massive waste problems, leaving 12% of water bodies contaminated. Water shortages and pollution have become major concerns in some of China's national forest parks (Wu 2000; Wang and Buckley 2010). Water use has risen dramatically with the influx of tourists and the development of infrastructure, such as hotels and restaurants, competing with scenic uses, such as waterfalls and streams, or conflicting with local people's agricultural and domestic requirements.

Fig. 6 Sky Elevator on the side of a rock tower in Zhangjiajie National Forest Park (photo by John L. Innes)

Untreated waste-water from residential and commercial areas in parks, discharged into water bodies has resulted in mortality of aquatic wildlife (Wu 2000) “White pollution”—such as plastic bags, tissues, and containers—is ubiquitous throughout the National Park system affecting wildlife and flora. Tourists feed monkeys in reserves such as Zhangjiajie, with a variety of foods ranging from peanuts to ice-cream, despite warning signs emphasizing the danger of familiarizing wild animals to human contact. Liu et al.’s (2001, 2003) research on the Wolong Panda Reserve (a National Natural Reserve) has demonstrated that biodiversity loss has been dramatic inside the reserve, and that tourism has probably contributed to habitat loss through the extraction of fuelwood to produce goods for sale to the tourists. The volume of visitors at popular sites such as Jiuzhaigou National Forest Park, is causing soil erosion and water pollution and resulting in the degradation of the scenic values that people come to experience (Li et al. 2005).

Fuzhou’s National Forest Park Management Plan (Fujian Forestry Survey and Design Institute 1994) listed more than twenty endangered species, yet none has been sighted in the last 15 years, bringing into question the efficacy of these reserves in protecting threatened wildlife. Yang et al. (2006) conducted landscape fragmentation analysis in Zhangjiajie National Forest Park and showed that between 1990 and 2000, 10% of the natural forests were converted to other uses. Thus, even protected areas are not necessarily functioning as intended.

COMMUNITY IMPACTS

The establishment of parks often results in conflict between local inhabitants and park managers (Coggins 2000; Jim and Xu 2004). One of the most obvious impacts on communities in China has been restrictions on the activities of local people, which has sometimes resulted in resentment toward parks. Examples have been found by Yuan et al. (2008) in the Changbai Mountain Biosphere Reserve in Jilin Province; by Chen et al. (2005) in the Shennongjia National Nature Reserve in Hubei Province; and by Fu et al. (2004), and Xu et al. (2006) in the Wolong Biosphere Reserve in Sichuan Province. This problem is not restricted to China, and has been documented in other parts of the world, such as Brazil (Stefania 2001), Nepal (Maikhuri et al. 2000), and South Africa (Wessels et al. 2003). Often the resentment revolves around small-scale issues associated with resource exploitation for economic necessity (Fu et al. 2004).

Many Chinese parks have been established in areas where there are local communities, and the parks now include villages and farms. The population density of many

parks and reserves exceeds 60 persons km^{−2} (Wu et al. 2002). The inhabitants are generally dependent on the surrounding forests for their livelihoods and continue to exploit the forest and its resources. For example, in most National Forest Parks, the cutting of bamboo is permitted, and there may even be bamboo processing facilities within the park, such as at Wuyishan, in Fujian. In itself, this may not be a significant problem, but the spread of anthropogenic *mao* bamboo (*Phyllostachys pubescens*) forests at the expense of other habitat types can seriously reduce the ecological value of a reserve (Coggins 2000). In Wolong Biosphere Reserve, such activities are believed to have been responsible for the decline in numbers of flagship species, such as the giant panda (*Ailuropoda melanoleuca*) (An et al. 2006), which does not consume the *mao* bamboo species. Past international efforts allowing the mixed-used of parkland for natural resources or agriculture have also ended in a failure to conserve ecological resources, such as in the Great Smoky Mountains of the USA (Young 2006); the lowlands of Guatemala (Grandia 2009), and parts of Thailand (Forsyth 2007).

Similarly, at Xishuangbanna Nature Reserve in Yunnan Province, the need to accommodate the livelihoods of indigenous groups whose lands were incorporated into the park may be compromising the future conservation of some species. However, the park’s gaining of local acceptance may help preserve some core areas from human disturbance (Nepal 2002). Even where such activities are forbidden, ineffective enforcement may result in continued resource exploitation (Nepal 2002; Fu et al. 2004). The influx of tourists is creating a market for local forest products which include wood carvings, honey, medicinal plants, and animal parts (used mainly in medicine), and this in turn may create conflicts.

One possibility is to re-locate residents to areas outside the designated park. This has had mixed success, with younger people and those living furthest from roads being the most likely to accept relocation (Xu et al. 2006). However, a number of studies have indicated that compensation is inadequate, and the low chances of finding a job in the new location acts as a further disincentive (e.g., Zhong et al. 2008). Closer to main roads, there may be economic opportunities associated with the influx of tourists, and people may be less willing to relocate. Park zoning using functional scientific approaches and Geographic Information Systems (GIS) to maximize both species protection using habitat suitability indices (e.g., Liu and Li 2008), and social benefits using community suitability indices; may aid in such relocation efforts and ensure their success in achieving the balance between economic, social and ecological elements of parks.

In some cases, the intrusion of large numbers of tourists into local social systems is undermining pre-existing social

relationships and values. This is a particular problem where tourism activities are centered in traditional social systems, such as minority communities, and more effective involvement of such communities is needed (Yang et al. 2004; Zhong et al. 2008). The National Park system has run into conflict with local communities, particularly with the parks developed from collectively owned tree farms in southern China. The conversion of what was once timberland—which communities could convert to a cash value of 10–30% of growing stock value when the trees were harvested—into parks, has generated a loss of real income for local people. After being gazetted as protected forest within a National Forest Park, residents lose an important source of income, potentially increasing poverty levels. Agencies responsible for creating forest parks, which include the central government (responsible for overall approval and some of the funding), provincial government (responsible for funding of operations and construction), and local government (responsible for provision of land and local resources, and community relations) often fail to consult local people, or to reach agreements that compensate them for the lost income.

Some local communities are now attempting to claim back the land, arguing that the land-use purpose has been changed without their consent (Zhang et al. 2004). However, this requires that local people have sufficient capacity, and the low levels of education prevalent among local people represent a continuing challenge (Jim and Xu 2004; Yuan et al. 2008). As a result, many of the economic benefits of parks may be diverted to outside groups, as had happened at Wolong Nature Reserve (Xu et al. 2009) and Zhangjiajie National Forest Park (Zhong et al. 2008). Exceptions exist, and, for example, at Jiuzhaigou Biosphere reserve, a survey of local people revealed that all individuals or their families had been involved in tourism-related activities (Li 2006b). However, even when local people are employed in the new parks, there may still be conflicts. In Northern China, logging bans led to thousands of laid-off workers seeking jobs at new parks. However, the lack of well-paid, full-time work, together with the lack of re-training hampered the transition of forest workers from silviculture to tourism.

Nature-based tourism can itself be a major source of degradation of local ecological, economic, and social systems (Zhou and Huang 2008; Wang and Buckley 2010). The intrusion of large numbers of visitors, with high levels of consumption and high volumes of waste, into natural areas with inadequate waste management infrastructure has already produced considerable damage to ecosystems. This tourism-related damage is particularly detrimental when local communities rely on these ecosystems for their livelihoods. Social problems associated with tourism development have included prostitution, crime, immigration and

indigenous cultural change (Xing and Wang 2006). Such problems often arise when outside tourist operators view the participation of local communities as an added attraction rather than an integral part of the whole venture (Gui et al. 2004). This means that even the social and economic benefits of parks that are emphasized, are diverted from their local source, but as we see from previous analysis (Fig. 2), maintained on a much larger scale than required to sustain individual parks. The goal to create a sustainable parks system that features “ecotourism” by definition, rather than tourism simply with the goal of being in a natural environment, depends on being able to achieve a balance between social, economic and ecological elements on a local community level.

ONGOING DEBATE

Not only are different park types administered by different agencies (Table 1). Both the current administrative system and the financial structure of National Parks in China are further complicated, since a single park may be under more than one type of government jurisdiction. For example, Zhangjiajie was established as a National Forest Park in 1982; then it combined with two adjacent nature reserves (Suoxiyu Nature Reserve and Tianzi Mountain Nature Reserve) to gain status as a UNESCO World Heritage Site (under the name “Wulingyuan Scenic and Historic Interest Area”). In 2000, it was named a National Geological Park and achieved World Geological park status in 2004 (Zhong et al. 2008). Each of these classifications is administered by a different department within a ministry, or even a different ministry, and a park may thus receive directives from multiple administrative agencies (e.g., Huang et al. 2008).

Each administrative system has its own priorities and objectives, making any long-term strategic focus difficult (e.g., Huang et al. 2008). Agencies such as the Ministry of Culture, State Tourism Administration, and State Environmental Protection Agency also have some control over the parks. To complicate matters further, the central government is responsible for approving the designation of National Forest Parks, yet most funding for parks operation comes from provincial or local governments, which also manage the parks. Provincial governments normally provide most of the financial support for infrastructure and facilities during the initial stages of development. They will also cover initial operational expenses. However, the cost-neutral approach that has been adopted for National Forest Park management means that park managers are expected to generate revenue to cover most of their operating costs through access and service fees, leases, and concessions. While parks can apply to the central

government for the funding of special projects such as roads, the central government does not provide funding for operating expenses. In such a financial environment, National Park managers have to explore a variety of options for funding, including tourism development, leased concessions, and Build-Operate-Transfer (BOT) contracts—often at the expense of ecological conservation.

Problems with the overall park system have sparked debate in China on how best to reorganize its management. The debate focuses on two key aspects: organizational arrangements and financial structures. The organizational arrangements issue focuses on whether China should introduce a streamlined, centralized management system, or develop a system based on local governments to manage all types of parks (Zhang 2006). A number of experiments adopting local management systems have been carried out in Anhui, Hunan, and Sichuan provinces. Such systems create local governance bodies that have authority to regulate all activities and infrastructure development within a park boundary. The potential advantage of this institutional arrangement is that local boards can be more attentive to the needs of specific communities, whereas a centralized system would be restricted to a more top-down approach. However, the experiments with local governments have so far been inconclusive, as they continue to struggle to balance the competing priorities of conservation and economic development (Zhang 2006). For example, the ropeways at Mt. Tai (Fig. 5) and the sky elevator at Zhangjiajie (Fig. 6), were both approved by local governments and both resulted in significant adverse environmental impacts such as habitat fragmentation, and soil erosion and compaction.

The debate over the financial structure of parks has focused on whether the government should separate the ownership and management rights of National Parks in an effort to raise revenue. Declining provincial government funding for day-to-day operations in National Parks is placing great pressure on park managers to find alternative sources of revenue. Many park managers are encouraging private sector investment to leverage capital for infrastructure improvements and to generate operating funds. One method currently in use is the BOT model, in which the park's management agrees to allow a private company to build infrastructure (e.g., roads, tourist facilities) inside the park, and in return the company has a specific time period to operate the facility and to charge service fees for its use and maintenance. After the contract term ends, the roads, facilities, and land revert back to park ownership—a system similar to private–public-partnerships (or 3P) projects used in North America to facilitate activities usually considered the responsibility of governments, including the provincial parks of Newfoundland, Canada (LeRoy 2004). Such BOT agreements have the advantage of shifting the

capital burden partially or wholly onto private corporations to build much needed and costly infrastructure, while allowing them sufficient time to earn back revenue in excess of the building costs.

Other funding mechanisms being explored include the creation of public companies that would be listed on the stock exchange to generate capital for use in operations or special projects. China has been using many such methods to leverage private funding for operating its parks, but the concern is that private operations may fail to manage public resources sustainably, leading to a “tragedy of the commons” (Hardin 1968)—ultimately the failure of shared (and finite) resources to supply for the common people due to the interests of the individual (or company). One unusual National Park lease in Sichuan Province, in which the local government allowed a private company to operate an entire park for over 50 years, has been criticized strongly by the public and by the central government (Tang 2006). A potential solution is to establish joint-stock systems, where the ownership (and income) is shared between different groups, as has been done in Wuyishan, Fujian Province (Zhuge et al. 2000), so that private economic interests are not the only factor to prevail in parks management.

Tourism remains a common method of raising revenue, but it too has generated criticism that private sector development inside parks has encouraged development at the expense of conservation. Canada—facing its own large park budget cuts since the mid-1990s—has innovated and introduced both market and social mechanisms into its National Park system, such as co-management with aboriginal groups (Brown-John 2006), increased user fees, the contracting out of park infrastructure or services, and in some instances complete privatization. However, even Canada's National Parks are at risk due to a lack of funding (LeRoy 2004), and China lacks Canada's well-developed legal system to protect from the misuse of natural resources. Compared with North America, China has incomplete legal systems, which makes enforcement of park regulations difficult. Parks are often designated without relevant laws to ensure their protection. Even national laws are lacking to clarify the goals, principles, management structure, financial systems and protection for National Parks. Although each park management agency has its own policies, in the current complexity of China's park system, park authority rests with multiple and often conflicting departments, making it difficult for park managers to follow all the regulations.

FUTURE DIRECTIONS

Since 2003, the central government has partnered with provincial and local governments and park managers to

resolve many of the issues facing China's National Parks. Measures such as promoting environmental protection, dismantling inappropriate buildings, delineating core protected areas, and developing GIS monitoring systems have been undertaken to strengthen the parks system. However, restoration efforts have not always been successful, even in flagship reserves such as the Wolong Biosphere Reserve where efforts failed to provide suitable habitat or deliver appropriate compensation to local farmers for lost income (Xu et al. 2007). In addition, China has recently promulgated new park regulations, including the Regulation for Chinese National Key Scenic Resorts and the Resolution of Chinese Forest Park Development (State Forestry Administration 2006), which lay out future directions for the development of these two types of national parks including planning, ownership, environmental protection, the management of biodiversity, and the encouragement of private involvement.

There are several other actions either planned, or underway, to reform the management of China's National Parks and ensure that they are sustainable. A more rational and science-based approach for planning will ensure that areas of natural and cultural significance are protected. This will involve developing an improved inventory of natural resources such as species counts, vegetation surveys and the analysis of soil and water quality; the quantification of visitor impacts including visitor counting, surveys of visitor satisfaction and experience, and measures of local conflict or benefit; and conducting comprehensive and interdisciplinary park management evaluations by a broader range of professionals. The central government has also begun a process of land ownership reform, clarifying ownership rights so that interested parties understand their legal obligations, and such that land disputes can be settled more readily. Consolidation of the many current park management systems into a single park management system is also likely (Meng 2008), and should resolve some of the problems caused by multiple designations (Wang 2007). The new management system will have an institutional structure capable of coordinating decision-making by inter-governmental agencies across national-, provincial-, and local-scales. A pilot study to test this coordination has been set up at Tangwanghe National Park in Heilongjiang Province (China Ministry of Environmental Protection. 2009).

Reforms will also attempt to increase the participation of forest-dependent communities in the development and management of commercial tourism services, and raise the amount of compensation given to local people whose livelihoods are impacted. This will constitute a major improvement from the current situation, in which limited funding and employment opportunities are offered to local communities affected by the parks; although some (e.g., Li

2006a) have argued that participation in decision-making is less important than the creation of employment opportunities. However, there will need to be much more obvious benefits for local people, including not only revenue sharing, but also general improvements to their quality of life—including improved access to education so that local people can participate more actively in the parks (Lu et al. 2003; Yuan et al. 2008). The need to provide environmental education and interpretation to park visitors (Luo and Deng 2008) will only be met if there is a sufficient supply of suitably qualified park personnel.

The use of third-party certification systems to monitor park management will also be expanded. For example, progress has been made on the certification of National Parks under ISO 14000 environmental management standards, and by the China National Standard of Rating for Quality of Tourist Attractions (GB/T 17775-2003) denotes the standard for National Parks certification from the Standardization Administration of China as given in both the 2003 Standards document and Li 2006b.

A National Park policy alone will be insufficient to conserve China's biodiversity. A number of supplementary actions are needed, including resolution of resource tenures, controlling the trade in natural plants and wildlife, conservation of endangered species and implementation of international conventions (Yang et al. 2004). For this to be done effectively, better collaboration with local people will be required (Gui et al. 2004; Yang et al. 2004). Additional tools, such as park zoning and enforcements on visitor numbers, seasons, and locations of access, can aid in achieving the goals of National Park sustainability.

The development of China's National Parks has been rapid over the last two decades: the area of all parks in China now cover over 16.9% of its total land area, 7.9% above the world average, and higher than the USA's protected area coverage of 12.9% (World Database on Protected Areas 2010). This does not mean that China's biodiversity is, or will be, adequately protected. Currently, there is no correlation between the areas protected as reserves and overall species richness, endemism or threat (Xu et al. 2008). Even the existing parks and reserves will only be sustainable when their objectives balance improving local livelihoods and protecting ecosystems. Unlike parks in more developed countries, the success of China's parks system will be measured by its capacity to reduce poverty, promote long-term rehabilitation of wildlife habitats, and protect Chinese culture and biodiversity.

CONCLUSION

China's National Parks have developed rapidly over the past few decades in response to a burgeoning population

with an increased disposable income, vacation time, and personal transportation. Although the large-scale social and economic drivers of the parks' system are often intact (i.e., ticket sales and jobs increases in proportion with the number of parks and their visitors), the lack of attention to environmental elements means that parks often fall short of meeting the criteria of sustainability [as defined in Holling (2001) and United Nations General Assembly (2005)]. The social and economic benefits are also not often manifested at a local-scale, furthering the inability to meet sustainability criteria. If China's parks continue to operate as they have done in the past, there is a chance of losing the ecosystems and wildlife that visitors come to experience, and furthering the poverty and social inequalities of indigenous and rural people. Young (2006) describes how a devotion to one or two desired objectives can lead to undesirable outcomes in other elements. We see this situation here as environmental degradation at the cost of jobs, ticket sales, and corporate development pressure. As the management of China's parks undergoes a complete overhaul, there is hope that with new structure and local community involvement, China's parks will be able to meet the principles of sustainability, and support ecotourism that conserves both the natural environment and sustains the well-being of local people—without being a financial burden on the system.

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