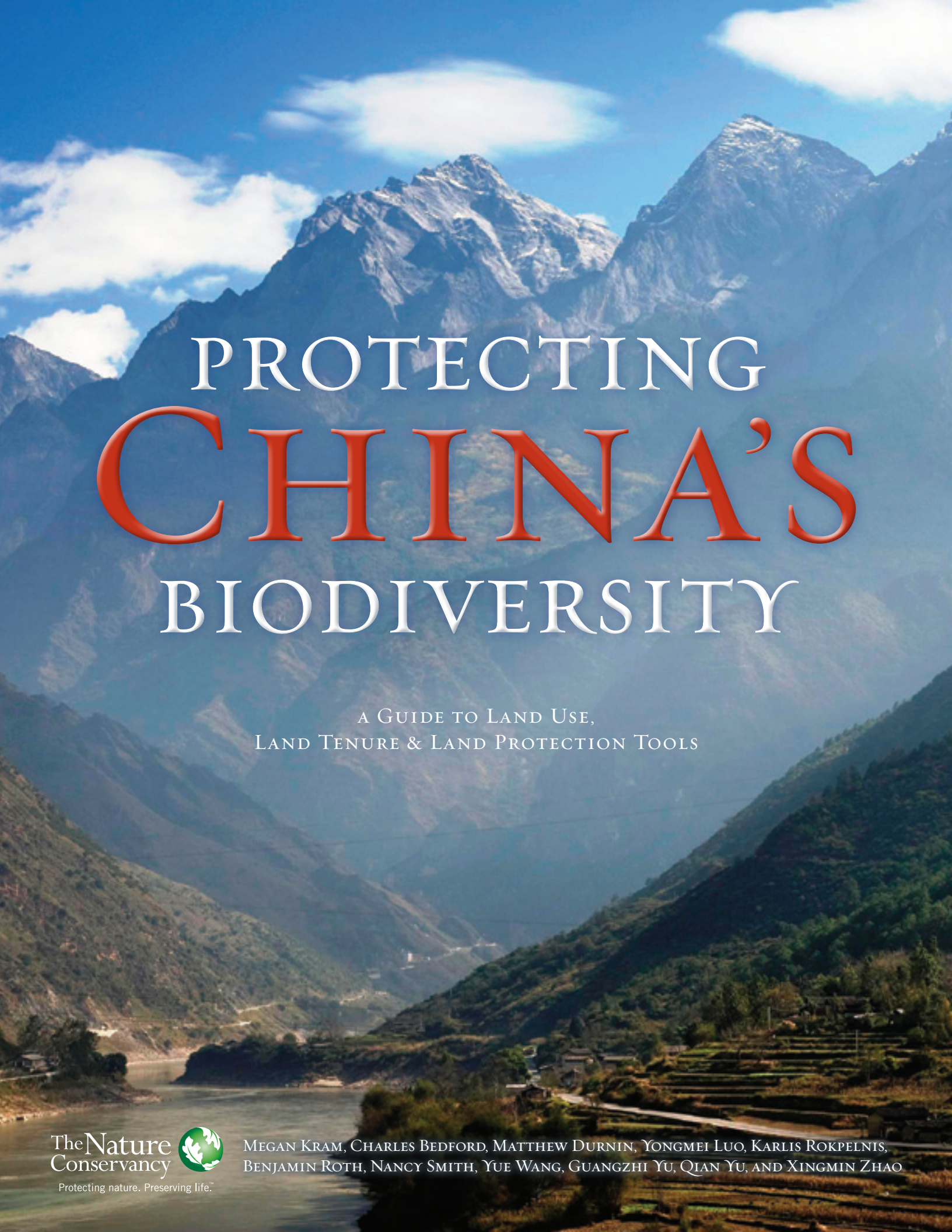

PROTECTING CHINA'S BIODIVERSITY

A Guide to Land Use, Land Tenure & Land Protection Tools

The Nature Conservancy
Protecting nature. Preserving life.™

Megan Kram, Charles Bedford, Matthew Durnin, Yongmei Luo, Karlis Rokpelnis, Benjamin Roth, Nancy Smith, Yue Wang, Guangzhi Yu, Qian Yu, and Xingmin Zhao

The Nature Conservancy

The Nature Conservancy is the leading conservation organization working around the world to protect ecologically important lands and waters for nature and people. The mission of The Nature Conservancy is to conserve the lands and waters on which all life depends. The Conservancy works in all 50 states and more than 30 countries.

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CHINA OVERVIEW MAP

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Introduction

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Executive Summary

Two years ago, The Nature Conservancy (TNC) began significantly expanding our land protection efforts in partnership with the Chinese government. Accordingly, it became necessary to enhance our understanding of Chinese land tenure. The answers to most of our questions were surprisingly hard to come by. Thus, we embarked on journey to compile the disparate information on Chinese land issues into a condensed format. As a result, we have created this book for anyone with an interest in Chinese land issues, and especially for those undertaking land protection initiatives. Contributions from the Bank of America Charitable Foundation made this effort possible.

This book is the first of its kind, providing a comprehensive yet digestible overview of land use, land tenure, and land protection opportunities in China. It is a reference guide that covers the following topics:

- **The "lay of the land"**—an orientation to Chinese biodiversity values and land use practices.

- **Land tenure system**—a description of China's land tenure system, including government agencies involved in land use decisions; the primary factors affecting land use; and how land use decisions are made and implemented.

- **Land protection in practice**—a description and analysis of land conservation tools and case studies.

We are pleased to share our research with you and hope that it sparks more land protection action in China and beyond.

—The Nature Conservancy in China
January, 2012

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Part 1. Lay of the Land

I. Biodiversity

Terrestrial biodiversity in China is among the highest in the world, and inventories of the distribution and status of the country's biodiversity are fairly comprehensive. Because the existing literature thoroughly documents China's biodiversity, this book provides only a brief overview of species diversity, and then describes the locations, types, and conservation issues associated with each major ecosystem. China is home to 15% of the world's vertebrate species and 12% of all plant species, making it third in the world for plant diversity with 30,000 species (Chinese Academy of Sciences, 1992) (Li et al., 2003).

Major land cover types include, in descending order of percentage cover of China's land mass: grasslands (33%); forests (21%); desert and salt flats (20%); barren lands (7%); shrublands (4%); wetlands, rivers, and streams (2%); and glaciers <1%) (Figures ES-1 and ES-2). The primary threats and conservation issues vary from livestock grazing in grasslands, to historic deforestation in forests, to overhunting and habitat destruction in deserts and salt flats (Table ES-1).

Figure ES–1. Grasslands, such as those on the Tibetan Plateau (below) are the predominant land cover type in China. Photo by Li Baoming

Table ES–1. Major land cover types: sub-categories and primary conservation issues and threats

Land cover type	Sub-types	Primary conservation issues and threats
Grasslands	• Meadow steppe • Typical steppe • Desert steppe • Alpine steppe	• Livestock grazing • Demand for energy resources (e.g., coal and oil) • Global climate change • Overhunting
Forests	• Cold temperate coniferous forest • Temperate coniferous and broadleaf mixed forests • Deciduous broadleaf forests • Warm temperate coniferous forest • Sub-tropical and tropical evergreen broadleaf forests • Sub-tropical and tropical coniferous forests • Tropical rainforests	• Historic deforestation • Timber harvesting • Harvesting of non-timber forest products • Conversion to plantations
Deserts & salt flats	• Sandy • Gravel (Gobi) • Loam (loess deposits) • Clay (saline desert) • Rocky (inselbergs)	• Gathering fuels and digging medicinal herbs • Overhunting and habitat destruction • Mining • Misuse of water resources and drought
Wetlands, rivers, and streams	• Lakes of the Qinghai-Tibetan Plateau & Xinjiang Basin • Freshwater marshes • Coastal wetlands • Rivers	• Land conversion • Unsustainable use • Dams • Pollution
Glaciers	• n/a	• Global climate change

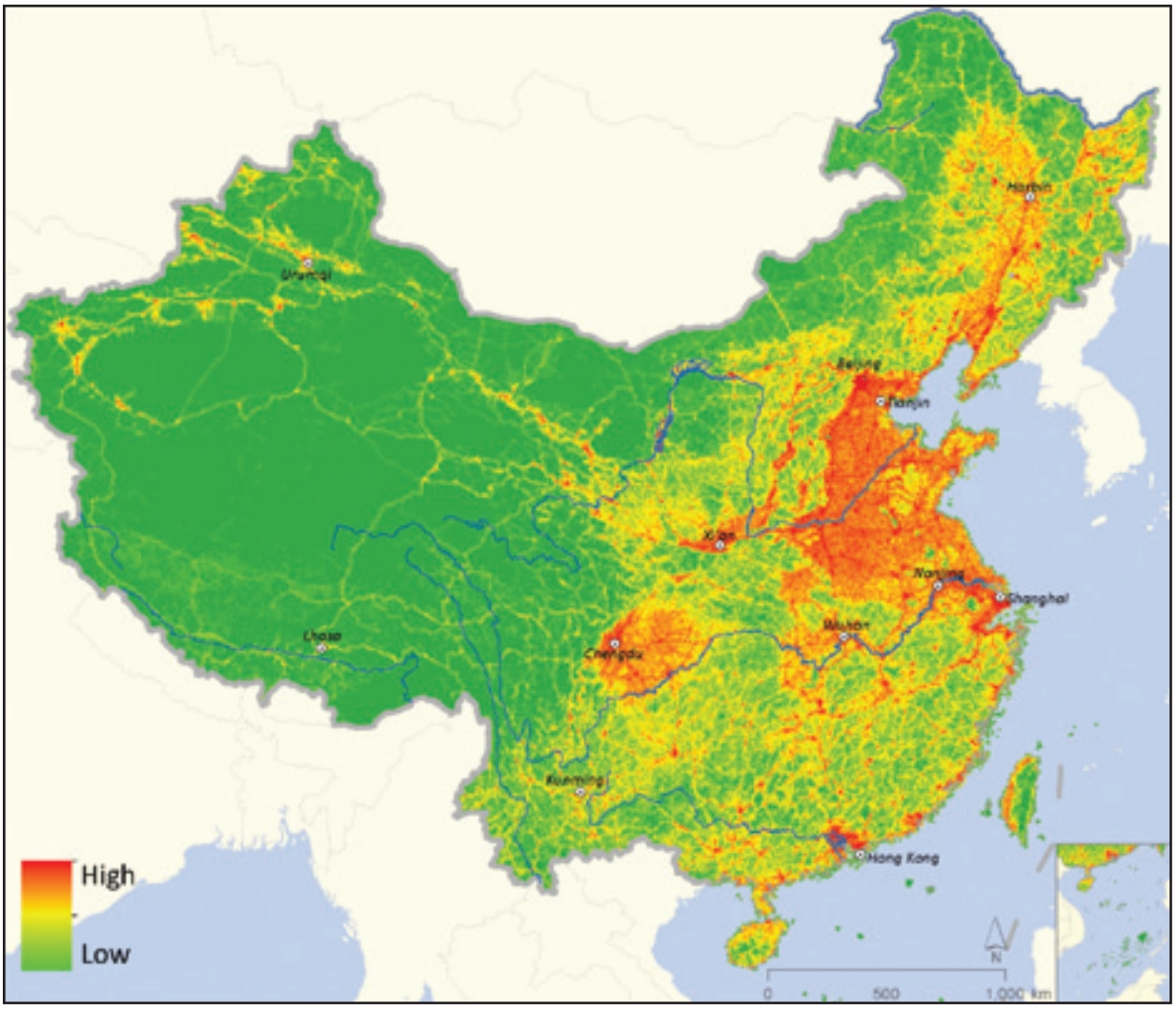
Figure ES–2. Major land cover types of China (Chinese Academy of Surveying & Mapping, 2004)

II. Land Use

This chapter identifies locations and trends in land use, which affects multiple ecosystems and their associated biodiversity. China is experiencing massive land use changes and impacts to the environment due to an unprecedented period of economic growth, which has catapulted it from one of the world's poorest countries 30 years ago to the world's second largest economy today. In fact, the statistics in this chapter changed as quickly as we could write. Based on trends in economic development, population growth, and land use, China's natural landscape will experience significant and increasing pressures well into the future. Some natural landscapes will be converted to non-natural uses entirely. Urbanization will likely have the largest negative impact, while the construction of roads and railways, and the development of energy will cause further fragmentation (Figure ES-3). Other uses such as livestock grazing and timber and forest product harvesting may not entirely convert the natural landscape, but will also have negative impacts. Fortunately, positive changes are also occurring, including massive afforestation efforts and land management/conservation programs.

Figure ES–3. Cumulative land uses (The Nature Conservancy, 2008)

This map combines land uses including major roads and railways as of 1994; and cropland, urban settlements, and other developed areas as of 2004. The largest contiguous blocks of habitat exist in northern and western China.



Urbanization—China has four times the population of the U.S., within roughly the same area. With 1.3 billion inhabitants, 20% of the world's population lives in China. While the rate of population growth has been declining for decades, the total number of inhabitants has been growing and is expected to do so through 2030. China's urban population is growing rapidly; between 1950 and 2009, the percentage of the population living in urban areas quadrupled from 12% to 48% (People´s Daily Online, 2009). Meanwhile, the rural population is declining, opening the landscape in areas that are not urbanized. The forests and agriculturally-productive landscapes of eastern China support far more people and major cities than do the grasslands, deserts, and high mountain regions of the west.

Cultivated land—The vast majority of China's cultivated land lies in eastern China. Nearly all of the arable land, totaling 122 million hectares or 13% of the country, is cultivated (Qiang, 2010). To ensure adequate food production, the government has identified a minimum threshold or "redline" of 120 million hectares of cultivated land (Central Government, 2006). Chinese law also requires a one-to-one replacement (in quantity and quality) of farmland that is converted to other uses. These policies, combined with development and other land use pressures, are shifting the location of farmland. Some cultivated lands are being newly created from other uses such as forestry, grasslands, and wetlands while existing cultivated lands are being converted to other uses such as built-up areas, forests, and grasslands.

Livestock grazing—Livestock grazing occurs throughout China and is possibly the most common use of grasslands. China is the world's largest producer of sheep and goats, and the fourth largest producer of cattle (Food & Agriculture Organization, 2011). Livestock grazing is a major driver of grassland degradation in China. The government has instituted a variety of programs to combat desertification, which has slowed to 3,000 km^2 per year (Reuters.com, 2006).

Forest uses—Since the late 1950s, China's forests have experienced several periods of significant deforestation, which contributed to related environmental disasters such as the Yangtze River flood in 1998. In response, the Central Government has attempted to restore forest cover by investing upwards of 1 trillion RMB into six forest conservation programs, the most significant of which include Grain to Green (1999-2016) and the Natural Forest Protection Program (NFPP) (1998-2020). These programs combine afforestation efforts (primarily in northern China) and timber harvesting bans or limits to restore forest cover. Forest cover was 20% as of 2008; the Central Government aims to achieve 23% forest cover by 2020, and 26% by 2050 (State Forestry Administration, 2007) (State Forestry Administration, 2009).

Mining and energy development—China has one of the largest mining sectors in the world and is the world's largest energy producer (World Bank and International Finance Corporation, 2002) (U.S. Energy Information Administration, 2008). Energy production is on the rise, which will impact biodiversity as China constructs more mines, oil and gas wells, dams and hydropower stations, wind farms, pipelines, and other infrastructure. In particular, western and central China will experience increasing energy development because they hold many untapped and lesser-tapped oil and gas fields, coal reserves, and areas with the highest potential for wind and solar energy production.

Transportation—China is expanding its road and rail networks, investing 5 trillion RMB to construct 40,000 km of railroads by 2020 (china.com.cn, 2008) (Ministry of Railways, 2008). The vast majority of planned and existing transit is located in eastern China. Secondary road construction is more of an emphasis in western China. The rail network is expanding nationwide to connect most cities with populations of at least 200,000 (China Railway Construction Corporation Limited, 2008).

Part 2. Land Tenure

I. Overview

Land tenure is the way in which people access and use land and natural resources. This part of the book teases apart the elements of the current land tenure system in China, as they relate to land protection efforts. It's critical to bear in mind that throughout China it is common for there to be differences between *de facto* and *de jure* land tenure—what the law allows versus what actually occurs on the ground. Laws and policies related to property rights have historically been applied differently across China. Furthermore, China has a history of land tenure overhauls that will likely continue into the future, thus complicating any long-term project or program. Therefore, what is true today may not be true 2 years from now, let alone 50 or 100. That being said, since 1978, the trend has been toward granting more (rather than fewer) property rights to individuals —even if their ability to exercise these rights varies.

II. Legal Framework

The **Constitution of the People's Republic of China** (P.R.C., 1982 as amended) and legislation based on the Constitution form the legal basis for the land tenure system. Legislation and reforms are implemented through regulations and policies, and then coordinated through an elaborate planning system. The **Five-Year Guidelines of the P.R.C.** are the major planning documents, which set priorities for economic development, growth targets, and land reforms; China is currently implementing its *12th Five-Year Guideline*. The **Central Committee of the Communist Party Documents** also set priorities and guide the implementation of laws and policies. China has also passed a host of **environmentally-related laws** that govern the use and management of rural lands, natural resources, and protected areas.

III. Administrative Divisions

The Chinese State (the State) is embodied by the Central Government and is under the leadership of the Communist Party. The Central Government technically maintains authority over all administrative divisions in the country, though the Party is in fact the leading authority. All administrative divisions underneath the Central Government are considered "local government." There are three such levels: **provincial, county, and below-county** (including districts, townships, and villages). Some provinces are also divided into **prefectures**, which is a fourth type of division that oversees one or more county-level governments. Most land administration occurs at the county level.

IV. Land Ownership

There are two types of land ownership in China: **state** and **collective**. Typically, one or more villages manage collectively-owned lands (Figure ES–4). Constitutionally, all land in China belongs to "the people," so technically, land cannot be owned privately. Instead, *use right*s to state and collectively-owned lands are allocated to groups, individuals, or other entities—typically for

30-70 years (see Chapter VIII, Use Rights). As of 1996, state lands totaled 53% and collectively-owned lands totaled 46%; ownership was not determined for the remaining 1% (Ho & Lin, 2003). Collective ownership encompasses nearly all of the cultivated land (94%) and most of the forest (58%) (Qian et al., 2004) (Zhu K., 2011).

Figure ES–4. Collectively-owned lands are managed by one or more villages, such as the Shigu Village area in Yunnan. Photo by Ami Vitale

V. Tenure Reform

In the last 60 years China has witnessed significant transitions in both urban and rural land policies, as the government has experimented with different tenure schemes for cultivated lands, forests, and grasslands to increase productivity and improve local livelihoods. Starting with the rise of the Communist Party and Chairman Mao Zedong, there have been three major waves of reforms:

1. **Private ownership (1930s/1940s to early/mid 1950s)**: The State granted individuals full ownership of agricultural land and forest land within this time period, also known as Mao's First Land Reform. Grasslands remained a common property resource.

2. **Collectivization/No individual rights (early/mid 1950s to late 1970s)**: The State rescinded ownership rights of individuals for agricultural lands, forests, and grasslands through collectivization.

3. **Decollectivization/Private and increasing use rights (late 1970s to present)**: The State granted individuals limited and short-term use rights, but not ownership, during a period of initial decollectivization in the late 1970s to mid-1980s. Since then, the State generally has been increasing use rights granted to individuals, except for forests during the 1980s and 1990s. The Central Government is currently concentrating reform efforts on collective- and state-owned forests in an attempt to bring the forest sector "up to date" with the agricultural sector (Xu et al., 2010). Managers of collectively-owned forestland and forests are issuing use rights to individual households, while a small number of state-owned forest farms are distributing them to former employees (Figure ES–5). Post-distribution, individuals enjoy ownership rights over forests (i.e., the trees and vegetation) and use rights of 30 to 70 years over forestland. Additionally, rules have been relaxed so that many types of private transactions involving forestland and forests are now permissible.

Figure ES–5. The collective forest tenure reform distributes the use rights from collectively-owned forestland to individual households, such as the one shown here in Mingzhu Village, Sichuan. Photo by Steve Blake

VI. Decision-Makers

Any project affecting land use in China will inevitably involve a myriad of government agencies, collective land managers, and use right holders:

Government—Two entities work in tandem to govern China: the Communist Party of China (CPC) and the Central Government (see Chapter III, Administrative Divisions). Within the Central Government, the State Council develops and implements laws through the 90 or so agencies that it manages. The agencies most frequently involved in land use decisions include the Ministry of Land & Resources, Ministry of Agriculture, State Forestry Administration (SFA), Ministry of Housing and Urban-Rural Development, and Ministry of Environmental Protection. For any one plot of land, multiple agencies may be involved in land use decisions based on the natural land cover, current and potential land uses, and protected area designations. County-level agency bureaus have the vast majority of responsibility for land management and administration.

Collective land managers—In general practice, one or more villages or sub-villages manages collectively-owned lands through a villagers' committee. Villagers' committees are comprised of three to seven members according to law, and exercise ownership rights over collectively-owned lands by, for example, distributing use rights to villagers for farming, residence, forest use, or other purposes.

Holders of use rights—The State and managers of collectively-owned land can decide whether and how to transfer use rights to parties such as state- or private-owned enterprises, individuals, and NGOs. Circulation to third parties is also possible, with restrictions (see Chapter VIII, Use Rights). Anyone can hold use rights, including, but not limited to, foreign entities.

VII. Land Use Planning

Land use planning determines which use rights are allowed in which places, thus helping or hindering land protection projects. The Central Government supports planning efforts for cultivated land, forests, energy development, transportation, and other land uses. Plans are legally binding, and proposed changes must be approved by the agency which originally approved the plan. That being said, implementation and enforcement is highly variable, and unplanned development is a common occurrence. Nationwide planning efforts most closely related to biodiversity protection include:

General land use planning—This refers to the Central Government's planning efforts that focus on agricultural land, construction land, and unused land. The most recent General Land Use Plan covers the years 2006-2020. Maintaining cultivated lands is the emphasis of these plans, though they also accommodate campaigns and initiatives to alter land use and development patterns, such as Grain for Green and the Natural Forest Protection Program.

Conservation planning—Conservation planning identifies important areas for protecting and managing high-priority ecological values. Over the last decade, the Central Government has supported at least four efforts to identify important areas for ecological values: Public benefit forests, Ecological Function Conservation Areas (EFCAs), Priority Areas for Biodiversity Conservation, and Major Function Zoning. Of note for land protection efforts, Priority Areas for Biodiversity Conservation are included in the Central Government's *National Biodiversity Conservation Strategy and Action Plan (2011-2030)* (see Part 3, Land Protection in Practice).

VIII. Use Rights

Allowable and prohibited uses—Land use plans and use rights consider the allowable and prohibited land uses identified by law. For example, the law encourages afforestation and restricts timber harvest, and is fairly ambiguous about other allowable and prohibited activities in forests. For grasslands, the law explicitly allows for livestock grazing and emphasizes the need to revegetate and protect important grasslands, while effectively allowing for just about any activity. The law encourages the use of "unused lands" such as deserts and high alpine areas, but provides limited guidance regarding this use.

Contract duration—Contract durations for use rights vary by land use/land cover type. From a land protection perspective, the most significant contract durations include 30-50 years for grasslands; 30-70 years for forestlands; 70 years or more for forestland "with special trees"; and up to 70 years for the rehabilitation of desertified land.

Rights and obligations—Allowable rights and perceptions thereof vary greatly, even within villages. Nonetheless, the law delineates contractual rights and obligations associated with use rights such as: the right to independently make decisions about land within the parameters of the contract; the right to make a profit on the land and natural resources; and the right to circulate use rights to other parties within the original contract duration. With the exception of cultivated lands, which must be used productively, the law is unclear as to whether it is permissible to acquire use rights but not use them (i.e., "non-use rights"), as land protection efforts may seek to do.

Registration—Chinese law requires documentation of ownership and use rights through contracts and the Central Government is pursuing a uniform registration system. However, according to one estimate, it could take 30-50 years for the Chinese government to register the 1.5 billion parcels of rural land in China (Landesa, 2009). Somewhere between 40-55% of rural Chinese households presently lack certificates and/or contracts validating their land rights (China Law & Practice, 2009) (Deininger et al., 2004) (Prosterman & Zhu, 2009) (Rural Development Institute, 2010). Where certificates or contracts exist, many are incomplete or inaccurate (Deininger et al., 2004). Such variances will continue to cause tenure security issues, land disputes, and relatively slow and inefficient land transactions.

IX. Tenure Security and Enforcement

While tenure security has improved over the last several decades, it continues to be a major challenge in China. Land reallocations and takings have caused tenure instability in rural areas. Land reallocations refer to administratively-led reallocations of land among households within villages, and were the main cause of conflicts during the 1990s. *Takings* refer to land conversions (such as to commercial development) by local leaders, which have been the main source of conflicts since the 2000s (Vendryes, 2010). Land protection projects must proactively address these vulnerabilities to ensure long-term success.

X. Other Tenure Factors Affecting Land Protection

Funding for land protection and management—Funding available for environmental protection appears to be substantial and growing. For example, China is investing upwards of 1 trillion RMB (approximately US$142 billion) to implement ecological conservation and restoration programs such as Grain for Green and the NFPP (see Part 1, Lay of the Land). Similarly, the Central Government's expenditures on environmental protection activities increased by 19% from 2008-2009, from 104 billion to 124 billion RMB (Shik & Yim, 2009). While overall expenditures on environmental protection are trending upward, those for protected areas still may be low compared to other countries (Liu, et al., 2003).

Protected species—Different government agencies have developed several lists of species warranting protection. However, from a legal perspective, only the State Key Protected Species lists have any "teeth." For example, a development project affecting a protected species on these lists may require an Environmental Impact Assessment (EIA).

Autonomous areas and minority populations—More than 60% of China's territory is inhabited by minority populations, although recognized ethnic minorities comprise just 8% of China's population (National Bureau of Statistics, 2011). All citizens are assigned one of the 56 officially-recognized ethnicities upon birth, the majority being identified as Han. Given the vast areas inhabited by ethnic minorities and the high conservation value of many minority "autonomous areas," ethnicity is likely to play a significant role in land protection projects. The presence of ethnic minorities or the ethnic autonomy status of a project location may require accommodations to local customs, language, spiritual traditions, and potential ethnic tensions and sensitivities.

Part 3. Land Protection in Practice

With no sign of growth slowing, land protection is becoming progressively more important to the persistence of China's, and the world's, wealth of biodiversity. Fortunately, China has a history of land protection efforts, primarily through protected areas. In 1956, the government designated the Ding Hushan Nature Reserve in southern China's Guandong Province as the country's first official protected area. Today, protected areas (particularly nature reserves) are the most widely-recognized and most frequently applied means for protecting land in China (Figure ES–6). They are not, however, the only means of conserving land within the current land tenure regime.

China boasts a relatively extensive protected area network, but it is generally understood that it does not effectively conserve the full suite of species and ecosystems that represent the nation's biodiversity. In recognition of this challenge, the Central Government released *The National Biodiversity Conservation Strategy and Action Plan (2011-2030)*. The plan's agenda for future conservation includes three important provisions, among many others (Ministry of Environmental Protection, 2011)

- Identifies 35 Priority Areas of Biodiversity Conservation (see Part 2, Land Tenure);
- Requires that 90% of China's critical species and key ecosystems be protected by 2015; and
- Requires that China's biodiversity be "effectively protected" by 2030.

Each province in China is developing its own more detailed plan. For example, Sichuan's plan commits to adding at least five new protected areas and allocates 930 million RMB toward their management (Watts, 2010). In addition to fueling the creation of new protected areas, the Biodiversity Action Plan may spark the application of other land protection tools.

I. Tools & Strategies

In April 2011, TNC held a land protection conference in China, during which participants characterized the conservation opportunities in China as follows:

- Strengthen the management of existing protected areas;
- Designate new protected areas, including National Parks; and
- Support new private tools outside of protected areas.

The first opportunity—strengthening the management of protected areas—is well-documented in the literature. The second strategy is currently being tested by provincial governments in Yunnan and Heilongjiang. The third strategy is the least explored and applied on the ground to date. To be successful, all of these opportunities will require public-private partnerships and careful consideration of stakeholder needs.

Figure ES–6. China has an extensive protected area network, including the Changbaishan Nature Reserve (below). Photo by Shen Xiaohui

Strengthen the management of existing protected areas—China's protected area network covers terrestrial ecological resources, geological areas, freshwater resources, and oceans. The most common types of terrestrial protected areas include nature reserves, forest parks, and scenic areas, which total more than 5,000 units and cover approximately 19% of the country (Table ES–2). Nature reserves provide the most stringent protection, at least according to law. Forest parks emphasize protection, with public access as a secondary goal. Scenic areas also protect ecological values, but typically emphasize tourism much more than do nature reserves and forest parks.

Effective management of protected areas has been a challenge since their inception. By the late 1990s, the Central Government reported that at least one-third of protected areas suffered from "the three withouts": recurrent funding, a management agency, and staff (State Council, 1998). These problems remain today. Other major challenges include limited community support and tenure issues, such as unmarked protected area boundaries and disputes over customary use rights.

Table ES–2. Summary of protected areas for terrestrial ecological resources: number, area, and percent of land in China. The protected areas are listed in descending order of number by designation type.

Type	Number	Thousands of hectares	Percent of land in China*	Source
Nature Reserves	2,541	147,735	15.5%	(Ministry of Environmental Protection, 2009)
Forest Parks	2,458	16,525	1.7%	(Zhang & Long, 2010)
Scenic Areas	906	18,240	1.9%	(Xinhua News Agency, 2009)
National Parks	2	80	0.01%	(MacLeod, 2008) (Wang, 2010)
Total	**5,907**	**182,580**	**19.11%**	

* There are also two types of international designations designed to protect terrestrial ecological resources: Biosphere Reserves and World Heritage sites. These designations typically overlay the other designations in whole or in part.

** Assuming a total land area of 956 million hectares

To resolve these challenges, over the last 20 years, the government has started to emphasize the quality of protected areas—not just quantity—through legislation and on-the-ground action. For example, the government has drafted (but not adopted) a comprehensive "protected area law." Additionally, since 1991, the Central Government has issued policies to enhance nature reserve management. Furthermore, SFA and TNC created 51 model nature reserves across the country, the first of which was Songshan Nature Reserve outside of Beijing (The Nature Conservancy, 2010). To facilitate additional land protection, SFA or other agencies could consider expanding the network of model nature reserves, potentially with the continued involvement of TNC and/or other NGOs. The government might also consider private management of protected areas, recognizing that any private party would need to have a vested interest in maintaining the values for which the protected area was established.

Designate national parks and other new protected areas—The National Park concept is relatively new to China. National parks provide an opportunity to generate much more income than nature reserves, in part because of their fresh new name which attracts tourism and investment; they may also protect biodiversity more effectively than scenic areas. There are two national parks in China at present—Pudacuo National Park established in 2006 in Yunnan Province (Figure ES–7) and Tangwanghe National Park established in 2008 in Heilongjiang Province. These efforts are the same in name only—they were created by different agencies under different guidance. In 2008, the Central Government designated Yunnan as the pilot province for national parks. Yunnan plans to create 11 more national parks by 2020, in part due to the financial success of Pudacuo, which generated 117 million RMB in 2009 alone (up from 6 million RMB in 2005, pre-designation as a national park; see case study) (State Forestry Administration, 2008).

Figure ES–7. Pudacuo National Park aims to protect resources while generating revenue through tourism. Photo by Zhu Li

Support new private tools outside of protected areas—The increasing transfer of use rights to individuals presents new opportunities for conservation by private parties such as NGOs and developers, who can acquire use rights in order to protect natural values. While more than 3,500 environmental NGOs operate in China, few have direct involvement in land protection (People´s Daily Online, 2008) (Wu, 2002). Some of the larger organizations such as TNC, World Wildlife Fund, and Shan Shui Conservation Center have the greatest involvement, but due to limited budgets and staff, as well as political constraints, they are mainly conducting small-scale demonstration projects in cooperation with the local or central government. Thus, although the use of private tools, where applied, has been promising in conserving biodiversity, such efforts are still relatively few and far between.

Private reserves—For the purpose of this book, private reserves are defined loosely as areas that non-governmental entities establish to protect ecological values, and that rely largely on private financing. The government may or may not recognize these areas formally as protected areas. There are a few examples of private reserve projects including Mutagh Ata, through which a philanthropist acquired the use rights to millions of hectares around the Mustagh Ata mountain and worked with the local people to establish a tourist guide service; the Yu Jia Shan Nature Reserve, which a businessman established as China's first, and perhaps only, private nature reserve; and the Motianling Land Trust Reserve, through which TNC is purchasing 50-year forest use rights to approximately 20,000 forested hectares in Sichuan Province (Figure ES–8).

Figure ES–8. Community meeting to discuss the Motianling Land Trust Reserve project. Photo by Zhao Peng

Conservation developments—Also known as limited development projects, conservation developments may be defined as "projects that combine land development, land conservation, and revenue generation while providing functional protection for conservation resources" (Milder, 2007). The main difference between conservation developments and private reserves is the source of income: Private reserves rely primarily on private financing, while conservation developments include a significant commercial revenue generation component. One example of a project "in-the-works" is the Great Wall Resort outside of Beijing, which aims to construct a luxury spa and eco-resort on less than 10% of its parcel while conserving the remainder for nature. Another project, already operational, is Monkey Island, through which a developer leased use rights and created a monkey park on 5.6 hectares of an island complex. Monkey Island's revenues (25 million RMB in 2009) benefit the local economy and an adjacent nature reserve, and the monkey population has rebounded.

Certification projects—Certification projects focus on sustainable resource management across an entire project area, and may include "micro-sites" of protection. Such projects create opportunities for private involvement in biodiversity protection, even if it is not the primary intent. Forest certification for timber harvest began in China in the early 2000s, and today there are upwards of 58 such projects (Forest Stewardship Council, 2011). China's first certified forest certificate was granted to the Changhua Forest Farm in Zhejiang Province (Hinrichs, 2009). In 2004, China initiated forest carbon sequestration pilot projects in six provinces, one of which may be the world's first forestry carbon sequestration project (Gao). That same year, TNC and Conservation International initiated the Tengchong County Forest Carbon Offsets Project in Yunnan. Unlike most (or potentially all other) certification projects in China to date, this project includes biodiversity enhancement as a primary objective. It is certified as the world's first "gold-level" project of the Climate, Community, and Biodiversity Alliance, a designation which requires that the project has "net positive impacts on biodiversity" as well as livelihood (Climate, Community, & Biodiversity Alliance, 2008).

Conservation leases and easements—Private parties involved with the projects described above have used conservation leases. For the purpose of this book, the term "conservation lease" refers to the transfer of use rights from one party to another for a specified period of time, through contracts or use rights certificates, for conservation purposes (see Part 2, Land Tenure). The lease model is well-suited to the current land tenure system in China, since leases can be written to coincide with the 30-70+ year terms of use rights contracts. Conservation easements are similar to leases, except that they are permanent and irrevocable. Thus leases provide more flexibility, while easements provide a greater guarantee of land protection over the long run. Leases are already being utilized in China, and easements may be ripe for application in the future, should the government ever adopt a true private property regime in which the land itself—not only the use rights—could be bought and sold.

II. Protected Area Reference Guide

This chapter expands on Chapter I, Tools and Strategies, to provide more information about protected areas for nature reserves, forest parks, scenic areas, and international designations. The chapter addresses the purpose, number and extent; establishment; and allowable and prohibited uses for each of the aforementioned types of protected areas. The chapter does not address national parks, which have not yet been adopted by the Central Government. Nor does it address areas that can effectively protect biodiversity but are not commonly recognized as protected areas, such as public benefit forests and Ecological Function Conservation Areas (see Part 2, Land Tenure).

III. Case Studies

Six case studies illustrate the practical application of each tool and strategy within the current land tenure regime, with the hope of sparking more such efforts:

- Pudacuo: China's first national park
- Yu Jia Shan: China's first private nature reserve
- Songshan: Evolution of a model nature reserve
- Monkey Island: Conservation development for primates, people, and profit
- Great Wall Resort: The making of a model conservation development
- Tengchong County Carbon Offsets: Protecting land through a gold-level certification project

Each case study also provides examples of public-private partnerships and stakeholder benefits, which help ensure project success.

Authors' Note

Two years ago, The Nature Conservancy (TNC) initiated this project as an internal, effort to enhance our understanding of Chinese land tenure, as a foundation for expanding our land protection efforts with the Chinese government. However, our questions quickly blossomed into broad-ranging topics from "What are the trends in urbanization and energy development?" to "Who are the decision-makers for land transactions?" to "What are the opportunities for 'private' land protection?" Soon we realized that the answers to most of our questions were not readily available in a condensed format, and sometimes were not available at all. Thus, we decided to write a book that would be freely available to the public, recognizing that anyone with an interest in Chinese land issues may benefit from the research. Contributions from the Bank of America Charitable Foundation made this project possible.

We have made every effort to include accurate and up-to-date information throughout the book, recognizing that some of the statistics, particularly in the Chapter II (Land Use) of Part 1 (Lay of the Land) were changing as fast as we could write. For example, when we started the project, China had the third-largest installed wind capacity in the world. Just two years later, China was ranked the top wind-producer. Thus, consider this book a baseline—a point-in-time snapshot—of land use, land tenure, and land protection in China. While we do not presently have plans to update this book in the future, we will upload relevant information into Wikipedia (www.wikipedia.com) so that it may be updated and remain available to the public over time.

Forward

As my friend Zhao Shan and I surveyed the scene before us, I realized that the Chinese government exerts power equally through action and inaction. We were in a mountain valley two hours north of Beijing, surrounded on two sides by the Great Wall, regarding an enormous warehouse that had popped up over the course of two weeks. It sat on a terraced field that had previously, and for generations, produced corn for resident farmers. In anticipation of Zhao Shan's company purchasing the farmers' use rights, one of the farmer's city relatives built the cheap structure to inflate the compensation package. While this building violated many laws, the local government initially took no action to remove it or punish the builder; ultimately, the government confiscated the building only after significant pressure from an interested party. The government has never systematically addressed entrepreneurial growth in this northern corridor out of Beijing, which has sprung up to serve a growing urban middle class looking for a "country" experience—anything from a meal at a country diner, to a you-catch-it trout farm, to a weekend retreat at a resort or second home.

Zhao Shan wants to prevent just this type of ad-hoc development in this valley. His vision is to control the valley from ridgeline to ridgeline, create a small footprint resort, establish an organic farming model, protect the remainder of the land for its natural values, and offer villagers higher wages and greater opportunity than they have now. Whether he will succeed depends on his skill at negotiating a complex set of hurdles that include garnering consent from the residents and leaders of the valley and then proceeding through the local government development process, which will require an open bid process based on his development plan. It won't be easy.

Issues regarding the allocation of land have shaped China's history for thousands of years, especially through three waves of land reforms during the last century. The crumbling of the imperial structure ushered in decades of instability characterized by shifting ideas about equitable land distribution. Tensions between landlords and tenants mounted though time, and chaos climaxed in the late 1940s when hundreds of thousands, if not millions, of landlords perished as massive land reforms transferred land ownership from landlords to tenant farmers. Since this first wave of land reforms (1930s/1940s to early/mid 1950s), there have been two others that have aimed to increase equality and land productivity: a second wave that rescinded ownership rights and established a commune system (early/mid 1950s to late 1970s), and a third wave that granted use rights (but not ownership) to individuals and, generally increased these rights over time (late 1970s to present). Individuals can now hold use rights for 30 years to upwards of 70 years and can legally renew them (though renewal has yet to be tried). Despite all of the tenure changes over the years, farmers and tenants remain deeply tied to the land—any sort of condemnation for public or private use is often accompanied by controversy, violence, and even, shockingly, protest suicides by the landholders.

While these reform efforts may not have fulfilled all of their objectives, and in practice often failed to respect established rights, they have helped to create an economic environment that is unprecedented in its growth and development. Land has been conveyed in ways to allow for private companies to build skyscrapers for "as far as the eye can see" in metropolitan areas such

as Beijing and Shanghai. Land rights are now accepted as collateral for loans, from the micro to the mega. Many local governments are financed by land rights sales, presumably with an eye toward transitioning to a more sustainable revenue source once all the land is conveyed.

While China's economy is burgeoning, unrelenting development is depleting the nation's wealth of biodiversity. This mega-diverse country is home to an amazing 15% of the world's vertebrate species and 10% of the world's plant species. But as development booms, the Yangtze River dolphin—declared "functionally extinct" in 2006 after construction of the Three Gorges Dam —may not be the only species lost. Massive urbanization, ever-increasing livestock grazing, escalating energy development, and intensifying forest uses are but a few of the activities transforming China's landscape.

On a positive note, I have been struck by China's actions to promote sustainable development and protect its natural heritage through a variety of conservation and restoration efforts. For example, China has established more than 2,500 nature reserves and has invested upwards of 1 trillion RMB in forest conservation programs, including the planting of more than 49 billion trees. The government has also committed, through its National Biodiversity Conservation Strategy and Action Plan (2011-2030) to protect 90% of China's protected species and key ecosystems in nature reserves by 2015, and to "effectively protect" China's biodiversity by 2030. To achieve these goals, more effective on-the-ground conservation action will be needed. Many protected areas are "paper parks"—parks in name only, in which illegal development is rife—and afforestation efforts, many of which have planted a limited number of species, have done little to benefit biodiversity.

This situation begs the questions: What more can be done to protect China's biodiversity, in a lasting and effective manner, particularly in the context of the country's complex and ever-changing land tenure? And, given my background as a lawyer, public land manager, and private lands conservationist in Colorado over the last 20 years, and now in Asia, I can't help but wonder how private parties such as NGOs and private developers can work together with the government to create innovative and meaningful conservation solutions.

It is in this context that I have become involved with a variety of efforts to explore how various land protection tools from around the world can be shared across boundaries and adopted to new contexts. This book is one of those efforts. This book aims to provide a comprehensive yet digestible overview of land use, land tenure, and land protection opportunities in China in order to improve the success of land protection initiatives. Gaining this understanding is a necessity for NGOs, conservation developers, and government entities seeking to protect land in a strategic manner. There is immense need and opportunity to protect land in China, even under the current land tenure system; but there is equally as much risk of wasting scarce resources by choosing projects that are infeasible or impractical, or whose costs outweigh the benefits. For those new to China, this book can "jump-start" their work. And for Chinese natives and others with in-country experience, it may hone their techniques, or close gaps in their understanding, making them more effective land managers and conservation practitioners. More broadly, the book may appeal to anyone involved in land transactions in China for

conservation or other purposes. Conservation practitioners working in other countries may especially value the case studies of Chinese land protection projects, with an eye toward replication in their own environments.

In the interest of providing a comprehensive yet digestible overview, the book can be used as a reference guide that offers the following:

- An orientation to **"the lay of the land"** of Chinese biodiversity values and land use practices;

- A description of the **land tenure system** including government structure and agencies involved in land use decisions; the primary factors affecting land conservation and other uses; how land use decisions are made and implemented; and

- A description and analysis of **land protection in practice**, including opportunities and related case studies.

It is the hope of all the authors that we accomplish the above goals in providing a useful resource for conservation practitioners, NGOs, government land managers, and communities. I know that I speak for all of us when I say we are excited about the prospect that this resource will spark new conversations about conservation in China and beyond.

—Charles Bedford, Deputy Regional Managing Director,
The Nature Conservancy's North Asia Program
Beijing, 2012

Laojunshan National Park. Photo by Xu Jian

PART 1:
LAY OF THE LAND

I. Biodiversity

This part of the book provides context for land protection efforts in China aimed at protecting biodiversity. Chapter I, Biodiversity, provides an overview of the country's wealth of species and ecosystem values. Because ample existing literature thoroughly documents China's biodiversity resources, this chapter does not delve into great detail. Rather, it provides a brief overview of species diversity, and then describes the locations, types, and conservation issues associated with each major ecosystem. Chapter II, Land Use, identifies the locations and trends in land use across the country, such as urbanization, livestock grazing, forest uses, and energy development, which can affect multiple ecosystems. Not surprisingly, China's flora and fauna are experiencing ever-increasing impacts as a result of China's unprecedented economic growth and exploding demand for natural resources. Thus, new and strengthened land protection efforts are required to ensure the persistence of China's rich biodiversity heritage (see Part 3, Land Protection in Practice).

A. Species Diversity

Terrestrial biodiversity in China is among the highest in the world, and research and inventories of the distribution and status of the country's biodiversity are fairly comprehensive. China is home to 15% of the world's vertebrate species including wildlife such as the Yunnan golden monkey, black-necked crane, and the iconic giant panda. China also accounts for 12% of all plant species in the world, ranked third in the world for plant diversity with 30,000 species (Chinese Academy of Sciences, 1992) (Li et al., 2003). Of the vertebrates, 667 (11%) of genera are endemic, while 275 (7%) plant genera are endemic (Table 1–1). It is estimated that approximately 233 vertebrate species face extinction while 15%-20% of the wild higher plants in China are endangered (Ministry of Environmental Protection, 2011). The species richness of terrestrial mammals varies throughout the country (Figure 1–1).

With such a wealth of biodiversity, a disproportionate amount of conservation resources appear to be dedicated to single-species conservation efforts, particularly the giant panda, but also species such as the South China tiger and the baiji dolphin (Durnin, 2011). Pandas arguably warrant robust conservation action, given that their wild population is less than 2,500 mature individuals and their current habitat is confined to isolated patches on six mountain ranges (World Wildlife Fund). However, China's vast array of biodiversity values may suffer given that much conservation attention goes panda and other conservation efforts focusing on single species (Figures 1–2 and 1–3).

China's species diversity can be attributed to wide variations in climate, geomorphology, and ecosystems. Covering approximately 9.6 million km^2, China is bordered by the Pacific Ocean on the southeast and extends northwest to the center of the Eurasian continent. The country spans 5,500 km and 50 degrees of latitude from north to south, covering multiple temperature zones from cold temperate to tropical. Precipitation mainly comes from monsoons that originate in the Pacific and Indian oceans, respectively. As a result, the eastern and south central areas of

China are moist and wet, while the northwest is arid and bordered by a transitional semi-arid zone of steppe vegetation. The terrestrial ecosystems reflect the latitudinal distribution of these zones and climate.

Table 1–1. Plant and vertebrate species in China (Chinese Academy of Sciences, 1992) (Li, Song, & Ouyang, 2003)

	Known Species			Known Genera and Endemism		
	China	World	Percent of World Species	Number of Endemic Genera in China	Total Number of Known Genera in China	% of Known Genera that are Endemic
Mammals	500	4,000	12.5%	72	514	14.0%
Birds	1,244	9,040	13.8%	112	1,244	9.0%
Reptiles	376	6,300	6.0%	26	371	7.0%
Amphibians	284	4,184	6.8%	30	273	11.0%
Fishes	3,862	19,056	20.3%	427	3,882	11.0%
Subtotal, Vertebrates	**6,266[1]**	**42,580**	**14.7%**	**667**	**6,284**	**10.6%**
Bryophytes	2,200	16,600	13.3%	13	494	2.6%
Pteridophytes	2,600	10,000	26.0%	6	224	2.7%
Gymnosperms	200	520	38.5%	10	34	29.4%
Angiosperms	25,000	222,000	11.3%	246	3,123	7.9%
Subtotal, Plants	**30,000[2]**	**249,120**	**12.0%**	**275**	**3,875**	**7.1%**
GRAND TOTAL	**36,266**	**291,700**	**12.4%**	**942**	**10,159**	**9.3%**

[1] *The National Biodiversity Conservation Strategy and Action Plan*, issued in 2011, states that the number of vertebrates total 6,455 and comprise 13.7% of the world's vertebrate species (Ministry of Environmental Protection, 2011).

[2] *The National Biodiversity Conservation Strategy and Action Plan* identifies 34,984 plant species (Ministry of Environmental Protection, 2011).

Figure 1–1. Species richness of terrestrial mammals by county (Xie et al., 2009)

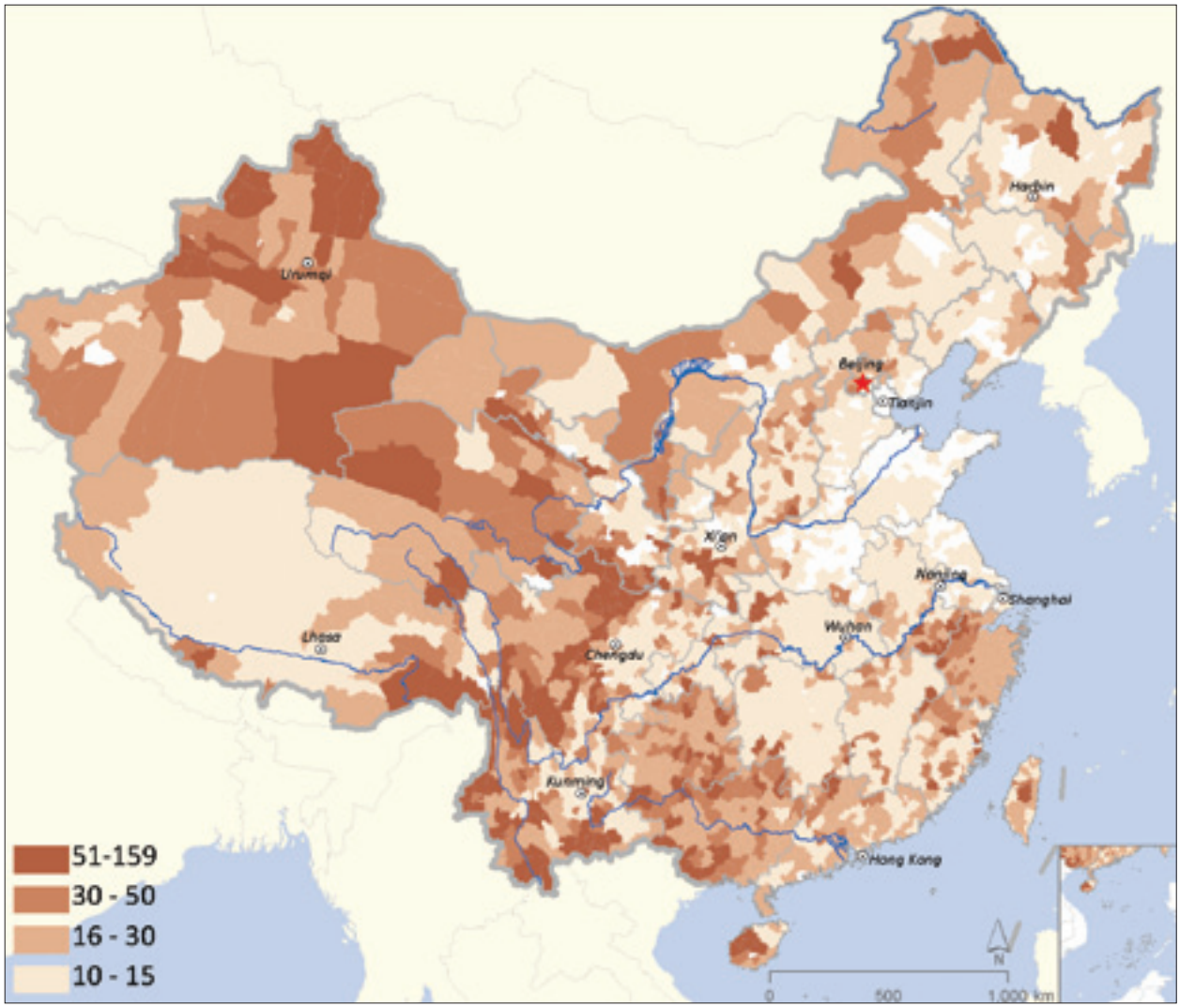
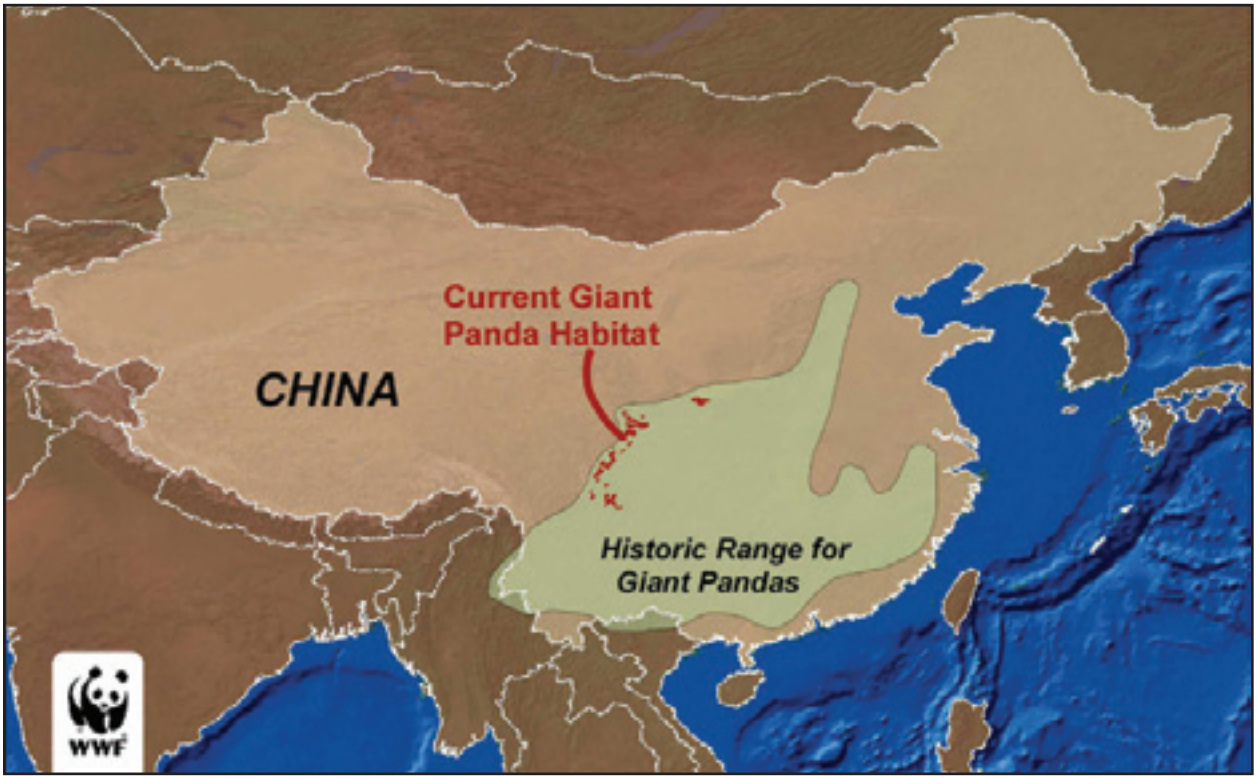


Figure 1–2. Significant resources are dedicated to single-species conservation efforts, such as the giant panda. Photo by Zhou Lulu

Figure 1–3. Current habitat and historic range of the giant panda in China (World Wildlife Fund)



B. Ecosystem Diversity

Terrestrial land cover includes, in descending order of percentage cover: grasslands; forests; deserts and salt flats; barren lands; shrublands; wetlands, rivers, and streams; and glaciers (Figures 1–4 and 1–5; Table 1–2). Most of these land covers include sub-categories, especially grassland, forest, desert, and wetland. This chapter describes the sub-categories and major conservation issues; Table 1–3 includes a summary.

This chapter does not describe one type of land cover—shrublands—due to limited information availability. In short, shrublands are widely distributed throughout China, from the tropics to temperature zones, and from sea level to 5,000 meters elevation. Given their wide range and distribution, there is great biodiversity within shrublands. They typically consist of vegetation less than 5 meters in height, with vegetative coverage exceeding 30-40% (Chinese Academy of Sciences, 2007).

Figure 1–4. Major land cover types of China (Chinese Academy of Surveying & Mapping, 2004)

Table 1–2. Land cover types and size

Ecosystems	Millions of hectares	Percent of China's land area
Grasslands	318	33.1%
Forests	198	20.6%
Desert & salt flats	191	19.9%
Barren lands	64	6.7%
Shrublands	39	4.1%
Wetlands, rivers, and streams	21	2.2%
Glaciers	5	0.5%
Other	124	12.9%
TOTAL	**960**	**100%**

Figure 1–5. Land cover as a percentage of China's land mass

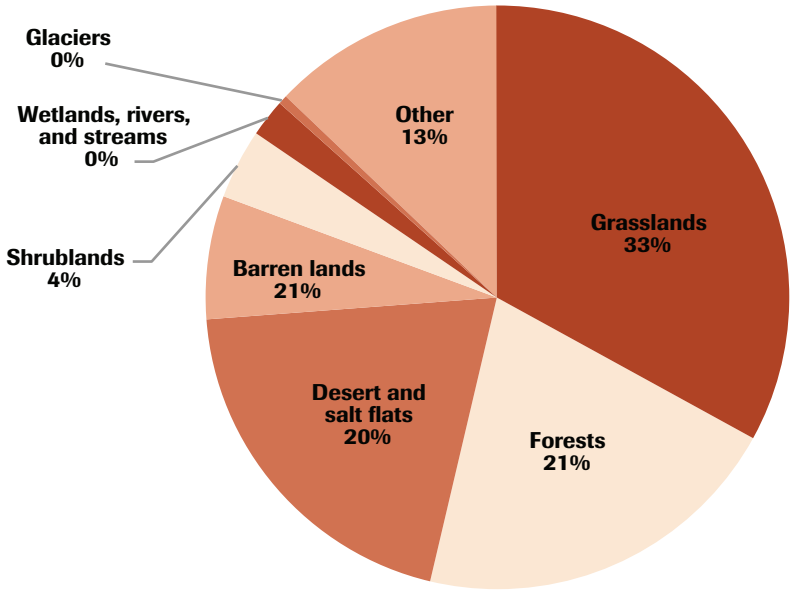


Table 1–3. Summary of sub-categories and major conservation issues for each land cover type

Land cover type	Sub-types	Conservation issues and threats
Grassland	• Meadow steppe • Typical steppe • Desert steppe • Alpine steppe	• Livestock grazing and demand for energy resources (e.g. coal, oil) • Global climate change • Overhunting
Forest	• Cold temperate coniferous forest • Temperate coniferous and broadleaf mixed forests • Deciduous broadleaf forests • Warm temperate coniferous forest • Sub-tropical and tropical evergreen broadleaf forests • Sub-tropical and tropical coniferous forests • Tropical rainforests	• Historic deforestation • Timber harvest • Harvest of non-timber forest products • Conversion to plantations
Desert & salt flat	• Sandy • Gravel (Gobi) • Loam (loess deposits) • Clay (saline desert) • Rocky (inselbergs)	• Gathering fuels and digging medicinal herbs • Overhunting and habitat destruction • Mining • Misuse of water resources and drought
Wetlands, rivers, and streams	• Lakes of the Qinghai-Tibetan Plateau & Xinjiang Basin • Freshwater marshes • Coastal wetlands • Rivers	• Land conversion • Unsustainable use • Dams • Pollution
Glaciers	• n/a	• Global climate change

1. Grasslands

DESCRIPTION

As the dominant land cover in China, grasslands account for approximately 33% of the land area (Figure 1–6, Table 1–2). Approximately 78% (318 million hectares) of the grasslands in China occur in the northern temperate zone (Kang et al., 2007). China's northern grassland ecosystems play a critical role both ecologically and socioeconomically, supporting diverse plant and animal species and traditional human uses such as livestock grazing to produce meat, milk, wool, and other animal products. These ecosystems are distributed across approximately 4,500 km, stretching from the northeastern plains adjacent to Mongolia to south of the Tibetan Plateau.

Figure 1–6. Grasslands and livestock on the Tibetan Plateau. Photo by Li Baoming

The grassland ecosystems in China can be classified as meadow steppe, typical steppe, desert steppe, and alpine steppe, as described below (Figure 1–7) (Kang et al., 2007):

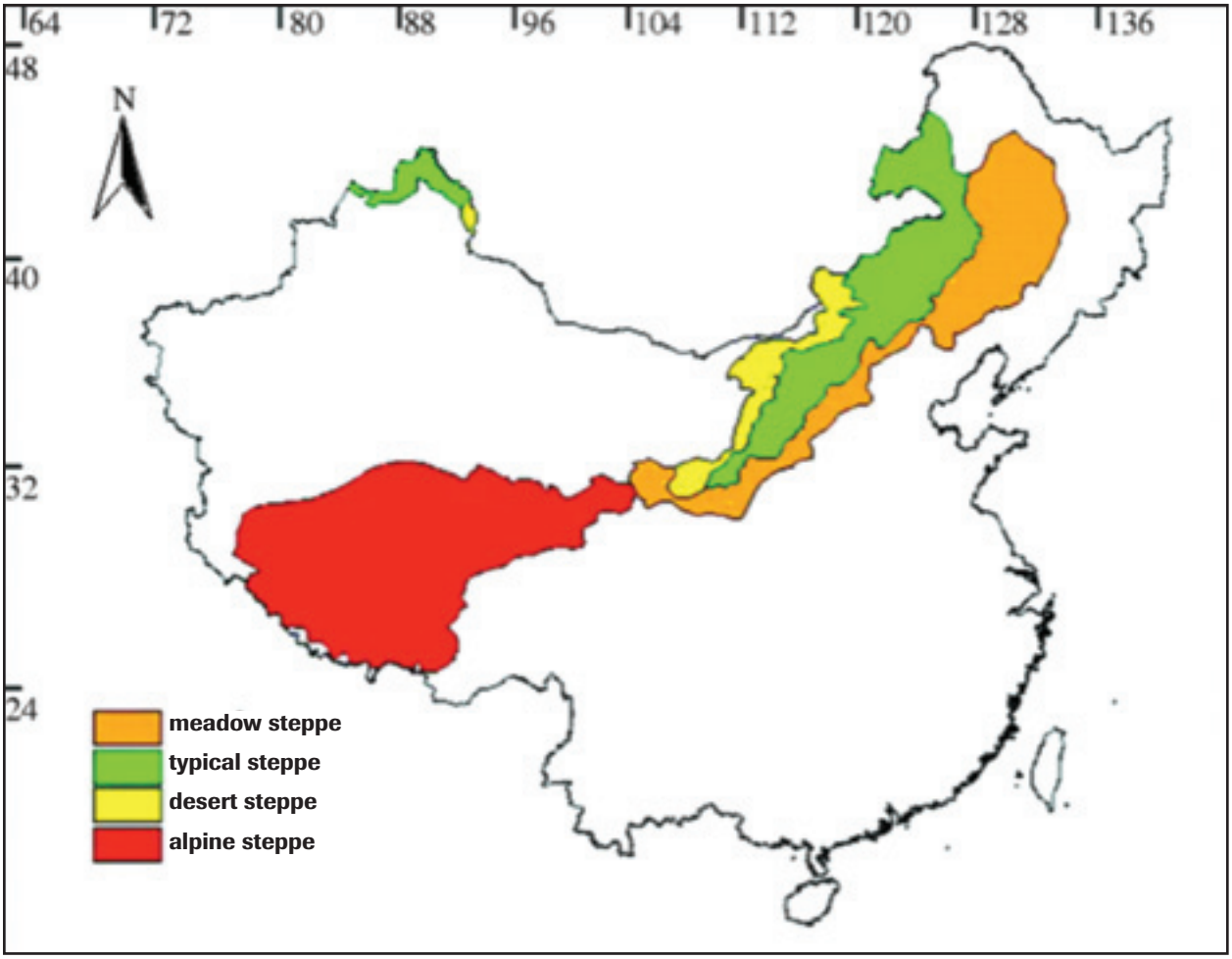
Meadow steppe occurs on the most moist and fertile sites in areas with annual precipitation around 450 mm and soils with high organic content (Kang et al., 2007). Typical species include *Stipa baicalensis, Bothriochloa ischaemum, Cleistogenes mucronata, Leymus chinensis, L. angustum,* and *Filifolium sibiricum*.

Typical steppe occurs in areas with semi-arid climates and annual precipitation of around 350 mm. Plant species are usually drought tolerant and typical species include *Stipa* sp., *Festuca* sp., *Leymus,* sp., and *Artemisia* sp.

Desert steppe occurs in the most arid regions with annual precipitation of between 150 and 250 mm. Typical species include *Allium polyrhizum* and several *Stipa* species.

Alpine steppe is typically found in southwest China (Qinghai and Tibet) between 2,300 and 5,300 m in elevation and is inhabited by cold- and drought-tolerant grasses and small shrubs. Typical species are purple feathergrass (*Stipa purpurea*), *S. subsessiliflora, Festuca olgae, Carex moorcroftii,* and *Artemisia salsoloides wellbyi.*

Figure 1–7. Distribution of grasslands in China by sub-type, adapted from (Kang et al., 2001)



CONSERVATION ISSUES AND THREATS

Nearly 90% of the grasslands in China are now degraded to varying degrees, with one-third of grasslands classified as severely degraded (SDPC, 1996) (SEPA, 1998) (Meyer, 2006). The situation is particularly grave in Inner Mongolia, where land degradation is generally believed to be a major reason for the increasing frequency of severe sandstorms and dust storms in northern China in recent decades. The environmental and economic future of the Inner Mongolia grasslands is at risk and in need of sound ecosystem management strategies for grassland sustainability. Primary causes of grassland degradation include the following:

Livestock grazing and demand for energy resources—An increasing demand for animal products and energy resources (e.g. oil and coal), in response to sharply rising human populations, has placed tremendous pressures on grassland ecosystems. For example, on the Tibetan Plateau, now accessible by rail, a growing human population and increasing numbers of cattle and sheep are putting pressure on the fragile alpine landscape and competing with wildlife. Grazing reduces vegetative cover and leaves grasslands more prone to erosion and dust storms, which can cause crop loss, human and livestock deaths, and other problems. Chinese experts estimate the number

of livestock grazing on some grassland areas in China's "Middle West" exceeds sustainable limits by 50-150% (Waldron et al., 2008). New roads and railroads also open the possibility of mining. The threat of invasive species, while not an immediate issue, will become problematic as these lands become more accessible. See Chapter 11, Land Use, for more information about livestock grazing and transportation construction.

Global climate change—Although overgrazing, mining, conversion to cropland, and development are the primary drivers of grassland degradation, in recent years, global climate change and droughts have exacerbated the problem. For example, Sanjiangyuan on the Qinghai-Tibet Plateau has witnessed unusual warming, and by some estimates temperatures in the region have increased by 0.88°C in the past 50 years and approximately 0.18°C per decade. This is greater than the global average temperature change, which increased by around 0.06°C per decade over last 100 years and to 0.16 -0.20°C in the last decade (European Environment Agency, 2010). Warming has caused glacial retreat, permafrost melting, and drainage and degradation of numerous lakes and wetlands critical to the region's rivers and grasslands. These trends pose significant challenges to conservation and herding communities. All grassland regions of East Asia are experiencing drying of rivers, wetlands, and the grasslands that provide sustenance to native animals and a livelihood for traditional herders. The thawing of permafrost and glaciers could have especially significant consequences downstream from Tibet, as major Chinese and Southeast Asia population centers depend upon river water coming from the plateau.

Overhunting—Finally, overhunting across the grasslands and poaching in protected areas is leading to widespread wildlife declines. For example, in the 1980s and into the mid-90s, international demand for fine wool led to the illegal taking of as many as 20,000 animals per year (Wildlife Conservation Society, 2010). Easier access to the grasslands could see this number increase.

2. Forests

DESCRIPTION

As the second largest land cover type in China, forest ecosystems encompass approximately 198 million hectares, or nearly 21% of the terrestrial land base (Table 1–2). For comparison, the forest cover of the U.S. was approximately 302 million hectares as of 1997 (Smith & Darr, 2004). China's forests are far less extensive today than they once were, due to conversion and unsustainable timber harvest. However, massive afforestation efforts are reversing that trend (see Land Use chapter). In fact, the Central Government has a goal of increasing forest coverage to 20% by 2010, 23% by 2020, and 26% by 2050 (State Forestry Administration, 2007)[3]. Nonetheless, China's forest resources are still relatively scarce on a per-capita basis; as of 2005 its per-capita forest cover was one-fifth of the world average, and its per-capita standing stock of timber was approximately one-seventh of the global average (Demurger et al., 2005).

[3] Official government estimates of forest cover range by at least 5%. In its Seventh National Forest Resource Inventory (2004-2008), the State Forestry Administration tallied 195 million ha or 20% of the country (Petry & Zhang, 2009). The Ministry of Land and Resources, by contrast, estimates 236 million ha of forest cover or 25% of the country (Table 1–5).

Little of China's original forest cover remains. According to one country-wide study of forest cover, approximately 53.1 million hectares of forest were lost or converted to other uses from 1700-2005. Forest loss was greatest in the northeast (Liaoning, Jilin, Heilongjiang) and southwest (Sichuan, Guizhou, Yunnan, Tibet) from 1700-2005, with total forest losses of 22.8 million hectares and 8.7 million hectares respectively. As examples of forest loss in specific areas, 70% of the natural forest cover was cleared from the three largest coniferous forest regions in China including Daxing'anling and the Changbai Mountains in northeastern China, and the Hengduan Mountains in the southwest (Li et al., 2003). In northern China, less than 10% of the original forest cover remains, and the western provinces of Ningxia, Xinjiang, Gansu and Qinghai have less than 4% forest cover (Zheng et al., 2001).

Currently, China's forests are concentrated in the northeastern, southwestern, and southeastern provinces (He et al., 2008) (Figure 1–9). As a result of the deforestation, secondary forests now form the majority of broadleaf forest cover and old-growth deciduous broadleaf forests are scarce. The largest forested area of 10 million hectares covers parts of Inner Mongolia and Heilongjiang provinces (Chen & Chen, 1991). There is nearly an equal distribution between coniferous forests (approximately 50%; Figure 1–8) and broadleaved forests (approximately 47%) across the country (Chen & Chen, 1991) (Wang, 2006).

Figure 1–8. Coniferous forests of Meili Snow Mountain, looking at Yubeng village, Yunnan Province. Photo by Xu Jian

China's forests can be broadly divided into seven sub-types (Figure 1–9):

Cold temperate coniferous forest dominated by larch (*Larix* spp.), spruce (*Picea* spp.), fir (*Abies* spp.), and pine (*Pinus* spp.). These forests are largely distributed in habitats dominated by cool-cold and humid conditions. Some 200 vertebrate species can be found in these forests, of which more than 40 are mammals and nearly 120 are birds.

Temperate coniferous and broadleaf mixed forests are dominated by Korean pine (*Pinus koraiensis*). This is a major forest type in the eastern part of northeastern China. Once an important timber base, this forest type today is severely limited. Well-conserved *P. koraiensis*-broadleaved deciduous forests occur mainly in nature reserves in the Xiao Xingan and Changbai mountains.

Deciduous broadleaf forests are widely distributed on hills and from mid-elevation to subalpine zones on mountains in the warm temperate and tropical zones. The diverse oak forests (*Quercus* spp.) and mixed oaks and deciduous broadleaved forests are typical of the warm temperate zone. There are approximately 11 types of oak forests extending from northern to southern China, each dominated by a different species of oak. Due to its extremely limited distribution, one of the more unique deciduous forests in China may be the beech (*Fagus* spp.) forests which occur only in mountains in the subtropical zone in the east central to south central part of the country (Chen & Chen, 1991). There are 9 types of birch forests in China, all distributed in mountainous regions. Three types of alder (*Alnus* spp.) forests occupy humid sites. Birch forests and poplar (*Populus* spp.) forests are typically secondary forests succeeding montane broadleaved forests and coniferous forests, under natural conditions. In subtropical regions, deciduous broadleaved forests are secondary forests that develop mainly after the original evergreen forests are damaged.

Warm temperate coniferous forest can be classified into four broad forest types by their dominant species as: Chinese red pine (*Pinus tabulaeformis*), Japanese red pine (*Pinus densiflora*), lacebark pine (*Pinus bungeana*), and Chinese arborvitae (*Platycladus orientalis*). Only the first is widely distributed. Most of the Pinus tabulaefonnis forests are concentrated in northern China. Pinus densiflora forests appear on the Shandong and Liaodong peninsulas. Platycladus orientalis forests are widely distributed, but restricted to small areas. The distribution of Pinus bungeana is limited to northern China the southern part of Shanxi, western Hubei, and northern Sichuan.

Sub-tropical and tropical evergreen broadleaf forests are widely distributed in the humid subtropical zone in China. The subtropical region occupies a quarter of the total area of the country. There is a very rich diversity of plant species distributed throughout the evergreen broadleaf forest area, including more than two-thirds of the genera (2,674) and one-half of the species (14,600) occurring in China (Li et al., 2003).

Forests in this region are typically mixed forests dominated by one or more evergreen species such as chinquapin (*Castanopsis* spp.), *Cyclobalanopsis* spp., *Machilus* spp., or *Schima* spp. There is a slight difference between the easternmost and westernmost evergreen forests within China's subtropical zone (Chen & Chen, 1991). In the western part, the most widely distributed forests

are *Castanopsis delavayi* forests. In the eastern part, there are more forest types, each with one of the following as the dominant species: *Castanopsis eyrei*, ring-cupped oak (*Cydobalanopsis glauca*), *Castanopsis carlesii*, *Castanopsis fargesii*, Tabu-No-Ki tree (*Machilus thunbergii*),and *Schima superba*.

Sub-tropical and tropical coniferous forests are abundant in China. Chinese red pine (*Pinus tabulaeformis*) forests from the warm temperate zone give way in the tropical and sub-tropical zones to Chinese red pine (*P. massoniana*) forests in the south and east, and to Yunnan pine (*P. yunnanensis*) and Chinese white pine (*P. armandi*) in the west (Li et al., 2003). A special note is required for another representative forest consisting of what are often referred to as "living fossils." This forest consists of species dating back to the Tertiary period such as *Cathaya argyrophylla*, golden larch (*Pseudolarix kaempferi*), dawn redwood (*Metasequoia glyptostroboides*), water pine (*Glyptostrobus pensilis*), taiwania (*Taiwania cryptomeriodes*), and *T. flousiana*. These species occur independently of each other, are dispersed in small isolated areas, and appear to be gradually declining (Chen & Chen, 1991) (Li et al., 2003).

Tropical rainforests in China are seasonally wet or dry rainforests occurring on the margins of the typical rainforest ecosystem range. Chinese tropical rainforests are an extension of the Indian and Malaysian rainforests, and are distributed in areas with sufficient year-round rainfall and heat. Rainforests dominated by Cotton tree (*Bombax malabaricum*), Chinese albizia (*Albizia chinensis*), and *Vatica astrotricha* are the most common and widely-distributed rainforest types in China. Sitting at the extreme northern edge of the south Asian tropical forest range, China has only a small area of tropical forest distributed in southern Guangdong, Hainan, southern Guangxi (Guangxi Zhuang Autonomous Region), southern Yunnan, and southeastern Tibet. Despite their relatively limited distribution (0.5% of China's land area) the tropical rainforest in China contains some of the country's highest biodiversity, with 25% of the country's species (Li et al., 2003). Hainan and southern Yunnan have more extensive rainforests than any other part of China, but with increasing human pressure for development, these forests are disappearing quickly. Rainforest coverage is also changing rapidly due to expanding human populations. For example, the rainforest on Hainan covered 25.7% of the total island area in the early 1950s, but within 30 years had decreased to 10.6%, of which just 6% is natural (Chen & Chen, 1991).

CONSERVATION ISSUES AND THREATS

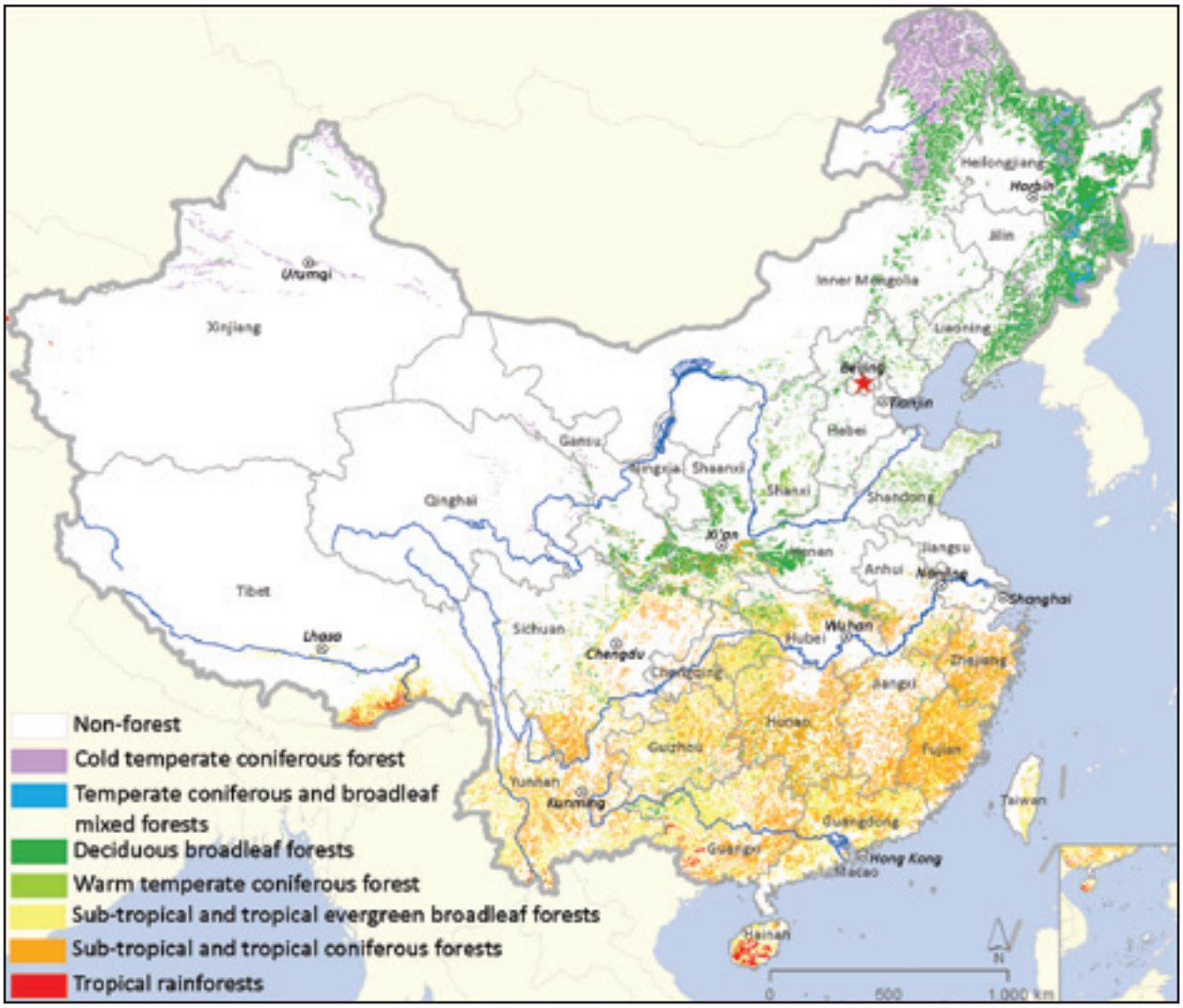
Historic deforestation—As mentioned, over the past several hundred years, forest cover declined greatly due to conversion to cropland, logging, and clearing for development. Forests are still recovering. Over the last 60 years, since the creation of the People's Republic of China in 1949, there have been several periods of intense deforestation. During the Great Leap Forward (1958-1961), citizens felled and burned thousands of hectares of trees for steel production, with only limited reforestation. Then, starting in the late 1960s, the government encouraged conversion of forests to agricultural land in order to increase grain self-sufficiency. Finally, in the 1980s, peasants were granted use rights to forests and many immediately harvested the trees for short-term profit, fearing that the use rights would be rescinded before they could reap the benefits (Demurger et al., 2005).

As deforestation escalated, so did ecological consequences including soil erosion, desertification, natural disasters, and loss of biodiversity. One of the most devastating results of deforestation was the flooding of the Yangtze River in 1998. The flood, China's worst in 44 years, drowned more than 4,000 people and rendered 14 million homeless (PBS.org). Deforestation was largely to blame; because 85% of the Yangtze River Basin had been logged, monsoon rainfalls coursed relatively freely toward the river.

Timber harvest and harvest of non-timber forest products—See Chapter II, Land Use.

Conversion to plantations—There has been a tendency toward replacing evergreen broadleaf forests with plantations of coniferous species such as Chinese red pine (*Pinus massoniana*) and Chinese fir (*Cunninghamia lanceolata*), leading to decreasing species diversity in these forests (Chen & Chen, 1991).

Figure 1–9. Major forest sub-types (Chinese Academy of Sciences)



3. Deserts and Salt Flats

DESCRIPTION

China boasts some of the world's largest and most extreme deserts such as the Taklamakan Desert just north of the Tibetan Plateau. They are expanding, due to desertification of grasslands and other ecosystems. The tallest sand dunes and highest elevation alluvial fan in the world are located in north-central China in the Badain Jaran desert. China's deserts are roughly distributed northwest of the Lang, Helan, and Burhan Budai mountain ranges and cover an area of approximately 191 million hectares, or approximately 20% of China's terrestrial area (Figure 1–11) (Li et al., 2003)(Alles, 2007).

The desert regions of China form the largest arid area in the temperate climate zone in the world (Warren-Rhodes et al., 2007). The distribution of China´s deserts is closely related to the pattern of rainfall, which is in turn strongly influenced by the East-Asian and Indian summer monsoon and the moisture sources from the South, Southwest and Southeast. Like most deserts, China's are characterized by strong continentality (large thermal variation), low precipitation, extreme climatic variations, intense sunshine, and strong winds and sandstorms in winter and spring (Warren-Rhodes et al., 2007). In winter, the desert regions are dominated by the Siberian high-pressure system, causing extremely dry and cold climates.

According to their substrata, deserts may be divided into **sandy, gravel (Gobi), loam (loess deposits), clay (saline desert) and rocky (inselbergs)**. The first two types cover the largest areas in China. In general, and in the classification in Figure 1–11, if more than 50% of an area is gravel or cobble plains it is considered Gobi desert.

Compared with other terrestrial ecosystems, the species composition of deserts is relatively poor. The total number of seed plants encountered in the vast desert areas of northwestern China is just a little more than 600. The Junggar Basin plain is considered to have the richest flora, yet, only about 500 species have been recorded. The flora of the Tarim Basin comprises less than 200 species (Ministry of Environmental Protection, 2004).

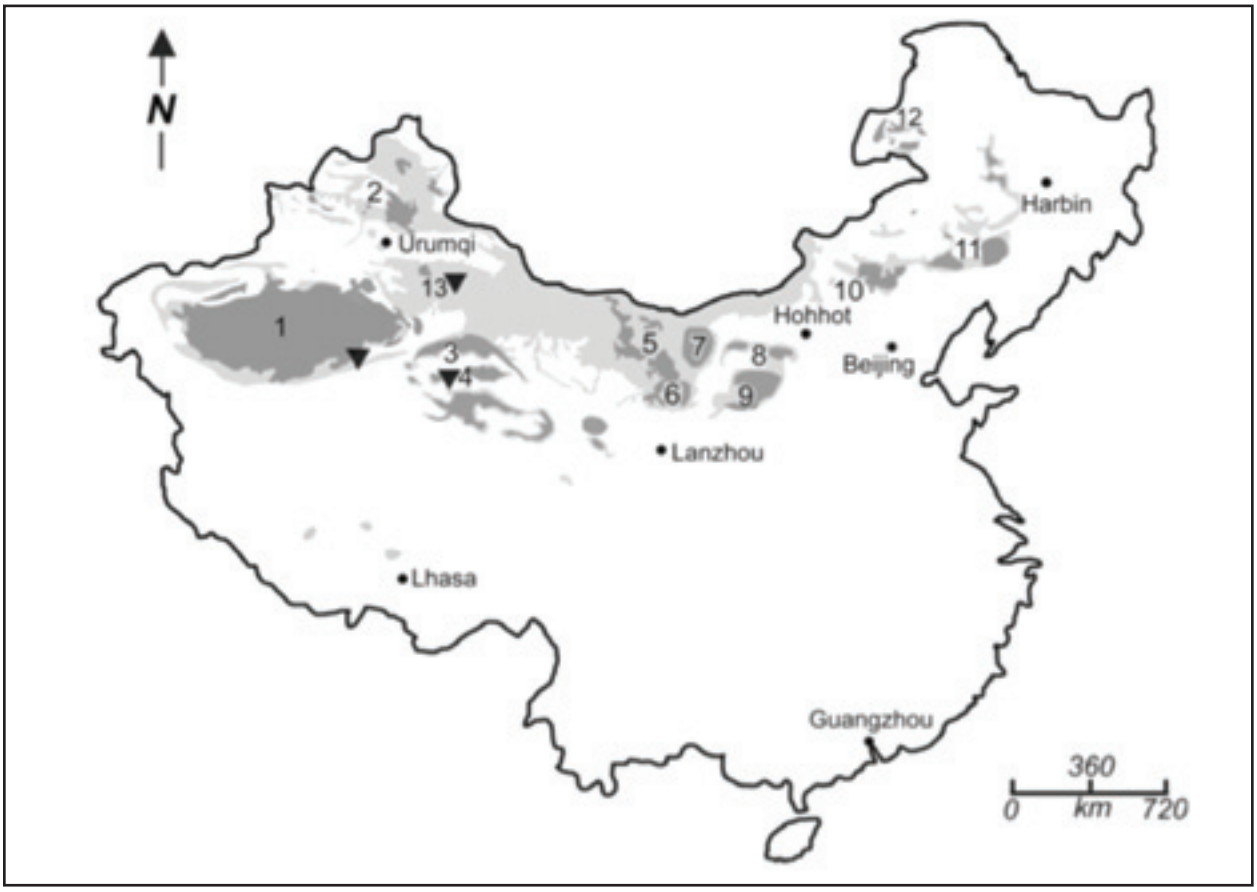
Despite the limited species composition, relatively unique ungulates developed in the deserts of China—including ancestors of its present livestock. These include, for example, Przewalskii's wild horse (*Equus przewalskii*), kulan (*E. hemionus*), bactrian camel (*Camelus bactrianus*), yarkland deer (*Cervus elaphus yarkandensis*), saiga antelope (*Saiga tatarica*), Przewalskii's gazelle (*Procapra przewalskii*), and gazelle (*Gazella subguttarosa*) (Figure 1–10). Other species that come down from the surrounding arid mountains to the borders of such deserts include alpine ibex (*Capra ibex*), mountain sheep (argali; *Ovis ammon*), and Himalayan blue sheep (*Pseudois nayaur*). Rodents, especially representatives of the Dipodidae (12 species) and Gerbillinae (*Cricetidae*) (7 species), are particularly conspicuous in desert ecosystems. Compared with adjacent humid regions, there is less bird and larger mammal diversity, though birds of prey are more numerous (12 species).

Reptiles are widely distributed in the desert ecosystems of northwest China, where both species and individuals are numerous. The most commonly seen are species of toadhead agamas (i.e., lizards; *Phrynocephalus*) and *Eremias*, a genus of wall lizards. In the western part of the deserts of Xinjiang lives a unique terrestrial tortoise, the Russian tortoise (*Testudo horsfieldi*).

Figure 1–10. Desert with Przewalskii's gazelle (Procapra przewalskii), Qinghai. Photo by Ge Yuxiu.

Figure 1–11. Map of sandy and Gobi deserts (*shamo*) and sandy lands (*shadi*) in China (Warren-Rhodes et al., 2007), redrawn from (Zhu et al., 1980)

Dark gray: sandy deserts and lands; **light gray**: Gobi desert. All of the light gray areas along China's border with Mongolia can collectively be referred to as the central Gobi Desert and cover over 100 million hectares (Li et al., 2003) (Warren-Rhodes et al., 2007).



1. Taklamakan Desert
2. Gurbantunggut Desert
3. Kumtag Sandy Desert
4. Qaidam Basin Desert;
5. Badain Jaran Desert
6. Tengger Sandy Desert
7. Ulan Buh Sandy Desert
8. Qubqi Sandy Desert
9. Mu Us Sandy Lands
10. Hunshandake Sandy Lands
11. Horqin Sandy Lands
12. Hulun Buir Sandy Lands and
13. Turpan Kumtag Sandy Desert.

CONSERVATION ISSUES AND THREATS

Due to harsh environments and relatively sparse human populations, it is generally thought that the impacts of human activities in deserts are relatively low. However, many of China's deserts, and particularly those in the northwest, have been severely damaged. Desert biological resources are being swiftly depleted. Primary threats include:

Gathering fuel and digging medicinal herbs—It is estimated that annually in desert areas of the Junggar Basin, on average, each inhabitant family utilizes at least two tons of saxoul *(Haloxylon ammodendron and H. persicum)*, a tree common to Gobi deserts. For example, in the Alxa desert of Inner Mongolia, the saxoul forests were reduced by 60% from 1958-1978 (Ministry of Environmental Protection, 2004). In addition, valuable medicinal plants, such as licorice *(Glycyrrhiza* spp.*)*, ephedra *(Ephedra przewalskii)*, cynomorium *(Cynomorium songaricum)*, and others have all decreased due to severe uprooting and collection. These species are all well-adapted to the harsh desert environment and play an important role in soil stabilization and hydrologic cycles. They also provide micro-habitats (e.g. cover and food) for many vertebrates and invertebrates. Their loss is leading to greater desertification and reduction of wildlife habitat.

Overhunting and habitat destruction—Przewalskii's horse *(Equus przewalskii)*, saiga antelope *(Saiga tatarica)*, Xinjiang tiger *(Panthera tigris lecoqi)*, desert bear *(Ursus arctos pruinosus)*, bactrian camel *(Camelus bactrianus)*, onager *(Equus hemionus)*, and Przewalskii's gazelle *(Procapra przewalskii)* are all desert dwellers, and were numerous in the deserts of Northwest China a few centuries ago. Przewalskii's horse disappeared from the wild in the 1960s mainly because of overhunting. The saiga antelope, originally widely distributed in Middle Asia, Mongolia, and the Junggar basin of China, has not been seen in China since the early 1950s.

Mining—Large scale prospecting and exploitation of petroleum and mineral ores, as well as the construction of roads and cities, threatens wild animals and plants through habitat destruction and disturbance, and by blocking the migration routes of wild animals.

Misuse of water resources and drought—Increasing the use of surface and groundwater resources in these arid regions for agriculture, mining, and other uses has lowered water tables in many areas of north and northwest China. This reduction in water availability has led to loss and degradation of desert plant ecosystems. Decreasing soil moisture can stop germination in many agricultural and natural plant species and lead to insect infestation, plant disease, and loss of plant cover.

Continued overuse and mismanagement of water resources in regions of northwest China, such as Gansu's Hexi corridor, have led to serious environmental problems such as reduced water flows in most rivers, drying up of terminal lakes, reduced water quality in the lower reaches of many rivers, increased soil salinity, and ultimately loss of plant cover. In 2004, severe drought and reduced water flow may have led to or compounded droughts in China's southern provinces, which were the worst droughts in 50 years. In the hardest-hit region of Guangxi Province, 1,100 reservoirs went dry and hydropower generation reduced dramatically (State Forestry Administration, 2002).

4. Wetlands, Rivers, and Streams

DESCRIPTION

The Convention on Wetlands recognizes 31 natural and 9 artificial wetland types, all of which are found in China (State Forestry Administration, 2002). Total wetland area is approximately 60 million hectares, including natural and artificial wetlands. Natural wetlands account for less than half of the total wetland area, covering 21-26 million hectares or between 2.2-2.7% of China's land area. Nearly half of China's natural wetlands disappeared from 1990–2008. Natural wetlands include peatland (approximately 11 million hectares), coastal wetlands (over 2 million hectares), and riverine and lacustrine wetlands (over 12 million hectares). By contrast, artificial wetland types account for approximately 36 million hectares and include paddy fields (34 million hectares) and saltpans and aquaculture areas (2 million hectares) (Mackinnon et al., 1996) (State Forestry Administration, 2002) (World Wildlife Fund, 2005) (The Nature Conservancy, 2007). (Cyranoski, 2009).

A significant diversity of plant and animal species inhabit and rely on healthy wetlands (Figure 1–12). Approximately 101 plant families, including 94 families of vascular plants, occur in China's wetland areas. Over 100 species are endangered. Of China's extensive bird species, its 31 wetland species comprise 54% of Asia's total of 57 endangered wetland bird species. The wetlands are particularly important to migrating waterfowl such as cranes; in fact, 9 of the world's 15 crane species have been recorded in China (State Forestry Administration, 2002).

Figure 1–12. Wetlands of the Chongming Dongtan Nature Reserve. Photo by nature reserve staff

Figure 1–13. Upper Yangtze River in Northwestern Yunnan. Photo by Ami Vitale

Wetlands and rivers are widely distributed throughout the country and are generally described as follows (Mackinnon et al., 1996) (State Forestry Administration, 2002) (Figure 1–14):

Lakes of the Qinghai-Tibetan Plateau and Xinjiang Basin are the sources of great rivers such as the Huang He, Chang Jiang, Mekong, and Nujiang (Salween) in the east; and the Indus, Ganges, and Brahmaputra in the south. These lakes, pools, and marshes are important for waterfowl such as the bar-headed Goose *(Anser indicus)* and black-necked crane *(Grus nigricollisi)*. Approximately half of China's lakes are saline and most are in northwest China and western Inner Mongolia. They support one of the largest breeding populations of the black stork *(Ciconia nigra)* in China (in the Tarim River Basin which lies in Xinjiang) and the relict gull *(Larus relictus)* in the Taolimiao Alashan Nur region of Inner Mongolia.

Freshwater marshes are primarily found in the northeastern provinces of Heilongjiang, Jilin, Liaoning, and Inner Mongolia. They are of great importance as breeding and stopover areas for large numbers of waterfowl and, in particular, four species of crane: red-crowned crane *(Grus japonensis)*, Siberian crane *(G. Leucogeranus)*, white-naped crane *(G. vipio)* and common crane *(G. grus)*. Peatlands are widely distributed throughout northeast China, the Qinahai-Tibetan Plateau in western China, and the Tian Shan and Altai Shan uplands in northwestern China.

Coastal wetlands include seven major types: deltas and bays, tidal mudflats, grassy and reed-bed salt marshes, mangrove swamps, sandy beaches, rocky sea coasts, and offshore islets. Some of the most important flyways in the world, such as the East Asian-Australasian Flyway, cross over China and wetland areas such as the Yellow Sea ecoregion between northeast China and the

Korean Peninsula. The entire global population of Saunders' Gull *(Larus saundersi)* breeds in the coastal wetlands of China. Many migratory waterfowl fly directly from Australia to China, using the coastal wetland areas as wintering and staging areas. The mangroves, fish ponds, and rice paddies along the coast also support large numbers of herons and egrets, as well as important species such as the black-faced spoonbill *(Platalea minor)* and the Saunders' Gull, which winter in Deep Bay, Guangdong/Hong Kong.

Rivers exceed 50,000 in total number and include some of the longest and most important freshwater resources in the world. More than 1,500 rivers each drain areas equal to or greater than 1,000 km^2. Many of China's and southeast Asia's largest and most valuable rivers begin high on the Qinghai-Tibetan Plateau, with significant elevation differences between their sources and mouths (State Forestry Administration 2002). Basins of rivers flowing to the ocean account for approximately 65% of China's land area, while basins of inland rivers emptying into lakes or other inland rivers account for approximately 35% of China's land area (State Forestry Administration, 2002).

The Yangtze, Yellow, Heilong, and Pearl River basins are the four largest and most ecologically and economically important to China's wildlife and people. The 6,300-km long Yangtze River is the longest in China and the third-longest in the world (Figure 1–13). It has eight major tributaries and a catchment area of 1.8 million square kilometers, which is equivalent to one-fifth of the total land of China. The Yellow (Huanghe) River is the second largest river in China with a length of 5,464 km. As one of the birthplaces of ancient Chinese civilization, the Yellow has lush pasturelands and abundant mineral deposits. The Heilong River in northern China covers a total length of 4,350 km, of which, 3,101 km are in China. The Pearl (Zhujiang) River covers 2,214 km in southern China.

One particularly important and unique area from an ecological perspective is the "Three Parallel Rivers" region. This region boasts China's most spectacular river canyons formed by the Nujiang (Salween) River, Lancang (Mekong) River, and the Yangtze River. In a remote corner of Yunnan Province, these three rivers run parallel to each other, coming within 70 km of each other before separating to water the plains of eastern China and Southeast Asia. The region is part of a 1.7 million hectare World Heritage Site: Three Parallel Rivers of Yunnan World Protected Areas (UNESCO).

CONSERVATION ISSUES AND THREATS

Land conversion—The largest threat to wetlands in China, as in many countries, is conversion to farmland and urban development. According to research by the Chinese Academy of Sciences, approximately 10 million hectares of wetlands were lost over a 30-year period, from 1978-2008 (Zhang, 2011). Specific to coastal wetlands, approximately 50% of China's have been lost to aquaculture and urban development. Reclamation and aquaculture have decreased mangrove forest cover by 72% since 1950, from 50,000 hectares in 1950 to approximately 14,000 hectares today (State Forestry Administration, 2002).

Figure 1–14. Major wetlands, rivers, and streams (National Foundational Geographic Data Center, 1994)

Unsustainable use—Wetlands in the low altitude southeast area of the Tibetan Plateau face local pressures due to drainage, peat mining, reservoir construction, pesticide use, and changes in agricultural practices. Also, waterfowl populations have declined due to overhunting, egg collection, and the destruction of fish stocks through illegal fishing. Over-extraction of water for urban and agricultural uses is also a major threat to many freshwater rivers and lakes. For example, flow records for the Yellow River show that there were 226 days without water flow in 1997 (State Forestry Administration, 2002).

Dams—Dams threaten many rivers in China and have fragmented and destroyed river ecosystems, thus preventing the reproduction or disrupting migration patterns of many fish and leading to their decline. Construction of hydropower stations typically results in flooding of riverbanks and, for larger projects, relocation of local residents. For example, the construction of the Three Gorges Dam, submerged 13 cities, 140 towns, and 1,450 villages, and resulted in the relocation of

1.3 million people to other locales (International Rivers, 2009) (news.163.com, 2009). It should be noted that small dams are arguably just as impactful (environmentally, if not socially) as larger dams in that they still fragment the river system and virtually never include fish passages (Harrison, 2011). There are approximately 85,000 dams across China at present (Wang & Zhao, 2010) (Guo et al., 2010). With increasing demand for electricity, flood control, and water supply, the number of dams will no doubt continue to increase (State Forestry Administration, 2002). See Chapter II, Land Use for more information about hydropower and dams.

Pollution—Pollution from domestic, industrial, and agricultural sources is another critical threat to wetlands, rivers, and lakes in China. Of the 15 reaches of the country's 7 largest rivers that are located near major cities, 13 have been seriously polluted (Mackinnon et al., 1996). Urban lakes have reached eutrophic status in Jinjiang, Hangzhou, and Huangshi and are hypertrophic in Nanjing, Whuan, Changchun, and Guangzhou. Pollution from agricultural and industrial runoff continues to be a major concern throughout China (Chang, 1993) (Zhang et al., 2008).

5. Glaciers

DESCRIPTION

Glaciers comprise the smallest ecosystem type, covering an area of approximately 5.5-5.9 million hectares or approximately 0.6% of China's land area. Yet, they are critically important to biodiversity because their meltwater supplies aquatic ecosystems. China's glaciers are primarily found in western China, in the mountains of Sichuan, Yunnan, Gansu, and Tibet. Many of Asia's major rivers, including the Jinsha (upper Yangtze), Lancang (upper Mekong), Nu (upper Salween), Dulong (tributary of the Irrawaddy), and Yarlung Tsangpo (upper Brahmaputra), originate from and rely on the meltwater of glaciers. These rivers are the source of water for hundreds of millions of people. Without them, the ecosystem services they provide, such as fish, drinking water, and irrigation, would be severely impacted.

CONSERVATION ISSUES AND THREATS

Global climate change—Unlike other ecosystem types, loss from direct human impact, such as land conversion, is not an issue with glaciers. The primary threat to glaciers is global climate change. Some estimates suggest that since the late 17th century, temperatures have risen in the western regions of China by as much as 1.3°C. This has led to a 20% decrease in glacial area (Shi & Liu, 2000). All told, approximately 1.2 million hectares of China's glaciers have disappeared in just over 300 years. Experts predict that temperatures will continue to rise in western China, and by the year 2100, glacial area losses could range from 30-60% (Shi & Liu, 2000). At this rate, some glaciers would likely disappear, and the rivers and streams that they supply would dry up as well. One study of the Hengduan Mountains in northwest Yunnan used repeat photos to show that the warming is in fact leading to a retreat of glaciers. Serious efforts to combat global climate change are these glaciers' only hope of survival (Baker & Moseley, 2007).

II. Land use

The Biodiversity chapter identified conservation issues and threats specific to individual ecosystems. This chapter describes trends in land uses across the country as a whole, since any one land use can affect multiple ecosystems and their associated biodiversity. It also describes the way that the Chinese government defines land use, which is important base knowledge for understanding various aspects of the land tenure system, such as land use planning (see Part 2, Land Tenure). And land use planning, in turn, affects the potential to implement land protection projects.

Overall, China is experiencing massive land use changes and impacts to the environment due to an unprecedented period of economic growth. Its growth has catapulted it from one of the world's poorest countries 30 years ago to the world's second largest economy today. Since the period of "economic reform and opening," initiated by Deng Xiaoping in 1978, China has moved from a closed, tightly-controlled, and centrally-planned economic system to one that is more market-oriented and showing signs of increasing liberalization. For example, the creation of a diversified banking system and stock markets, the emergence of a private sector, and increased receptiveness to foreign investment and trade all have contributed to China's remarkable GDP growth rate, which was estimated as 10.3% in 2010 (Central Intelligence Agency, 2011).

China's economy is heavily dependent upon industries with a large ecological footprint to sustain its extraordinary growth rate. Manufacturing, infrastructure construction, and heavy industry, for example, account for roughly 50% of China's GDP (Central Intelligence Agency, 2011). China is the world leader in the gross value of industrial output, and land-intensive extractive and agricultural industries are a major pillar of China's economy. China was also the leading global exporter in 2009 and the world's third largest importer in 2010. Looking forward, China's 12th Five-Year Guideline (2011-2015)[4], released in March 2011, indicates that Beijing seeks to change its growth model to focus on stabilizing prices, and turn the economic spotlight away from manufacturing and exports to service-based industries (Bloomberg News, 2010) (Central Government, 2011).

In the meantime, it is commonly said that China is not only the world's factory, but also its smokestack. A 2007 *New York Times* series entitled "Choking on Growth" described the way in which China's low-cost and high-impact economic strategy is heavily damaging the environment and public health (The New York Times, 2007). Furthermore, the environmental impacts of China's "red-hot" growth are readily apparent, with desertification, loss of arable land, and pollution of air, land, and water accounting for billions of dollars of lost economic productivity per year (The World Bank and State Environmental Protection Agency, 2007).

[4] Five-year guidelines are major planning documents, which set priorities for socioeconomic development, growth targets, and land or other reforms for five-year (or so) blocks of time. See Part 2, Land Tenure.

Needless to say, based on trends in economic development, population growth, and land use, China's natural landscape will undoubtedly experience significant and increasing pressures well into the future, as this chapter explores. These trends are driving the need for effective land protection. Some natural landscapes will be converted to non-natural uses entirely. Urbanization will likely have the largest negative impact, while the construction of roads and railways, and the development of energy will cause further fragmentation (Figure 1–15). Other uses such as livestock grazing and the harvest of timber and other forest products may not entirely convert the natural landscape, but they too will have negative impacts. Fortunately, some positive changes are occurring too, in particular massive afforestation efforts and other management/conservation programs.

Note that in a variety of places throughout this chapter, comparisons are made between China and other countries. The U.S. provides a particularly useful comparator since the countries have approximately the same land area.

A. Government Definition

The Central Government identifies land use according to three major categories: agricultural land, construction land, and unused land. These trends are driving the need for effective land protection. As of 2008, agricultural lands covered 69% of China and included cultivated lands, forests, grasslands, orchards, and "other" lands. "Unused lands" such as deserts, alpine tundra, and swamps covered approximately 27% of the country, while construction lands such as residential areas and transportation corridors covered 3% (Table 1–4 and Figure 1–16). These statistics pertain to actual, on-the-ground uses as opposed to planned uses.

The Ministry of Land and Resources (MLR) collects and updates land use statistics on a regular basis. In 2000, the MLR published China's first national land use survey. This survey, which the State Council initiated in 1984, created a baseline of information about the amount, quality, and use of land in China, not including Hong Kong, Taiwan, or Macau (Yun & Wang, 2007). The MLR is in process of completing a second nationwide survey, initiated in 2007, to gauge changes in land use since the first survey. In addition to these major survey efforts, approximately once a year the MLR collects land use statistics from the provinces; Table 1–4 shows the results from the 2008 survey.

Figure 1–15. Cumulative land uses (The Nature Conservancy, 2008)

This map combines land uses including major roads and railways as of 1994; and cropland, urban settlements, and other developed areas as of 2004. The largest contiguous blocks of habitat exist in northern and western China.

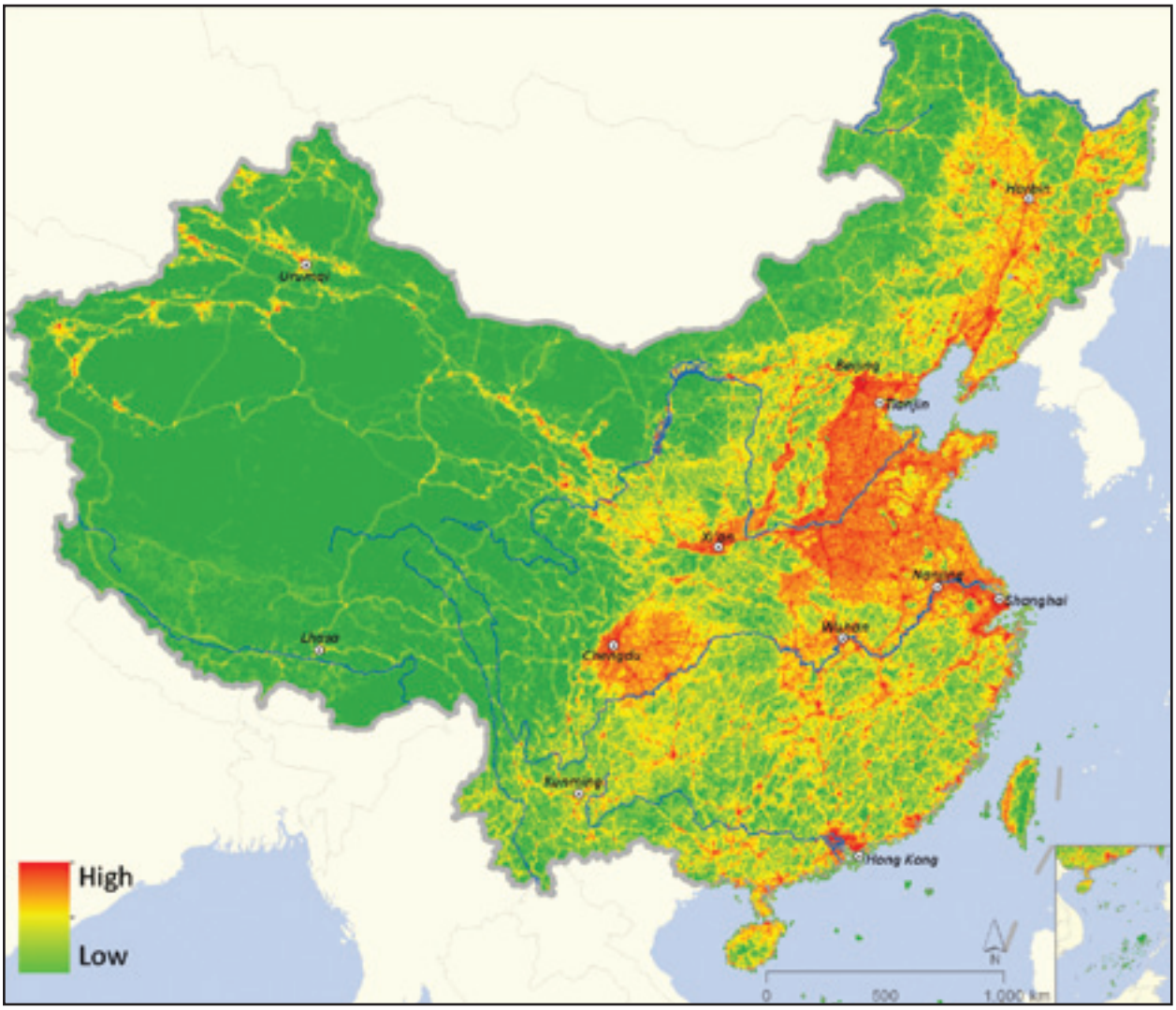
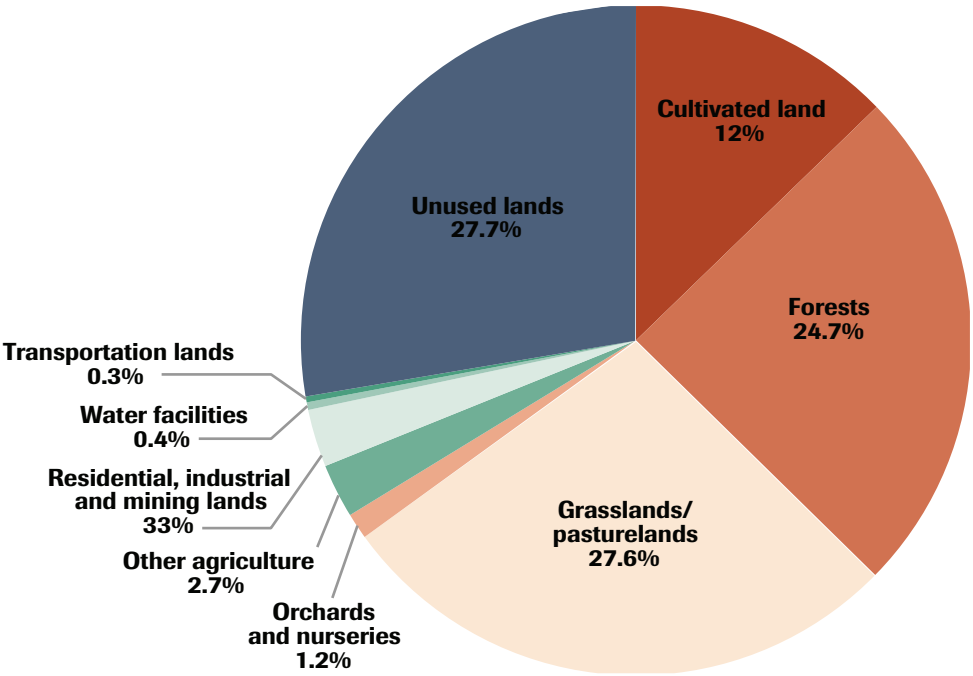


Table 1–4. Land use in China, 2008 (Ministry of Land and Resources, 2009)

Land use category	Hectares	Percent of all land in China	Description
AGRICULTURE			
Cultivated land	121,681,114	12.7%	Land that is currently cultivated or otherwise set aside for cultivation (e.g., fallow land).
Forests	236,126,436	24.7%	Lands covered by forest, regardless of species mix or usage (e.g., for timber harvest or other purposes). Does not include orchards and nurseries (see below).
Grassland	263,345,213	27.6%	Grassland land cover with at least 10% vegetative cover.
Orchards and nurseries	11,797,171	1.2%	Orchards and nurseries for the purpose of collecting fruit, seeds, tea, etc.
Other	25,480,060	2.7%	Other agricultural lands.
Subtotal	**658,429,994**	**68.9%**	
CONSTRUCTION			
Residential, industrial, and mining lands	26,912,673	2.8%	Broad category that encompasses a wide array of uses: Residential lands including the areas encompassed by cities, townships, and villages; industrial and mining lands including mines, factories, etc.; salt flats from which salt is harvested; and other places of special interest such as areas used for national defense, cemeteries, Scenic Areas, etc.
Transportation	2,401,032	0.3%	Land covered by roads, railroads, pipelines, airports, havens, docks, etc.
Water facilities	3,645,219	0.4%	Reservoirs, dams, hydropower stations, etc. Does not include irrigation facilities for cultivated land.
Subtotal	**32,958,924**	**3.4%**	
UNUSED			
Unused lands	264,400,658	27.7%	Lands that are not used or that are difficult to use, such as deserts, salt flats from which salt is not harvested, grassland with less than10% cover, swamps, alpine tundra, glaciers, beaches, etc. Also includes rivers, lakes, streams, etc.
Subtotal	**264,400,658**	**27.7%**	
GRAND TOTAL	**955,789,576**	**100.0%**	

Figure 1–16. Land use in China, 2008 (Ministry of Land and Resources, 2009)



B. Urbanization

China has four times the population of the U.S. and nearly seven times that of Brazil, within roughly the same area. With 1.3 billion inhabitants,[5] one out of every five people in the world lives in China. The rate of population growth has generally been declining for decades, but the overall number of inhabitants has been growing and is expected to do so at least through 2030 (Figures 1–17 and 1–18). The country has at least 125 cities (including Hong Kong) with metro area populations of more than 1 million people, the largest of which include Chongqing (29 million), Shanghai (23 million), and Beijing (people.com.cn, 2008) (National Bureau of Statistics, 2011). By comparison, Europe has 36 cities with over one million residents while the U.S. has 9. Nearly 600,000 people poured into the municipality of Shanghai every year from 2000-2010 (Cox, 2011)[6].

[5] The population of mainland China (not including Taiwan, Macao, or Hong Kong) is 1.3 billion. The population of China, including Taiwan, Macao, and Hong Kong, is 1.4 billion (National Bureau of Statistics, 2011).

[6] Calculated by subtracting Shanghai's 2000 population of 16.41 million from its 2010 population of 22.21 million and dividing by 10 years.

Figure 1–17. Population 1950-2050, U.S. and China (Population in thousands and projected from 2005-2050) (United Nations Population Division, 2010)

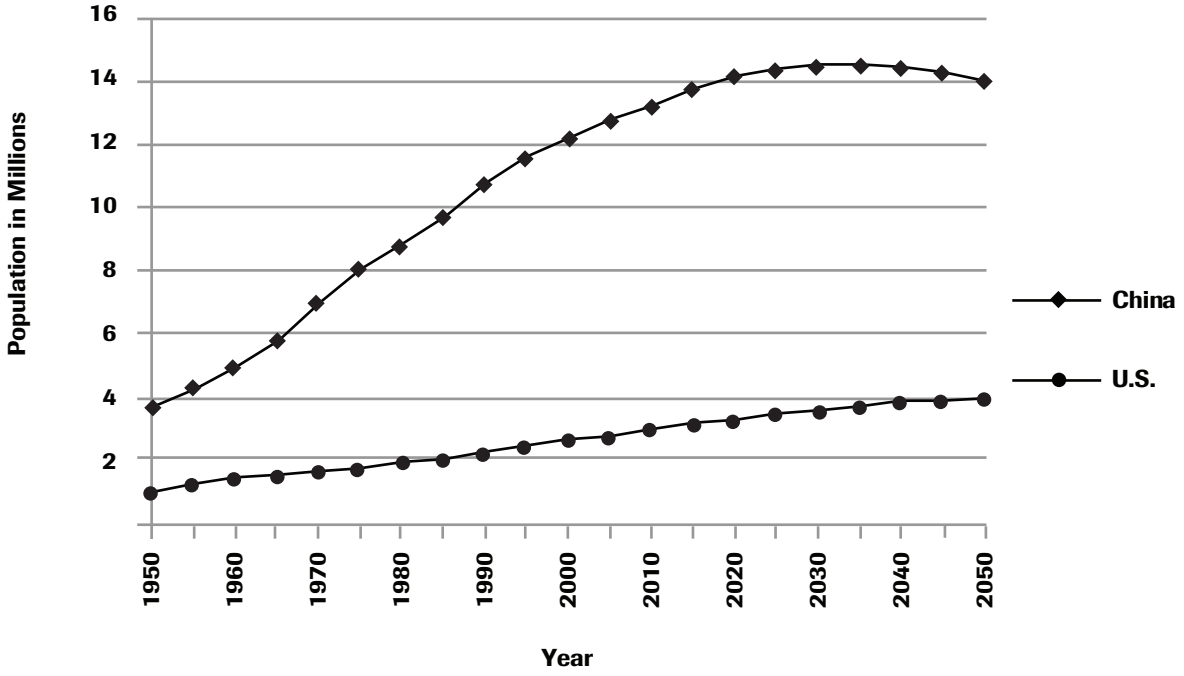
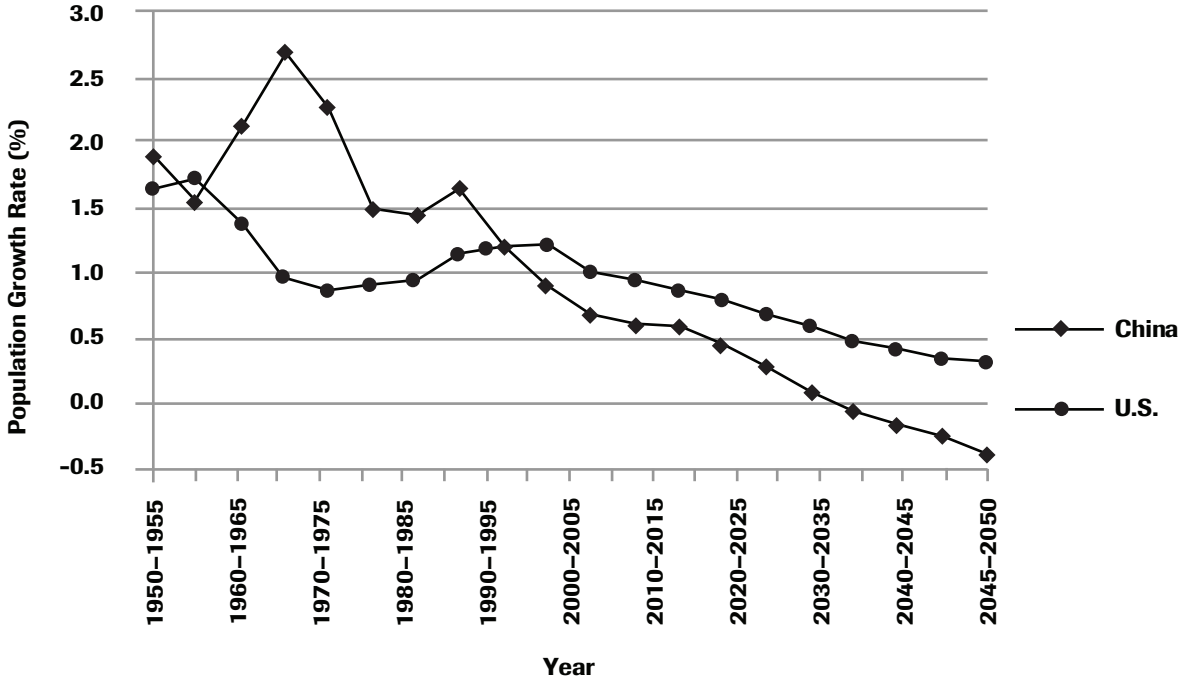


Figure 1–18. Population growth rate (%), U.S. and China, 1950-2050 (projected for 2005-2050) (United Nations Population Division, 2010)



The population is distributed unevenly throughout the country, with the major cities and most of the population lying in the east, where the natural resources are much more favorable for human habitation (Figure 1–19). The forests and agriculturally-productive landscapes of eastern China support far more people than do the grasslands, deserts, and high mountain regions of the west.

China's population is rapidly urbanizing as rural residents flock to cities to seek higher-paying jobs. Residents of eastern China generally migrate to cities in the east, while those of western China generally migrate to cities in the west. The west is also attracting some eastern migrants despite its harsh terrain, though as a proportion of total migration, the "going west" phenomenon is small (Bao, 2008). The Central Government encourages the "balanced development" of cities and towns in the *11th Five-Year Guideline (2006-2010)* and emphasizes the development of metropolitan regions (Kamal-Chaoui et al., 2009). This represents a shift in focus from the previous Five-Year Guideline (2001-2005), which emphasized the urbanization of rural townships. For information about Five-Year Guidelines, see Part 2, Land Tenure.

China's urban population is growing rapidly—much more quickly than that of the U.S., for example (Figure 1–20). Between 1950 and 2009, the percentage of the population living in urban areas quadrupled from 12% to 48% (People´s Daily Online, 2009). According to the 2010 census, the urban-rural population is now evenly split, 50% and 50% (National Bureau of Statistics, 2011). Experts forecast that the country's urban population will grow steadily from more than 50% by 2015, to more than 60% by 2030, and to more than 70% by 2045 (Danlu, 2010) (United Nations Population Division, 2010) (Figure 1–20). By 2025, China could have 219 cities with more than 1 million inhabitants each, including 8 "megacities" with more than 10 million residents (McKinsey Global institute, 2008). China also has plans to create the largest megacity in the world with 42 million residents and covering an urban area that will be 26 times larger than greater London (Moore & Foster, 2011).

Figure 1–19. Cities with populations exceeding 100,000; 1994 data. The vast majority of cities with populations exceeding 100,000 lie in eastern China.

Figure 1–20. Percent of population in urban areas, 1950-2050 (projected for 2005–2050) (United Nations Population Division, 2010)

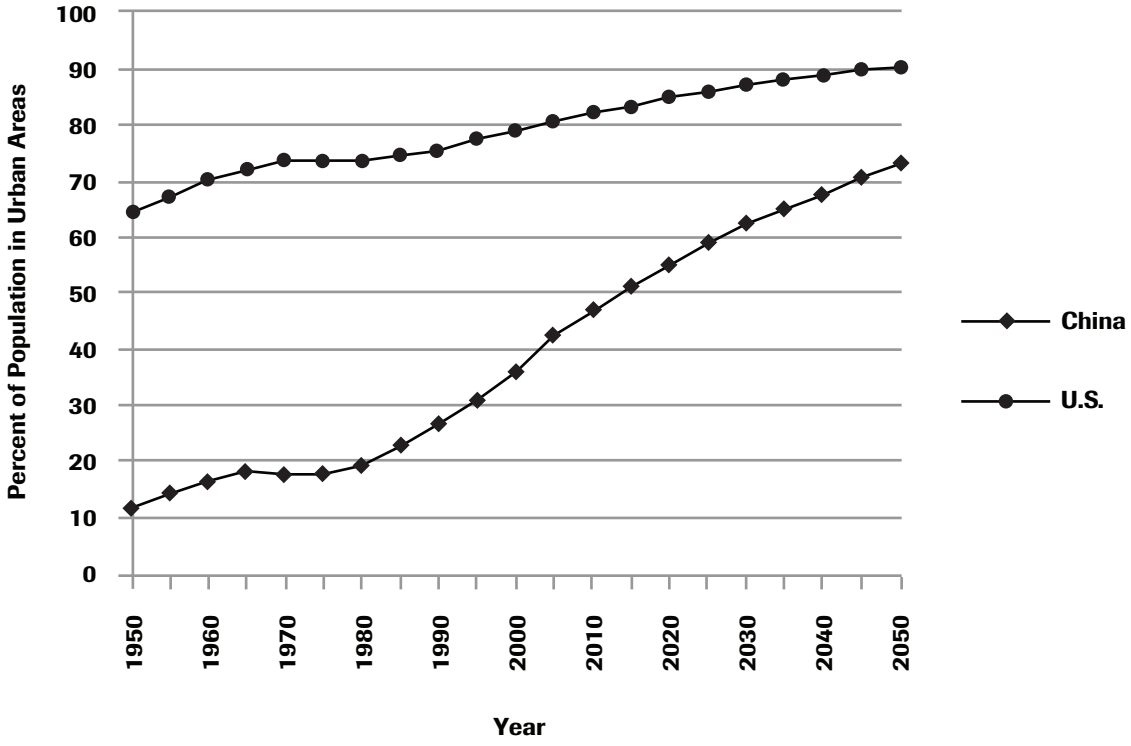
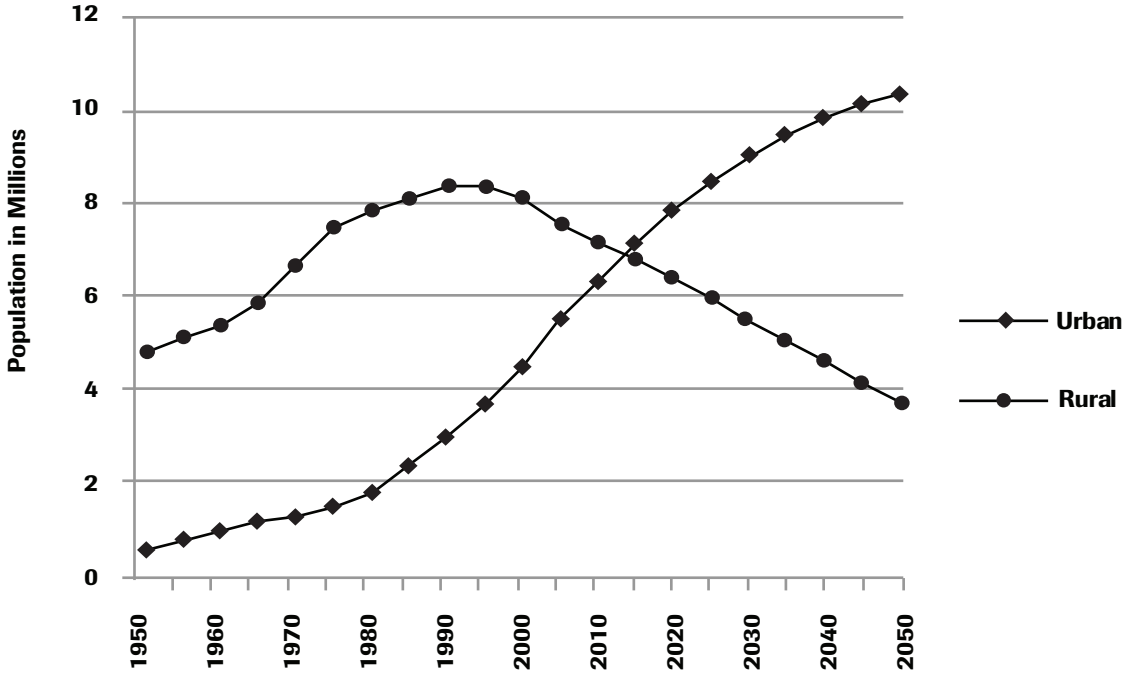


Figure 1–21. Urban and rural population in China, 1950-2050 (population projected for 2005–2050) (United Nations Population Division, 2010)



Cities are expanding both upward and outward. Endless city scenes of cranes, bulldozers, and high-rises sheathed in temporary netting confirm that China's construction industry is booming. Theoretically such construction should lead to higher density and reduce or preclude the need for spatial expansion, but real estate speculation has resulted in high vacancy rates in major cities such as Beijing, Shanghai, and Shenzhen. According to one estimate, there are 64.5 million vacant homes in China (Liu, 2010). Therefore, the influx of new urban dwellers is also causing cities to spread outward. In Beijing for example, since 1949 approximately two-thirds of the one-story hutongs, some dating back to the Yuan Dynasty (1206-1341), have been bulldozed to make way for high-rises and other uses (MacLeod, 2010). Meanwhile, Beijing's built area has been expanding, and increased by 11% from 2001-2005. This expansion is also common in other major cities throughout the country (Table 1–5). Although most Chinese would prefer to live in city centers, which enjoy better public services, many live on the outskirts where housing prices are more reasonable (Qi & Lu, 2008).

As people flock from rural to urban areas, the population of the rural landscape is declining, thereby opening up the landscape in the areas that are not "eaten up" by growing cities (Figure 1–21). Over time, this trend may provide more land protection opportunities in rural areas. Rural population peaked in 1990 at 840 million residents, and has declined by more than 120 million residents over the last 20 years. Villages are shrinking in size and may disappear completely as young people move to larger towns and cities (Hessler, 2010). By 2050, experts project that the rural population will have declined to 379 million (27% of the population). However, even as people relocate from rural villages to townships, pressures for other uses of rural land such as timber harvest, cultivation, and energy development will continue to grow to support the country's burgeoning total population. Some cities are increasing residential density in order to free up land for other purposes. For example, the prefecture-level city of Huzhou in northern Zhejiang Province became a model zone for rural development by merging 6,000 villages into 281 central rural communities in order to convert more land for agricultural purposes (Hu, 2010).

Table 1–5. Change in built area, population change, and change in population density of major Chinese cities, 2001-2005, recreated from (Qi & Lu, 2008)

Type of Change	Nanjing	Chongqing	Beijing	Shanghai	Shenzhen	Shenyang	Guangzhou	Tianjin	Hangzhou	Chengdu
Change in built area	25%	16%	11%	11%	11%	7%	9%	6%	8%	15%
Change in population	10%	15%	3%	3%	3%	1%	4%	1%	6%	13%
Change in population density	-12%	-10%	-8%	-6%	-6%	-6%	-5%	-4%	-2%	-1%

C. Cultivated Land

The vast majority of China's cultivated land covers the eastern monsoonal plains and river basins, including the Northeast Plains, Northern China Plains, Middle & Lower Yangtze River Plains, the Pearl River Delta, and the Sichuan Basin. According to available statistics, nearly all of China's arable land, totaling 122 million hectares or 13% of the country is cultivated (Qiang, 2010). With 1.3 billion people to feed, the country places great emphasis on efficient and large-scale food production. This high rate of cultivation is not surprising given China's immense and growing population, and that China's per-capita average of arable land is less than 30% of the world's average (State Council, 2007).

The Central Government places a strong emphasis on food security through domestic production and, to a far lesser degree, grain imports. Since the 1960s, China has been a net importer of grain, though the annual portion of grain that is imported is only around 3–4% of all grain produced domestically (Chu et al., 2006). Since the mid-1950s, per-hectare domestic yields have increased while the area of cultivated land has decreased. To ensure adequate food production, the government has identified a minimum threshold or "redline" of 120 million hectares of cultivated land (Central Government, 2006). The law also requires a one-to-one replacement of any farmland that is converted to other uses, in terms of quantity and quality.[7] In the coming years, to feed its ever-growing population, the government will need to expand the area of farmland, increase farmland productivity, and/or increase grain imports.

These policies and realities, combined with development and other land use pressures, are shifting the location of farmland. Some cultivated lands are being newly created *from* other uses such as forestry, grasslands, and wetlands, while existing cultivated lands are being converted *to* other uses such as built up areas, forests, and grasslands. According to one nationwide study that assessed cultivated land changes from 1986-2000, land area converted from other uses to cultivation totaled 55% from grasslands, 28% from forests, and 20% from wetlands or other unused lands and other uses. Over this same time period, conversions of cultivated land area to other uses included 38% to built areas, 30% to grasslands, 17% to forests, and 16% to other land uses/land cover types. Overall, there was a net increase of cultivated land of 2.7 million hectares (1.9%) and a net decrease of grasslands, forests, and unused land as a result of their conversion to cultivated lands (Deng et al., 2005).

Although this study's data is already a decade old, the trend of converting cultivated lands to and from other uses has continued and will probably do so for the foreseeable future. For example, since 1999, a forest restoration program called Grain to Green has been converting 15 million hectares of cultivated land on steep slopes into forests (See Forest Uses section below). Conversely, though residential development has been exploding and pressures for other uses mounting, local governments must convert other uses into cultivation in order to honor the one-to-one farmland replacement requirement.

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[7] Land Administration Law Article 31

D. Livestock Grazing

Livestock grazing occurs throughout China and is possibly the most common use of the grasslands in the Inner Mongolia Plateau, Xinjiang, Qinghai, and the Tibetan Plateau. Intensive grazing, beyond sustainable levels, reduces biodiversity and productivity, and also causes erosion and desertification. China is the world's largest livestock consumer (AgriFood Asia), and is likely to remain so as the country's population and income levels grow. In 2004, China supported approximately 375 million grazing livestock including cattle, sheep, goats, horses, mules, and camels. China is the world's largest producer of sheep and goats, and the fourth largest producer of cattle (Figure 1–22) (Food & Agriculture Organization, 2011). For comparison, China has approximately 11% fewer heads of cattle than the U.S. (a difference of 11 million), but over 30 times more sheep and goats. The number of sheep, goats, and cattle varied and remained relatively steady between 1999-2009, while the number of other livestock grazers decreased (Figures 1–23 and 1–24). The former are much more frequently used as food sources.

Figure 1–22. Top five global producers of goats, sheep, and cattle in 2009 (Food & Agriculture Organization, 2011)

Goats	
China	**149,376,747**
India	125,732,000
Pakistan	56,742,000
Bangladesh	56,400,000
Nigeria	53,800,400

Sheep	
China	**136,436,206**
Australia	79,937,577
India	64,989,000
Iran	53,800,000
Sudan	51,100,000

Cattle	
Brazil	202,287,191
India	174,510,000
U.S.	96,034,500
China	**82,623,951**
Argentina	50,750,000

As the Biodiversity chapter explains, livestock grazing is a major driver of grassland degradation in China. One source estimates that desertification costs China more than 40 billion RMB annually and affects more than 40 million people (Meyer, 2006). The accelerated and large-scale degradation and desertification of grassland ecosystems in areas with fragile environmental conditions and poor ecosystem structures have raised concerns within many organizations and institutions inside and outside of China.

As a result, the government has instituted a variety of programs to combat desertification. In the 1970s, the government created the Three-North Shelterbelt Project and the National Project for Prevention and Control of Sandification (see Forest section below). Then in 2002, the government launched the *National Action Plan to Combat Desertification* for northwestern China. This 10-year project received $8 billion of funding and included six main ecological restoration projects, aimed at controlling desertification over 22 million hectares by 2010. China also implemented a "Grassland Seed Base Program" from 2000-2002. Finally, China has also employed technical fixes to reduce desertification such as reducing livestock grazing pressure on grasslands through rodent and insect control, fencing, and improved livestock management (Su, 2006) (Waldron et al., 2008) (Wang et al., 2010).

Figure 1–23. Number of goats, sheep, and cattle in China, 1999-2009 (Food & Agriculture Organization, 2011)

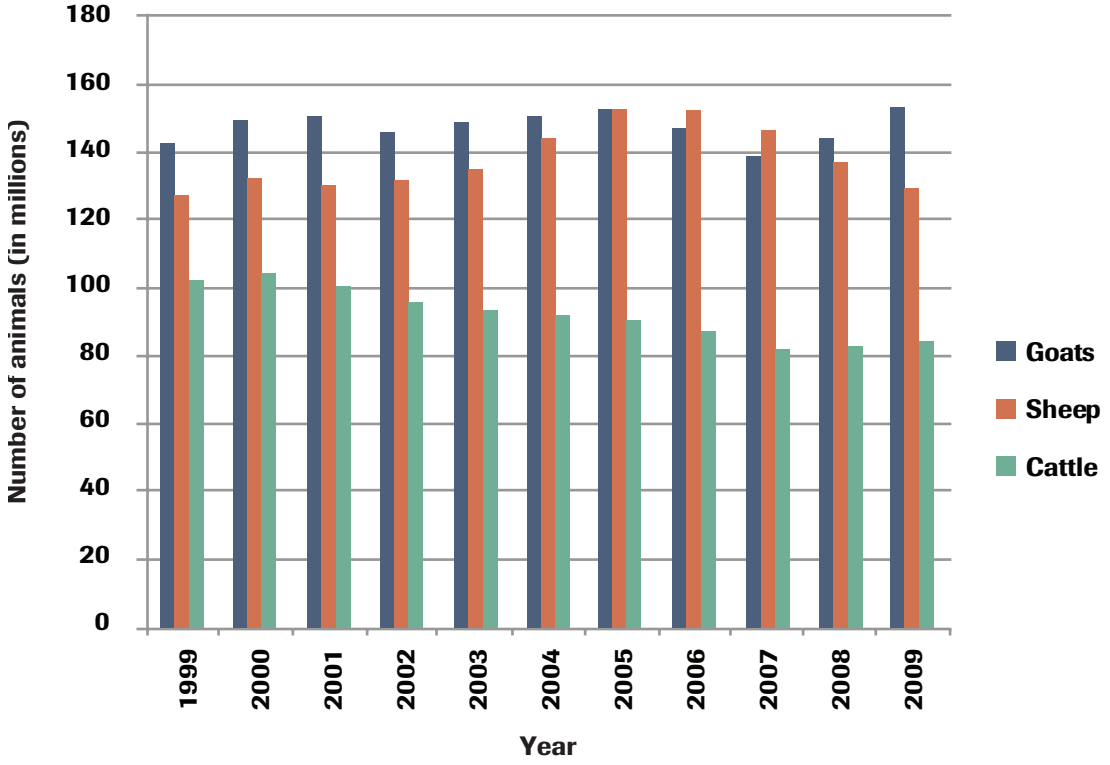
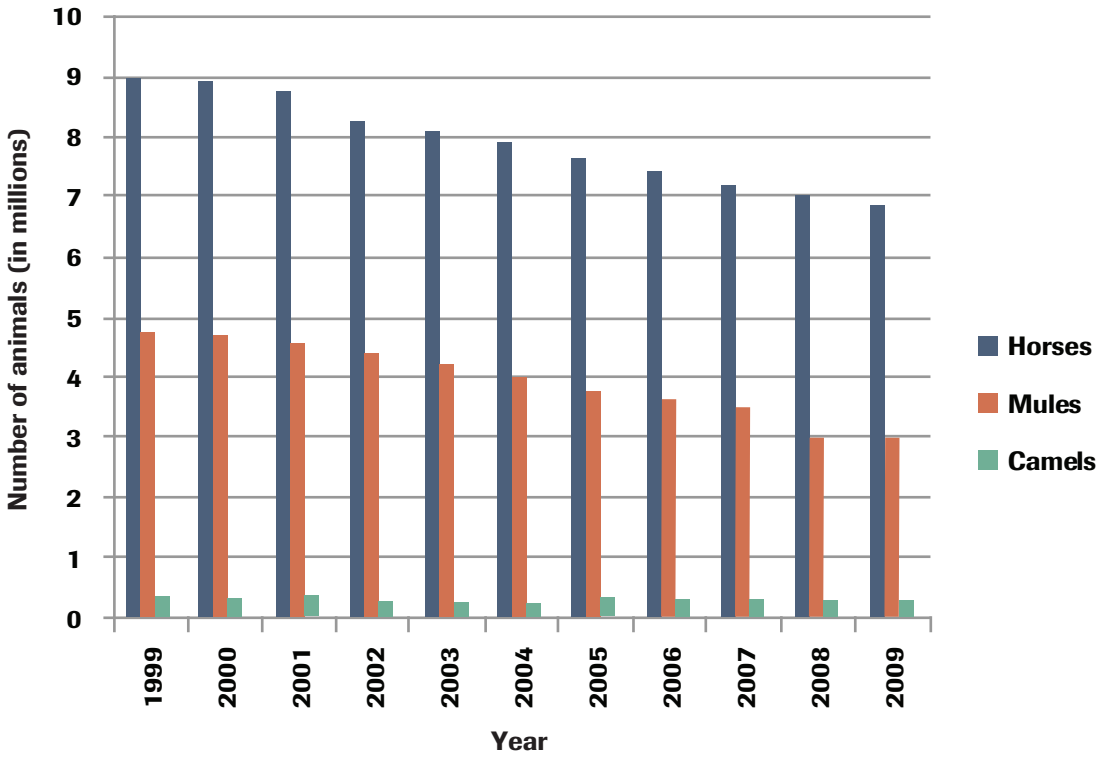


Figure 1–24. Number of horses, mules, and camels in China, 1999-2009 (Food & Agriculture Organization, 2011)



Together, these efforts have helped to slow degradation, but have not halted or reversed it. There has been considerable debate as to the effectiveness of these programs in different regions of China. Nevertheless, in 2006, the State Forestry Administration claimed that the rate of desertification had slowed to 3,000 km² per year from the annual rate of 10,400 km² at the end of the last century (Reuters.com, 2006).

E. Forest Uses

To guide forest use, the Central Government passed a Forestry Law in 1984, which was subsequently updated in 1998. The Forestry Law (1998) identifies five forest types: protection, special purpose, timber, economic, and fuel. These types can be categorized as either public benefit or commercial (Figure 1–25). *Public benefit forests* are generally intended to remain in a natural state in order to provide ecological and human health benefits, though some economic development may be possible. By contrast, *commercial forests* are intended for activities which can provide revenue. According to the State Forestry Administration (SFA) (2010), commercial forests comprise 57% of forests and public benefit forests comprise 43% (Figure 1–26). Together, timber forests and protection forests comprise nearly all of the forest cover in China (94%), while special purpose forests, economic forests, and fuel forests are much rarer.

As the Biodiversity Chapter describes, China's forests have experienced several periods of significant and widespread deforestation since the late 1950s. In response, the Central Government has attempted to restore forest cover by investing upwards of 1 trillion RMB into six forest conservation programs (Tables 1–6 and 1–7). These programs utilize a combination of afforestation and timber harvesting bans or limits.

Figure 1–25. Types of forest in China[8]

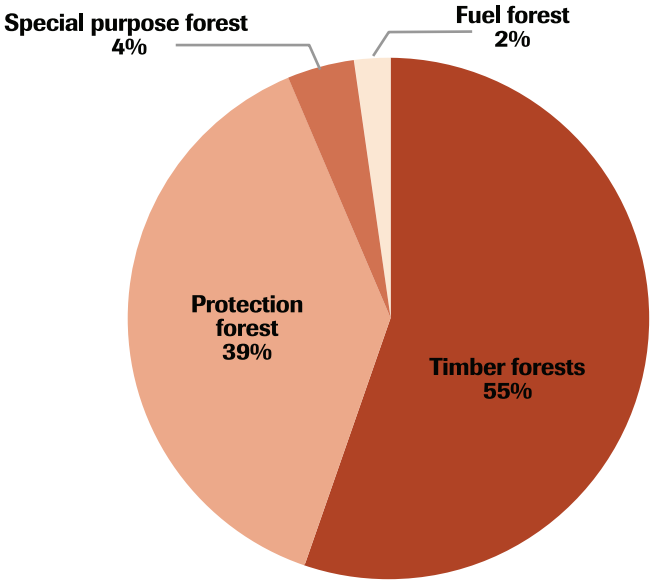
Public benefit forests

- **Protection forests**—Also called shelter forests, the goal is to protect key ecological and economic values such as water source conservation, water and soil conservation, wind and sand breaks, embankments, farmland, and cattle grazing.
- **Special-purpose forests**—Goals include national defense, environmental protection, and scientific research.

Commercial forests

- **Timber forests**—Goal is timber production including, but not limited to, bamboo.
- **Economic forests**—Goal is the production of "fruits, edible oils, drinks, flavorings, industrial raw materials, and medicinal materials."
- **Fuel forests**—Goal is the production of fuelwood.

Figure 1–26. Types of forests in China, 2010 (State Forestry Administration, 2010)



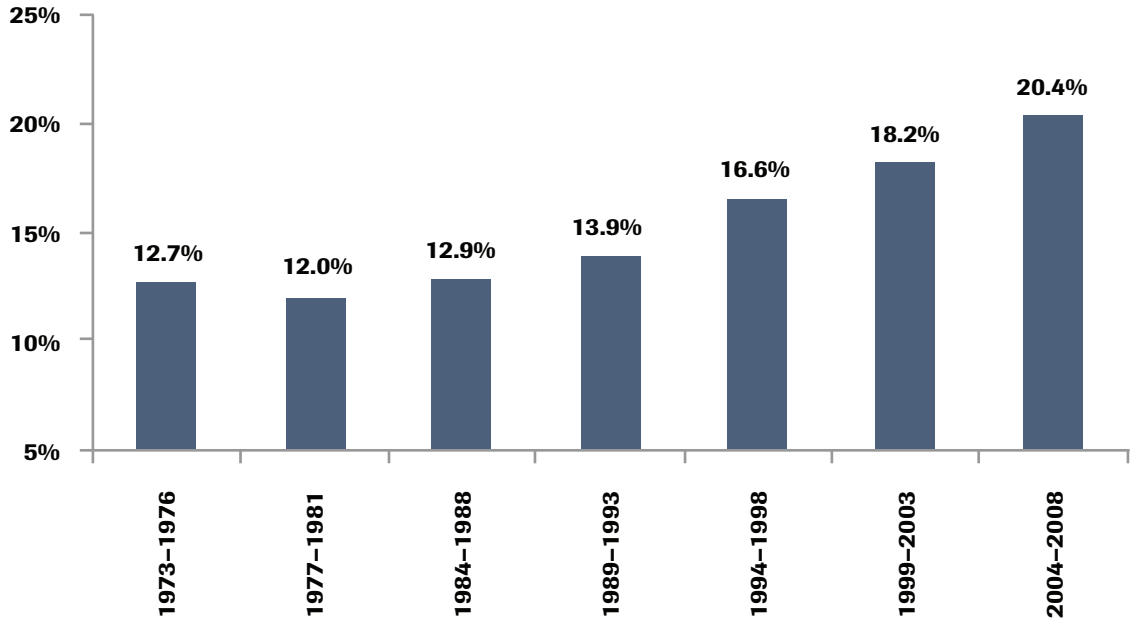
[8] Forestry Law Article 4, as modified

1. Afforestation

As of 2007, China had planted more than 49 billion trees and shrubs through government-sponsored efforts (State Forestry Administration, 2007) (Yang & Ci, 2008). In 2008 alone, 540 million people planted 4.7 million hectares of forest across the country, which is an area larger than Switzerland (Xinhua News Agency, 2009). As a result of these efforts, from 1981-2008, State Forestry Administration calculations of forest cover increased from 12% to 20% of total land cover (Figure 1–27). Forest cover has increased by approximately 12.6 million hectares since the 1980s, with the largest increases occurring in the southeast (5.3 million hectares), southwest (3.2 million hectares), and north (2.2 million hectares) (Liu & Tian, 2010).

The Central Government aims to achieve 23% forest cover by 2020, and 26% by 2050 (State Forestry Administration, 2007). Much of the reforestation and afforestation is planned for northern China, with 30% in Inner Mongolia alone to combat desertification, reduce dust storms, and maintain or restore ecosystem services such as carbon sequestration.

Figure 1–27. Forest cover in China from 1973-2008, according to seven national forest inventories conducted by the State Forest Administration (State Forestry Administration, 2009) (State Forestry Administration, 2006) (People's Daily, 2005) (State Forestry Administration, 2005)[9]



[9] According to an expert from the State Forestry Administration (SFA), specific percentages of forest cover may not be entirely comparable pre- and post-1998 due to different methodologies applied (Liu, 2011)

Figure 1–28. Tree planting in Tengchong County, Yunnan. Photo by The Nature Conservancy

China's afforestation efforts can be divided into two phases distinguished by their emphasis on forest type. Prior to 1997, afforestation focused largely on commercial (i.e., timber) forests. In 1980, for example, China planted 4.1 million hectares, 61% of which occurred in timber forests and 15.4% of which occurred in protection forest. After 1997, afforestation declined in timber forests and increased in protection forests through the implementation of China's six forest conservation programs such as the Natural Forest Protection Program and Grain to Green. In 2007, for example, 16% of all afforestation occurred in timber forests, while 71% of afforestation occurred in protection forests. This change reflected a shift in China's forest development strategy from economic functions to ecological functions.

Afforestation efforts generally have been improving in China since 1978, due to better methodologies and planning. Nonetheless, the forest restoration programs are not without their critics; there has been much debate around their appropriateness and ability to meet goals related to desertification, biodiversity, ecosystem services, and socioeconomic values (Liu et al., 2008) (Cao et al., 2009) (Wilske, et al., 2009) (Yin et al., 2010). Afforestation efforts have been generally successful at increasing vegetative cover. However survival rates and benefits to biodiversity have been variable largely due to the planting of monocultures or limited numbers of species, as well as limited attention to topography, climate, and hydrology. This has been particularly true on commercial plantations (The World Bank Group, 2000), where afforestation efforts have focused more on increasing available timber volume than on diversifying species mix. While there is some variation in species mix, the species of choice in the north include poplars, aspens, Chinese pine, and Mongolian pine (*Pinus sylvestris* var. *mongolica Litv.*); and in the south include eucalyptus, Chinese fir and Chinese red pine, (Chen., 2010). China has started to expand

the species mix it uses, recognizing that limited species diversity can leave trees susceptible to disease and insect infestations. As one expert described, "Some of the forest planted in the past has had suboptimal results caused by using unsuitable tree species and initial densities, as well as by some of the afforestation methods" (Yang & Ci, 2008).

Based on China's aforementioned goals for future forest cover, it is expected that afforestation efforts will continue for the foreseeable future. The locations and processes for future efforts are yet to be determined, however. Several of the main afforestation programs were slated to end by 2010 including the Beijing-Tianjin Desertification Control Program and five of six projects of the Key Shelterbelt Construction Program. Two other programs could end in the near future – the Fast-Growing High-Yielding Timber Plantation Program in 2015 and Grain to Green in 2016. Whether the government will let these programs expire, renew these programs, or institute different programs remains to be seen. It should be noted that NFPP was slated to expire in 2010, but the government renewed it until 2020 and increased funding (State Forestry Administration, 2011). Furthermore, the government may encourage greater involvement of the private sector and other stakeholders. Regardless of where and how afforestation occurs, forest conservation will remain an important issue in China due to climate change, land conversion, and demand for timber.

2. Timber Harvest and the Timber Ban

The State Council sets the allowable timber harvest through the five-year provincial quotas (Figure 1–29). China's reported harvest climbed from 6 million m^3 in 1949 to 68 million m^3 in 1995. It is important to note that there is almost certainly a discrepancy between reported and actual logging in China. Illegal logging is an ongoing problem in the country; producers do not necessarily adhere to quotas and undeclared production is common (Sun et al., 2005). In any case, after 1995, the timber harvest reportedly declined due to the general degradation of mature timber forest resources and the logging ban issued through the Natural Forest Protection Program (NFPP) (Zhu et al.). Through the NFPP, commercial logging of natural forests (as opposed to plantations) has ceased in 13 provinces in the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River. Commercial logging of natural forest has also been reduced in northeastern China and Inner Mongolia. (Zhang S., 2010).

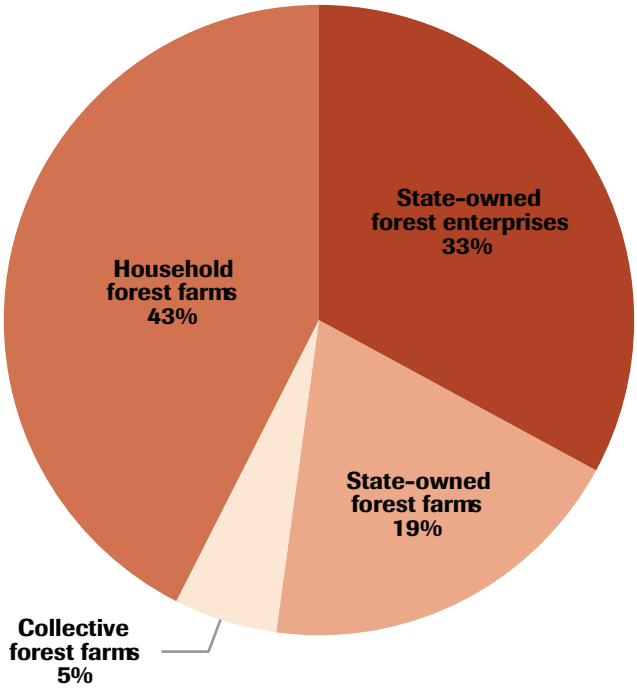
The NFPP is aiding the recovery of China's forests, but is also causing a gap between domestic demand and supply. Timber consumption is on the rise; from 1989-2006, timber consumption climbed from 107 million m^3 to 250 million m3, and in 2009 reached 457 million m^3 (Lu) (Fordaq, 2010). If timber consumption continues to increase into the future, the gap between supply and demand will widen unless China increases domestic harvests or imports.

There are four sources of domestic timber supply: state-owned forest enterprises, state-owned forest farms, collective forest farms, and household forest farms (Figure 1–30). As of 2005, state-owned forest enterprises (135) were mostly located in northeast and southwest China, state owned forest farms (4,000) in northwest China, and collective and household farms in southern provinces such as Fujian and Guangdong. State-owned and collective/household-owned forests each contribute approximately 50% of China's domestic timber supply (Sun et al., 2005).

Government policy has been to shift timber production from state-owned natural forests to collectively-owned plantation forests. As a result, timber harvest from state-owned forests has decreased greatly while timber production from collective forests has increased (Sun et al., 2005). Collective harvests have been unexpectedly reduced in some areas, however, as the logging ban was arbitrarily extended in many areas of the country to select collective forests (China.org.cn, 2002). In any case, domestic timber harvests are likely to increase in the years to come. With the government's mass tree planting efforts, the country will certainly have timber resources to harvest, if it chooses to do so. At a minimum, harvests would occur on the 13 million hectares covered by the Fast-Growing and High-Yielding Timber Plantation Program (Table 1–6).

Figure 1–29. The government allows timber harvest in specified parts of the country, such as in parts of Yunnan (below). Photo by Zhang Weiwei

Figure 1–30. Timber production in China by different producers, 2002 (Sun, Wang, & Gu, 2005)



3. Harvest of fuelwood and non-timber forest products

"Where there are forests and communities, there will be fuelwood gathering" (Yu, 2010). The demand for fuelwood in China far exceeds available resources. Annual fuelwood harvesting accounts for 33% of total forest resource consumption, while fuelwood forest accounts for only 2-3% of China's total forest area (Zhang, 2006). As a result, peasants expand their fuelwood harvests into timber forests and protection forests. To address these pressures, the State Forestry Administration aims to "actively establish" more fuelwood forests (State Forestry Administration, 2007). In addition, the government is encouraging the use of alternative energy sources such as solar cookers.

Harvest of non-timber forest products (NFTP) is also common throughout China. NFTPs include "products used as food and food additives (edible nuts, mushrooms, fruits, herbs, spices, and condiments, aromatic plants, game), fibers (used in construction, furniture, clothing or utensils), resins, gums, and plant and animal products used for medicinal, cosmetic, or other purposes" (Kleinn et al., 2006). In China, more than 6,000 plant species are used for medicinal purposes, 80% of which grow in forests. Other common NFTPs in places such as Yunnan Province include mushrooms, walnuts, pine nuts, eucalyptus oil, and honey (Kleinn et al, 2006). Because many NFTPs are spontaneously collected by local communities, estimates of total yield are difficult to obtain. However, the logging ban may be prompting local communities to more sustainably harvest non-timber forest resources (Yu, 2010).

Table 1–6. Summary of China's six key forest conservation programs, listed in descending order of actual or needed investment

Program and Duration	Grain to Green (a.k.a. Sloping Land Conversion Program) (1999-2008, renewed until 2016)	Natural Forest Protection Program (1998-2010; renewed until 2020)	Wildlife Conservation and Nature Reserve Development Program
Investment	430 billion RMB.	340.2 billion RMB (96.2 billion RMB in Phase I, from 1998-2010; plus 244 billion RMB in Phase 2, from 2010-2020).	135.7 billion RMB are needed from 2001-2030.
Goal	By 2010, reforest 15 million ha of cultivated land and 17 million ha of land in the "waste mount ains" and other areas suitable for afforestation.	Phase I: Protect and restore natural forests primarily through implementing logging bans, protecting natural forest, and reforesting 8.7 million ha. Phase II: By 2020, increase the area of afforestation by 5.2 million hectares, forest reserves by 1.1 billion m^3, and carbon sinks by 416 million tons.	Strengthen the conservation of wild flora and fauna by increasing nature reserve numbers. By 2010, nature reserves should total 1,800 (including 220 national-level) and cover 16.1% of total land area. By 2030, they should total 2000 (including 280 national-level) and cover 16.8% of total land area. By 2050, they should total 2,500 (including 350 national-level, and 2000 managed by SFA) and cover 18% of total land area.
Geographic Scope	25 provinces.	17 provinces (logging ban in 13), with emphasis on the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River.	All of mainland China.
Achievements	As of 2009, 9.2 million ha of cultivated land were converted, and trees and shrubs had also been planted on 18.4 million ha of waste mountains and other areas suitable for afforestation, thereby exceeding goal.	Stopped commercial logging of natural forest in the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River. Reduced commercial logging of natural forest in northeast-ern China and Inner Mongolia. Protected 98 million ha of natural forest as of 2007. As of 2009, reforested 5.9 million ha.	As of 2009, the total number of nature reserves totaled 2,541 and covered approximately 15.4% of the country.
Sources	(State Forestry Administration, 2007) (State Forestry Administration et al.) (Wang X., 2006) (people.com.cn, 2010)	(State Forestry Administration, 2007) (Wang X., 2006) (Liu et al., 2008) (Department of Afforestation and Greening, 2010) (State Forestry Administration, 2011)	(State Forestry Administration, 2007) (State Department of Wildlife and Forest Plants Conservation, State Forestry Administration, 2010) (State Department of Wildlife and Forest Plants Conservation, State Forestry Administration) (State Forestry Administration, 2006). (Ministry of Environmental Protection, 2009)

Table 1–6 continued from page 77. Summary of China's six key forest conservation programs, listed in descending order of actual or needed investment

Program and Duration	Fast-growing and High-yielding Timber Plantation Program (2001-2015)	Beijing-Tianjin Desertification (Sandstorm) Control Program (2000-2010)	Key Shelterbelt Construction Program (duration varies by project; see Table 1–7)
Investment	71.8 billion RMB.	41.2 billion RMB as of 2010.	From 2003-2007, 6.3 billion RMB was invested in 5 of the 6 programs.
Goal	Increase domestic timber supply and sustainable rural economic development by establishing 13 million ha of timber production base. Eventually meet domestic demand for timber with the production base.	By 2010, return 1.3 million ha of farmland and 1.3 million ha of waste land/ mountain to forest; plant new forest on 4.9 million ha; and "treat" 10.6 million ha of grassland. Immigrate 180,000 farmers based on ecological considerations.	Across 6 large landscapes, plant trees 49.3+ million ha and "improve" 5.9+ million ha of inefficient shelter forest. See Table 1–7.[10]
Geographic Scope	18 provinces.	5 provinces (Inner Mongolia, Hebei, Shanxi, Beijing, Tianjin).	28 provinces across 6 project sites.
Achievements	As of 2009, 7.3 million ha of timber production base had been established.	As of 2010, forest cover reached 15%; afforestation totaled 6.0 million ha, and 8.7 million ha of grasslands were treated.	From 2001-2008, at least 43 million ha had been planted.
Sources	(State Forestry Administration, 2007) (State Forestry Administration, 2010) (Department of Afforestation and Greening, 2010)	(State Forestry Administration, 2007) (Ministry of Agriculture, 2010) (Chinamining.org, 2011) (National Development and Reform Commission, 2008)	(State Forestry Administration) (State Forestry Administration, 2005) (State Forestry Administration, 2010)

[10] "Improving" forest in this context involves a variety of activities to enhance a forest's structure, function, and productivity, such as planting trees which are suitable to the site.

Table 1–7. Projects of the Key Shelterbelt Construction Program (State Forestry Administration) (State Forestry Administration, 2005)

China invested 6.3 billion RMB in five of the six programs from 2003-2007, not including the Upper and Middle Reaches of Yangtze River shelter program. Investment for the Three Norths Shelterbelt program totaled 57.9 billion RMB. The authors did not find investment information for the other programs.

Project	Goal	Geographic Scope	Duration	Achievements
Coastal Shelter Program	Plant 1.4 million ha of forest and improve 1.0 million ha of "inefficient shelter forest."	11 provinces	Phase I: 1990-2000 Phase II: 2001-2010	In Phase I, 3.2 million ha were planted.
Plains Greening Project	During Phase II, increase vegetative cover by 5.5 million ha.	26 provinces	Phase I: 1987-2000 Phase II: 2001-2010	In Phase I, 7.0 million ha were planted.
Pearl River Shelter Program	During Phase II, plant 2.3 million ha of forest and improve 1 million ha of "inefficient shelter forest."	6 provinces (Jiangxi, Hunan, Yunnan, Guizhou, Guangxi, Guang-dong)	Phase I: 1996-2000 Phase II: 2001-2010	In Phase I, 0.7 million ha were planted.
Taihang Mountains Afforestation Project	Plant 3.6 million ha of forest over the life of the project.	4 provinces (Beijing, Hebei, Henan, and Shanxi)	Phase I: 1994-2000. Phase II: 2001-2010	As of 2005, 2.6 million ha had been planted.
Three Norths Shelterbelt Program	Plant 35.1 million ha of forest over the life of the project.	13 provinces	Total project: 1978-2050. Phase IV: 2001-2010	As of 1998, 20 million ha had been planted. 9.5 million ha were planted from 2001-2010.
Upper and Middle Reaches of Yangtze River Shelter Program	Plant 6.9 million ha of forest and improve 3.9 million ha of "inefficient shelter forest."	17 provinces	2001-2010	At least 6.9 million ha have been planted.

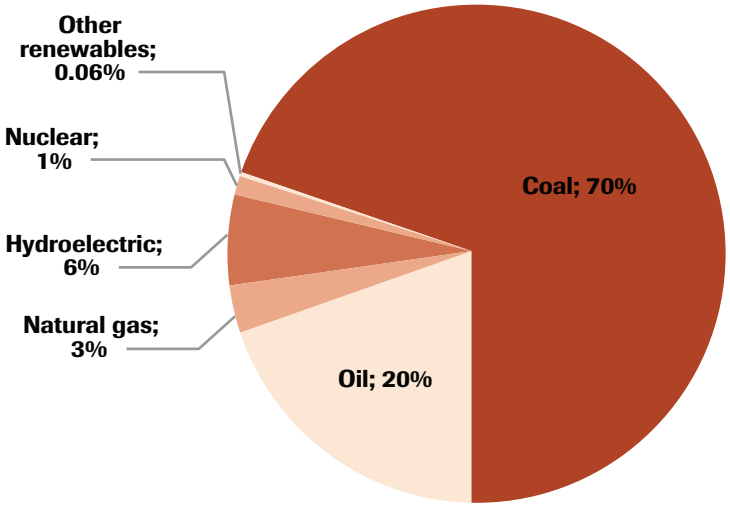
F. Mining & Energy Development

China has one of the largest mining sectors in the world, is the world's largest energy-producer, and is the first or second largest energy consumer (World Bank and International Finance Corporation, 2002) (U.S. Energy Information Administration, 2008).[11] Both production and consumption of energy are on the rise, which will impact biodiversity as China constructs more coal mines, oil and gas wells, commercial wind farms, and other infrastructure to fuel its energy needs (Figure 1–31).

[11] The International Energy Agency (IEA) claims that China has become the world's largest energy consumer (International Energy Agency, 2010) but the Central Government refutes this claim (Hook, 2010).

China's mining activities, consumption, and production of all energy types are growing, and will have an increasingly large footprint on the landscape. Western and central China in particular will experience increasing pressure for energy development because many of the untapped and lesser-tapped oil and gas fields are located there, as are the coal reserves and the areas with highest potential for wind and solar energy development. Specifically, 58% of coal reserves are located in central China, while 36% of coal reserves, 12% of oil and 53% of known natural gas reserves lie in western China. The abundance of available mineral and energy resources poses threats to fragile the ecosystems in the mountainous and desert regions of central and western China, and has called for rising attention on post-mining reclamation, particularly since China has made a late start in reclamation relative to other countries (China Academy of Land & Resource Economics) (Cao, 2007).

Figure 1–31. Total energy consumption in China by type (2008), recreated from (Energy Information Administration, 2011)

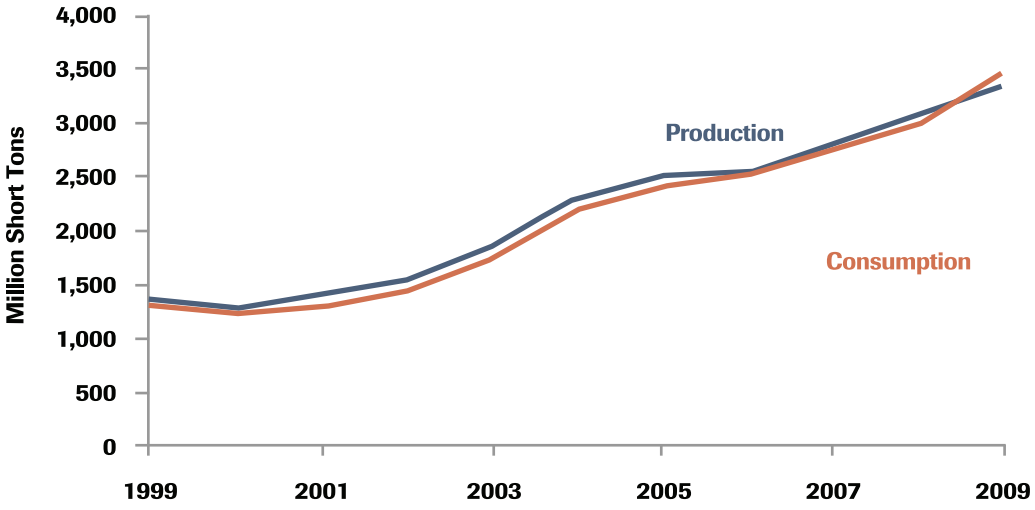


1. Coal and Other Mining

China is the world's largest producer of coal (44% of the world total in 2009) and a number of other minerals, such as rare earth elements which are used in electronic devices for defense, alternative energy, and communications industries (98% of the world total in 2009). It also provides gold (13% of the world total in 2009), and in 2009, produced upwards of 25% of the world production of other minerals such as aluminum (primary), antimony, iron ore, lead, manganese ore, mercury, molybdenum, tin, tungsten, vanadium, and zinc (Table 1–8). From 2005-2009, production of all of these minerals increased by an average of 48%. Of the various forms of mining, coal mining arguably has the greatest impact on China's landscape based on the sheer volume of minerals extracted if nothing else—more than 3 billion metric tonnes according to a 2009 estimate (Brown, et al., 2011).

With 14% of the planet's known minable coal reserves, China boasts the third largest coal reserves in the world behind the U.S. and Russia (Energy Information Administration, 2011). The production and consumption of coal more than doubled between 1999 and 2009 (Figure 1–32).

Figure 1–32. China's coal production and consumption, 1999-2009, reprinted from (Energy Information Administration, 2011)



Although the vast majority of China's provinces produce coal, it is distributed unevenly across the country. China has approximately 30,000 coal mines, 24,000 of which are small mines that produce one-third of the country's total coal production (Yang, 2007). Most of its reserves (81%) lie in the provinces of Xinjiang, Inner Mongolia, Shanxi, and Shaanxi. The government has identified 14 large coal bases, each of which consist of a series of individual mines (Figure 1–33) (Chinamining.org, 2011):

Coal and other mining activities are impacting China's landscape through land conversion, erosion, subsidence, and other means. The area directly impacted by any given mine) (coal or otherwise) is relatively limited (i.e., 18-20 hectares on average for a large-scale mine) (He, 2008), but the associated infrastructure can be significant and add to the impact. For example, more than 300 cities and towns had been established around mining projects in China as of 2006 (He, 2008). During the early 1990s, domestic mining activities resulted in the loss of approximately 1 million hectares of cultivated land (approximately 1% of total domestic cultivated land at that time), 1 million hectares of forest land, and 260,000 hectares of grassland (Liu). According to another source, by 2004, mining had destroyed or degraded 2 million hectares and by 2008, the number had increased to 3 million hectares (Wang, 2004) (Li, 2009). Subsidence and erosion also impact the landscape—he mining area. In the Huabei and Huadong coal mining regions[12], coal mining causes the subsidence of approximately 7,000 hectares annually (He, 2008). In Yunnan Province, 2,000 hectares of land were destroyed in geological disasters caused by mining from 1989-2000, and 22 million tons of soil was eroded. The government invested 200 million RMB in post-disaster treatment (Zou & Mao, 2004).

[12] The Huabei region includes Beijing, Tianjin, Hebei, Shanxi and Inner Mongolia provinces; the Huadong region includes Shanghai, Shandong, Jiangsu, Anhui, Zhejiang and Fujian provinces.

Figure 1–33. Distribution of coal resources in China

1. Shendong—Southwestern Inner Mongolia
2. Shaanbei—Northern Shaanxi
3. Huanglong—Central Shaanxi
4. Jinbei—Northern Shanxi
5. Jinzhong—Southern Shanxi
6. Jindong—Southeastern Shanxi
7. Mengdong (Dongbei)—Southeastern Heilongjiang, Liaoning
8. Lianghuai—Northern Anhui
9. Luxi—Southwestern Shandong, Central Shandong
10. Henan—Central Henan
11. Jizhong—Southern and Northwestern Hebei
12. Yungui—Western Guizhou, Southeastern Yunnan
13. Ningdong—Northern Ningxia
14. Zhundong—Central and Eastern Xinjiang

Table 1–8. Production of select minerals for which China produced at least 25% of the world's total in 2009 (Brown, et al., 2011)

Mineral	2005	2006	2007	2008	2009	% change '05 – '09	World total in 2009	% of World total in 2009
Aluminum (primary)	7,806,000 Metric tonnes	9,358,400 Metric tonnes	12,558,600 Metric tonnes	13,178,200 Metric tonnes	12,846,000 Metric tonnes	65%	36,900,000 Metric tonnes	35%
Antimony	151,457 Tonnes (metal content)	156,200 Tonnes (metal content)	163,000 Tonnes (metal content)	183,000 Tonnes (metal content)	166,200 Tonnes (metal content)	10%	179,000 Tonnes (metal content)	93%
Coal	2,205,000 Millions of metric tonnes	2,373,000 Millions of metric tonnes	2,536,000 Millions of metric tonnes	2,682,000 Millions of metric tonnes	3,050,000 Millions of metric tonnes	38%	6,938,000 Millions of metric tonnes	44%
Iron ore	420,493 Millions of metric tonnes	588,171 Millions of metric tonnes	707,073 Millions of metric tonnes	824,011 Millions of metric tonnes	880,171 Millions of metric tonnes	109%	2,248,000 Millions of metric tonnes	39%
Lead	1,142,000 Tonnes (metal content)	1,331,000 Tonnes (metal content)	1,402,000 Tonnes (metal content)	1,402,700 Tonnes (metal content))	1,610,000 Tonnes (metal content)	41%	3,900,000 Tonnes (metal content)	41%
Manganese ore	7,500,000 Metric tonnes	8,000,000 Metric tonnes	10,000,000 Metric tonnes	11,000,000 Metric tonnes	12,000,000 Metric tonnes	60%	33,400,000 Metric tonnes	36%
Mercury	1,094,000 Kilograms	760,000 Kilograms	798,000 Kilograms	1,333,000 Kilograms	1,300,000 Kilograms	19%	1,700,000 Kilograms	76%
Molybdenum	30,000 Tonnes (metal content)	43,900 Tonnes (metal content)	67,700 Tonnes (metal content)	81,000 Tonnes (metal content)	93,500 Tonnes (metal content)	212%	231,000 Tonnes (metal content)	40%
Rare earth elements	119,000 Metric tonnes	133,000 Metric tonnes	120,000 Metric tonnes	125,000 Metric tonnes	120,000 Metric tonnes	1%	123,000 Metric tonnes	98%
Tin	121,600 Tonnes (metal content)	126,300 Tonnes (metal content)	145,900 Tonnes (metal content)	121,500 Tonnes (metal content)	128,000 Tonnes (metal content)	5%	279,000 Tonnes (metal content)	46%
Tungsten	51,200 Tonnes (metal content)	45,000 Tonnes (metal content)	41,000 Tonnes (metal content)	43,500 Tonnes (metal content))	50,000 Tonnes (metal content)	-2%	62,300 Tonnes (metal content)	80%
Vanadium	17,000 Tonnes (metal content)	17,000 Tonnes (metal content)	18,000 Tonnes (metal content)	18,500 Tonnes (metal content))	20,800 Tonnes (metal content)	22%	58,000 Tonnes (metal content)	36%
Zinc	2,547,800 Tonnes (metal content)	2,844,200 Tonnes (metal content)	3,047,700 Tonnes (metal content)	3,186,000 Tonnes (metal content))	3,091,600 Tonnes (metal content)	21%	11,400,000 Tonnes (metal content)	27%

2. Oil

China is the fourth largest producer of oil behind Saudi Arabia, Russia, and the U.S, and is the second largest consumer of oil behind the U.S. (Central Intelligence Agency, 2011). Since the early 1990s, its oil consumption has grown at a far faster rate than its oil production (Figure 1–34). In fact, oil production has remained relatively flat for the last two decades. Companies have already tapped the largest and most easily accessed oil fields and have increased production in harder-to-access reserves to offset slowdowns in older fields.

Approximately 85% of China's oil capacity is located onshore and 15% is located offshore. The onshore resources are distributed widely throughout the country and their productivity varies greatly. The largest and oldest oil fields such as Daqing and Shengli are located in the northeastern part of the country (Energy Information Administration, 2011).

On-shore production growth is expected to remain stable. Newer exploration and production has been focused in western China including, but not limited to, Xinjiang, Sichuan, Gansu, and Inner Mongolia. The Energy Information Administration (2011) reports exploration and production activities within the Inner Mongolia Autonomous Region (Ordos Basin) and the Xinjiang Uygur Autonomous Region (Junggar, Turpan-Hami, and Tarim Basins) (Figure 1–35).

Production from China's offshore resources is expected to increase. For example, the China National Offshore Oil Corporation (CNOOC) plans to double its production in Bohai Bay. Offshore areas of focus include the Bohai Bay region in northeastern China (the oldest oil-producing offshore zone and the second-largest producing oil field in China in 2010), the Pearl River Delta, and the South China Sea. The East China Sea has received lesser attention.

Figure 1–34. China's oil production and consumption, 1990-2012, reprinted from (Energy Information Administration, 2011)

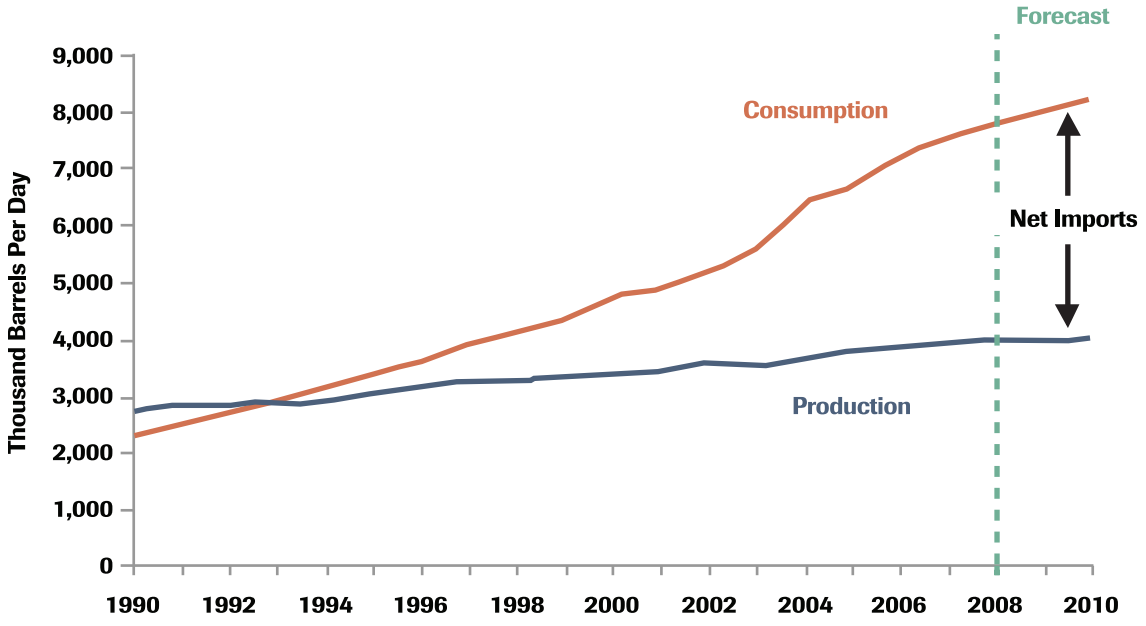


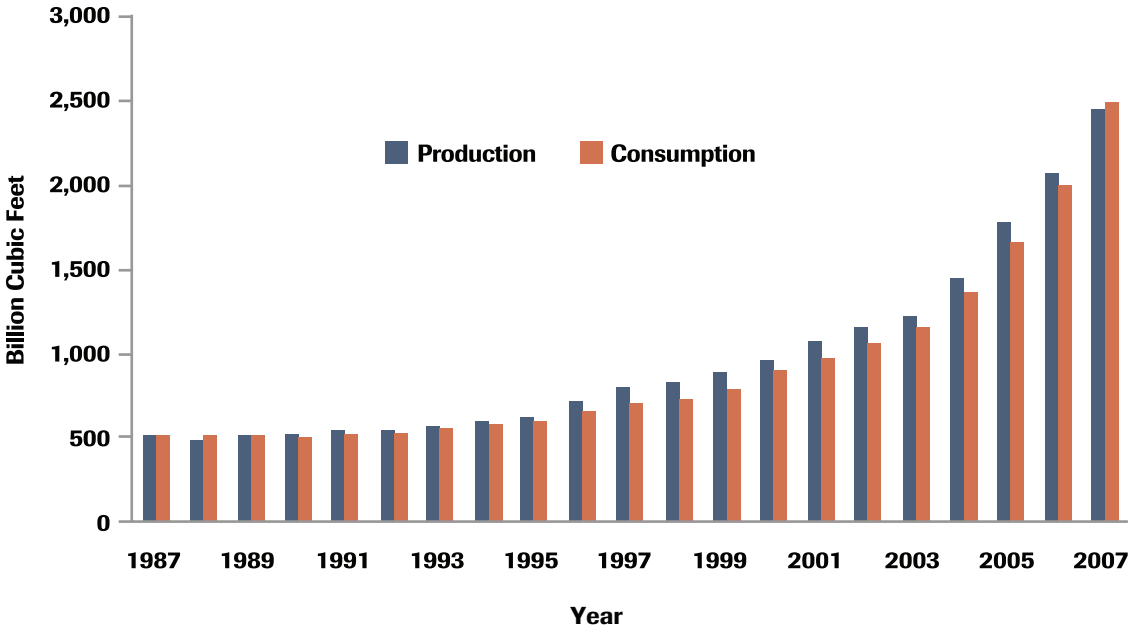
Figure 1–35. Oil and gas basins (Wang, 2008)

3. Natural Gas

China has moderate domestic natural gas reserves; its production and consumption more than doubled between 2001 and 2007 (Figure 1–36). According to one estimate, the country is ranked thirteenth in the world in terms of proven natural gas reserves, with 3 trillion cubic meters. By comparison, Russia—the top-ranked country—has 16 times the reserves of China, while the U.S—the fifth-ranked country—has more than double the reserves (Central Intelligence Agency, 2011). China's production of natural gas is on par with that of the Netherlands and Norway and is ranked eighth in the world. The U.S. and Russia are currently the top producers in the world, each with an annual output that is more than 6 times that of China's (Central Intelligence Agency, 2011).

Onshore, China's known natural gas deposits are located primarily in Shaanxi in the north (Ordos Basin), Xinjiang and Qinghai in the northwest (Tarim, Junggar, and Qaidam Basins), and Sichuan in the southwest (Sichuan Basin), (Figure 1–35). Xinjiang produces the most gas of any province. The Tarim Basin is likely to be the focus of significant additional development, given that it holds half of China's proven reserves, but only 12% of the basin had been explored as of 2009. Offshore, the South China Sea and Bohai Bay in the Yellow Sea are the focus of most natural gas development (Energy Information Administration, 2011).

Figure 1–36. China's natural gas production and consumption, 1987-2007 (2006 and 2007 are estimates), reprinted from (Energy Information Administration, 2011)



4. Hydropower

According to at least one expert, China is experiencing an "absolute, incredible proliferation of hydropower construction" (Harrison, 2011). This construction will continue: In January 2011, the Central Government released the "No.1 Document" and *The Decisions on Speeding-up Reform of Water and Resources*, which established water conservation as a primary goal of the country over the next 5-10 years. China plans to complete the "harnessing" of major medium- and small-sized rivers during the *12th Five-Year Guideline (2011-2015)*, and will invest 4 trillion RMB into the construction of water facilities over the next decade (Zhu, 2011) (chinanews.com, 2011) (Yao & Lin, 2011).

China boasts the greatest hydropower potential and number of hydropower stations of any country in the world, and less than half of its 542 million kw of technically feasible capacity has been developed to date (Zhao, 2009). China doubled its total installed capacity between 2004 and 2010, from 100 million kw to 200 million kw. The Three Gorges Dam in Hubei Province, operational in 2008, has the largest hydropower capacity of any dam on the planet (18,200

MW), as well as the notoriety for displacing the most people (1.2 million), flooding the largest number of cities and towns (13 cities, 140 towns, 1,350 villages), and creating the longest reservoir on Earth (more than 600 kilometers) (International Rivers) (Figure 1–37).

Figure 1–37. The Three Gorges Dam has the largest hydropower capacity in the world, and has created the longest reservoir on Earth. Photo by Brian Richter

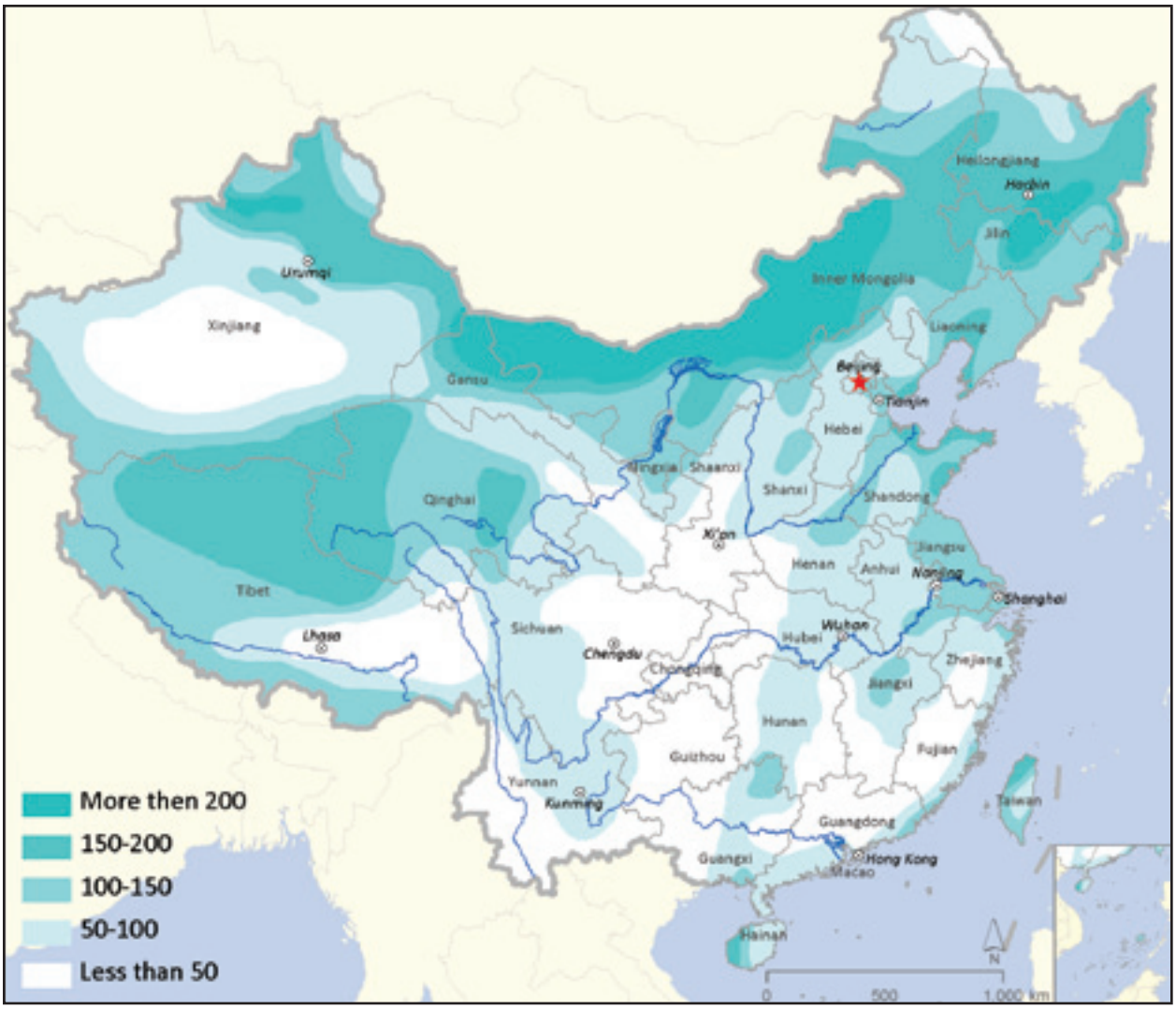
China tallied 45,000 hydropower stations as of 2010 and more than 85,000 dams as of 2007 (Wang & Zhao, 2010) (Guo et al., 2010). As of 2007, 5,200 of those dams (either built or under construction) were higher than 30m, and more than 140 dams were slated to be over 100m high (Wang & Zhao, 2010). The country is in the process of constructing the world's tallest dam, Shuangjiangkou Dam in Sichuan Province, which will be 312m high—nearly the height of the China World Trade Center in Beijing. Small dams are also very common throughout China, generally built by private companies and local governments for hydropower.

Mass construction of additional hydropower stations and dams will continue, fueled by the country's desires for electricity, flood control, water supply, and irrigation. In 2009, the National Development and Reform Commission (NDRC) announced a goal to increase non-fossil fuel energy consumption to 15% of the primary energy mix by 2020, and to reduce carbon dioxide emissions by 40-45% from 2005 levels (www.yunnan.cn, 2010); to meet this goal, at least 330 million kw of hydropower is required. Most of this development will be concentrated in Yunnan, Sichuan, Qinghai, and Tibet, where vast hydropower still remains untapped. Hydropower development is complete in Guangxi, Chongqing, and Guizhou provinces (www.yunnan.cn, 2010). For water supply, which is more of an issue in the dry north than in the wetter south, several major dams and diversions will eventually transport water from south to north as part of the South-to-North Water Diversion Project. Water will travel from the old Grand Canal to Tianjin (East Route), from the Han River at the Danjiangkou Reservoir to Beijing (Middle Route), and from the Upper Yangtze tributaries to the Yellow River (West Route).

5. Wind

The World Wind Energy Association describes China as "the locomotive of the international wind industry" (World Wind Energy Association, 2010). China more than doubled its wind capacity every year from 2006-2009, and is the largest market for new turbines. As of 2010, it boasted the largest wind capacity in the world, with nearly 45,000 MW of installed capacity. By comparison, the U.S. has the second largest installed capacity with 40,000 MW and Germany has the third largest, with 27,000 MW (World Wind Energy Association, 2011). China has already far exceeded its goal of 30,000 MW of installed capacity by 2020 (National Development and Reform Commission, 2007). It should be noted that despite the growth in its wind industry, China's wind production still represents just 1.2% of its total electricity supply according to a 2010 estimate (World Wind Energy Association, 2011). Nonetheless, wind development is having a significant footprint on China's landscape. Wind development is primarily ecologically impacting the grasslands and Gobi desert of the northwest, the "Sanbei Region" spanning the northern part of the country, and the eastern coastal dry lands, islands, and shores (Figure 1–38). Liaoning, Xinjiang, Inner Mongolia, and Guangdong are developing most quickly.

Figure 1-38. Wind potential in w/m² (Lin, 2010)



6. Other

Of the array of energy resources in China, the development of coal, oil, natural gas, wind, and hydropower may have the greatest impact on China's landscape. However, the government also aims to increase production of other renewable energy resources such biomass and solar. The government has identified these resources as development priorities (National Development and Reform Commission, 2007). Furthermore, additional oil and gas pipeline construction is anticipated. Individually developing these resources may not have a particularly large effect on terrestrial biodiversity values, but it will certainly add to cumulative impacts.

Biomass—The sources of China's biomass energy include straw from biomass energy plantations, agricultural crops, livestock waste, industrial organic water waste, municipal sewage, and garbage. The biomass energy plantations may involve some conversion of native ecosystems.

As the NDRC (2007) explains in its "Medium and Long-Term Development Plan for Renewable Energy," "Energy plantations will be grown in marginal areas (including barren mountains, barren land, and sandy areas suitable to afforestation) to supply feedstock for agriculture and forestry based biomass power generation." As of 2007, China had planned to create more than 13 million ha of "high-yield and good quality" biomass energy plantation bases within 15 years (State Forestry Administration, 2007).

Solar energy—China's best solar resources lie in far western China in the Qinghai-Tibetan Plateau, far from population centers in the east. China aims to provide small scale solar power stations in regions where villages and households do not have electricity, particularly Tibet, Qinghai, Inner Mongolia, Xinjiang, Ningxia, Gansu, and Yunnan. The government is also constructing solar energy demonstration projects in open and deserted areas in Inner Mongolia, Gansu, and Xinjiang (National Development and Reform Commission, 2007). In terms of commercial operations, the government aims to connect to the grid 400 MW of solar photovoltaic and solar thermal by 2020 (National Development and Reform Commission, 2007). The footprint of these operations on the landscape may be relatively limited; for example, if one estimates approximately seven acres of disturbance for every one MW of solar energy, a total of only 2,800 acres may be impacted based on the 2020 goal.

Pipelines—China's uneven geographic distribution of oil and natural gas, as well as increasing demand for these fuels, has prompted the country's construction of a pipeline system to transport the resources to consumers. The construction of pipelines and associated roads often leads to a host of other impacts to ecosystems as formerly inaccessible areas become accessible for a range of activities such as hunting, logging, and mining. China has undergone a period of "expedited development" of pipelines since 1996 (Qi, 2009), and an average of 5,000 km was constructed annually from 2003-2008 (Shen & Li, 2010). Estimates of the extent of current pipelines vary widely. According to one source, approximately 78,000 km of oil and gas pipelines had been established across China as of 2011, of which 40,000 km were for natural gas, 20,000 km were for crude oil, and 18,000 km were for refined oil (Qian & Yu, 2011). According to another source, China's largest oil and gas producer (China National Petroleum Corporation; CNPC) constructed 270,000 km of pipeline from 2006-2010, exceeding the total laid in the previous 42 years (China Daily, 2011).

More pipeline construction is expected as China increases its imports, increases natural gas production, and increasingly shifts oil production from the older fields in the northeast to newer fields in more remote parts of the country. For example, as of 2009, plans were in place for China to construct import lines from Russia and Myanmar, most notably through the ecologically sensitive Altai region of northern Xinjiang. Part of the Russia-China line is completed and runs from Siberia to Daqing; a second stage of construction is slated to be complete by 2014, after which the pipeline will run for 4,700 km (BBC News, 2011). CNPC aims to construct 270 km of pipeline, to total 540 km, by 2015 (China Daily, 2011).

G. Transportation

To support its economic growth, China is investing major resources in expanding road and rail networks. The vast majority of existing transit is located in eastern China, where the majority of the population resides. New highway and high-speed railway development will occur there also, though secondary road construction is also an emphasis in western China. Further fragmentation of biodiversity habitat is a major concern, although China does make concessions for wildlife in its road construction. For example, there was significant effort to conserve wildlife passage routes during the construction of the Lhasa railroad.

1. Road Construction

As with population, road density is greatest in eastern China. In 2004, the State Council issued the "National Expressway Network Plan," aiming to expand roads from all major cities over a 30-year period. The plan envisions a "7-9-18 Network" consisting of 7 expressways from Beijing, 9 expressways running north-south ("verticals"), and 18 expressways running east-west ("horizontals"). Together, these roads would total 85,000 km—68,000 km for highways, regional ring roads, and connecting roads, and 17,000 km for other smaller roads.

As of 2007, the Central Government had constructed 42,000 km of major roads to complete five verticals and seven horizontals, thereby forming the backbone of the national expressway system. By 2009, China had already exceeded its goal by constructing 75,000 km of roads (The Transport Politic, 2009). For comparison, China and the U.S. now have roughly equivalent highways systems in terms of length (U.S. Department of Transportation).

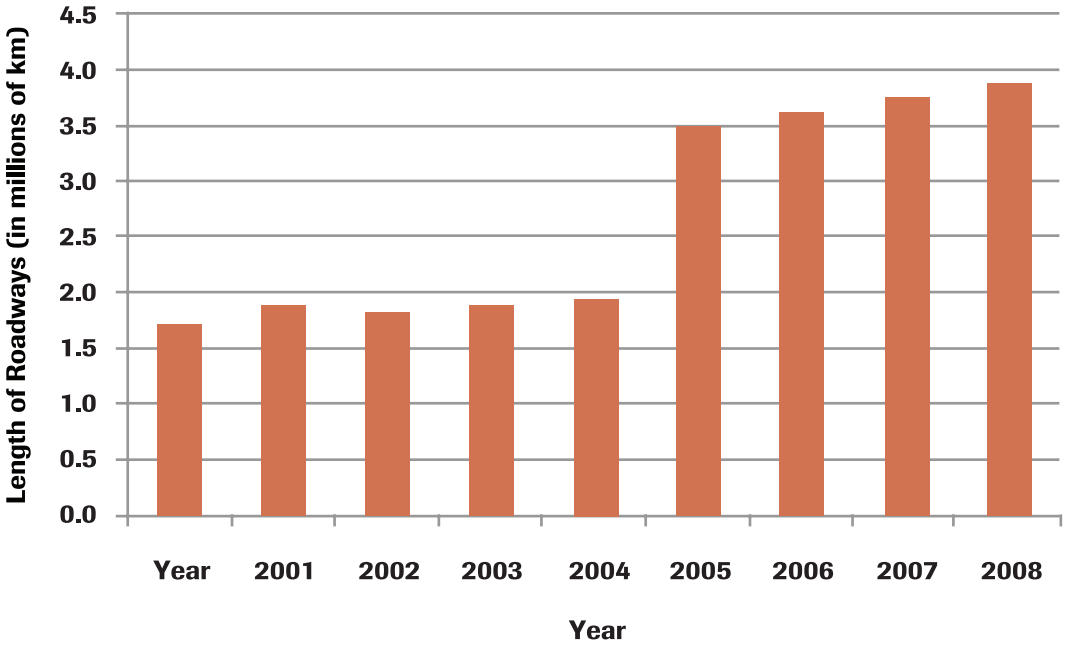
The government has also dedicated attention to rural transit. From 2004-2005, China completed a major rural road-building effort and nearly doubled the length of rural roadways from 1.9 million km to 3.5 million km (Figure 1–39). In just over a year, China constructed more paved rural roads than were built during the previous 50 years combined (Hessler, 2010).

2. Railway Construction

China is also dedicating significant resources to railway construction and has developed a "Mid-term and Long-term Railway Network Scheme" (2008). Currently, there are approximately 78,000 km of railroads in China, which like roads, are concentrated in eastern China. The Central Government will invest 5 trillion RMB to newly construct 40,000 km of railroads by 2020 (china.com.cn, 2008) (Ministry of Railways, 2008). Once completed, the rail network will connect most cities with populations of at least 200,000 (China Railway Construction Corporation Limited, 2008). Two types of railways are being constructed: very high speed lines for passenger use between major cities, and typical high-speed lines for regional, commuter, and freight trains (The Transport Politic, 2009). According to the plan, eight very high-speed passenger-dedicated railways (Beijing-Shenzhen, Beijing-Shanghai, Beijing-

Ha'erbin, Shanghai-Shenzhen, Xuzhou-Lanzhou, Hangzhou-Kunming, Qingdao-Taiyuan, and Nanjing-Chengdu) totaling 13,368 km in length and intercity passenger transport systems in densely populated areas will be constructed. The Shanghai-Kunming line will be the longest at 2,264 km long—roughly the distance between Boston and Miami.

Figure 1–39. Length of roadways in China from 2001-2009, including but not limited to major highways (china.com.cn, 2008) (Ministry of Transport, 2009) (Xu, 2010)



Collectively-owned land in Jiangxi Province. Photo by Yang Xin

PART 2:
LAND TENURE

I. Overview

Simply put, *land tenure* is the way in which people have access to and use land and natural resources. A more detailed definition describes land tenure as "the institutional (political, economic, social, and legal) structure that determines (1) how individuals and groups secure access to land and associated . . .resources, including trees, minerals, pasture, and water and (2) who can hold and use these resources—for how long and under what conditions" (USAID, 2010).

Clearly, there are many dimensions to land tenure. It is like a bowl of "spaghetti," consisting of intertwining concepts such as administrative divisions, ownership, use rights, management, enforcement, etc. This part of the book teases apart the elements of the current land tenure system in China, as they relate to land protection efforts, and explains them in digestible portions. For those interested in land protection projects or other transactions involving rural land in China, it is imperative to have a basic understanding of these components.

Before we get started, some foundational principles to bear in mind: First and foremost, this part explains land tenure based on laws as they relate to potential land protection projects in rural China. It provides a foundation to help the reader to understand the basics of land tenure in China. However, anyone actually embarking on a project should consult independent legal advice. Second, it is extremely common throughout China, as in almost all countries, for there to be differences between *de facto* and *de jure* land tenure—what the law allows and what actually occurs on the ground. Laws and policies related to property rights have historically been implemented differently across China. Finally, China has a history of land tenure overhauls that will likely continue into the future, thus complicating any long-term project or program. Therefore, what is true today may not be true 2 years from now, let alone 50 or 100. These overhauls have granted and rescinded ownership and use rights to and from various parties (particularly rural people) for the last century. Since 1978, the trend has been toward granting more, rather than fewer, use rights to households. However, individuals' ability to exercise these rights varies, and because of the history of change, rural people in particular have little if any confidence in laws and regulations that supposedly assure them of security. This longstanding history of tenure insecurity, while improving, still challenges the stability of land rights and complicates land protection efforts.

II. Legal framework

The Constitution of the People's Republic of China (P.R.C., 1982 as amended) and legislation based on the Constitution form the legal basis for the land tenure system. Implementation of the legislation and further reforms are carried out through a variety of regulations and policies, which is then coordinated through an elaborate planning system. The **Five-Year Guidelines of the P.R.C.** (formerly called Five-Year Plans) are the major planning documents, which set priorities for economic development, growth targets, and land or other reforms. These documents identify socioeconomic development goals for five-year (or so) blocks of time. China developed the *1st Five-Year Plan* in 1953. It has just finished implementing its eleventh which covered the years 2006-2010; and is now implementing its twelfth, which will cover the years 2011-2015. The *12th Five-Year Guideline* seeks to address rising inequality and promote more sustainable growth.

The **Central Committee of the Communist Party (CCPCC) Documents** also set priorities and guide the implementation of laws and policies. These documents are numbered according to their order of publication within a given year. For example, the first document of the year is "Central Document No. 1" (中央一号文件, *zhongyang yihao wenjian*), the second is "Central Document No. 2," and so forth. The "Documents No. 1" have a special status, as they are generally considered to indicate the political priority of central authorities for the year to come. As for land issues, the "Documents No. 1" from 1982-1986 and again from 2004-2010 were dedicated to rural development, and especially to land rights issues. For 2011, "Document No. 1" addresses rural issues for the eighth consecutive year, but it is the first year to highlight and emphasize water conservation and development (CCTV, 2011) (Zhu, J., 2011).

China has also passed a host of **environmentally-related laws** over the last several decades that direct rural land ownership and use. These laws govern land tenure in general, natural resources, and protected areas (Figure 2–1). Although the laws vary widely in their implementation, they provide the basis for opportunities to conserve important landscapes. For example, the Forestry Law and the Grasslands Law describe allowable and prohibited uses in these vegetation types, including but not limited to protection and restoration priorities (see Chapter VIII, Use Rights). Also, protected area laws and regulations describe requirements for establishing and managing nature reserves, forest parks, and other types of protected areas (see Part 3, Land Protection in Practice). Furthermore, the Land Administration Law details requirements for land use planning nationwide, through which the government delineates areas for use and protection (see Chapter VII, Land Use Planning).

Figure 2–1. Major laws and some relevant regulations directing land tenure for rural lands in China[13]

The laws are listed in order of their original effective dates. Where the government has issued amendments, the amendment year is listed. This book references the most recent version of the laws, unless otherwise noted.

Land tenure in general

- Land Administration Law (1986, 1988, 1998, 2004)
- Rural Land Contract Law (2003)
- Property Rights Law (2007)
- The Law on the Mediation and Arbitration of Rural Land Contract Disputes (2010)

Natural resources

- Forestry Law (1984, 1998)
- Grassland Law (1985, 2003)
- Mineral Resources Law (1986, 1996)
- Water Law (1988)
- Environmental Protection Law (1989)
- Law on the Protection of Wildlife (1989)
- Water and Soil Conservation Law (1991)
- Agriculture Law (1993)
- Regulations on Wild Plants Protection (1997)
- Regulations for the Implementation of the Forest Law (2000)
- Law on the Prevention and Control of Desertification (2002)
- Coal Law (2006)
- Renewable Energy Law (2009)
- Law on Island Protection (2009)

Protected areas

- Construction Management Regulations of Scenic Areas (1993)
- Regulations on Nature Reserves (1994)
- Regulations on Forest Park Management (1994)
- Regulations on Scenic Areas (2006)
- [Draft] Natural Heritage Protection Act (2009)[14]

[13] Other laws related to land tenure other than for terrestrial resources and rural lands include: Law on Administration of Urban Real Estate (1994) and the Fisheries Law (1986, 2000, 2004)

[14] The August 4, 2009 version is the latest version of which the authors were aware. It is possible that more recent versions exist. This law, if passed, would provide guidance for scenic areas, forest parks, nature reserves, and other protected areas.

III. Administrative Divisions

The Chinese State (the State) is embodied by the Central Government and is under the leadership of the Communist Party (the Party).[15] The Central Government technically maintains authority over all administrative divisions in the country, though the Party is in fact the leading authority. All administrative divisions underneath the Central Government are considered "local government." There are three such levels: provincial (省, *sheng*) (Figure 2–2), county (县, *xian*), and below-county. Some provinces are also divided into prefectures (州, *zhou*), which is a fourth type of division that oversees one or more county-level governments (Figure 2–3). This chapter briefly describes the most common components of these divisions; see Chapter VI, Decision-Makers, for a more in-depth description of governance.

There are three main types of **provincial-level** divisions including 22 provinces, 5 autonomous regions, and 4 municipalities. Sample provinces include Yunnan, Gansu, and Jilin. The five *autonomous regions* (自治区, *zizhi qu*) are areas associated with one or more ethnic minorities: the Xinjiang Uyghur Autonomous Region, the Inner Mongolia Autonomous Region, the Tibet Autonomous Region, the Ningxia Hui Autonomous Region, and the Guangxi Zhuang Autonomous Region (Chapter X, Other Tenure Factors Affecting Land Protection). The four *provincial-level municipalities* (直辖市, *zhixia shi*) include Beijing, Shanghai, Chongqing, and Tianjin.

Technically, Taiwan, Hong Kong, and Macao are also considered provincial-level divisions. Currently China does not exercise effective power over Taiwan, whereas Hong Kong and Macao are *Special Administrative Regions* (SARs). Under China's "one country, two systems" policy the SARs enjoy complete autonomy, with the exception of foreign policy and military defense which are the responsibility of the Central Government.

Provincial-level jurisdictions vary widely in terms of area, population, and economic indicators. For example, not including the provincial-level municipalities, they range in size from Hainan at 34,000 km² (roughly the size of Belgium) to Xinjiang at 1.7 million km² (roughly the size of Alaska). Population densities range from Tibet's 2.7 million inhabitants spread over 1.2 million km² to Jiangsu, which packs 75 million inhabitants into an area of 102,000 km².

Some provinces are divided into *prefectures* (州, *zhou*). Prefectures oversee two or more counties and/or cities within a province, typically that share common features. For example, ethnic autonomous prefectures usually combine several autonomous counties of the same ethnicity. There are a total of 47 prefectures, 30 of which are autonomous, plus nearly 300 prefecture-level cities.

[15] Preamble of the Constitution

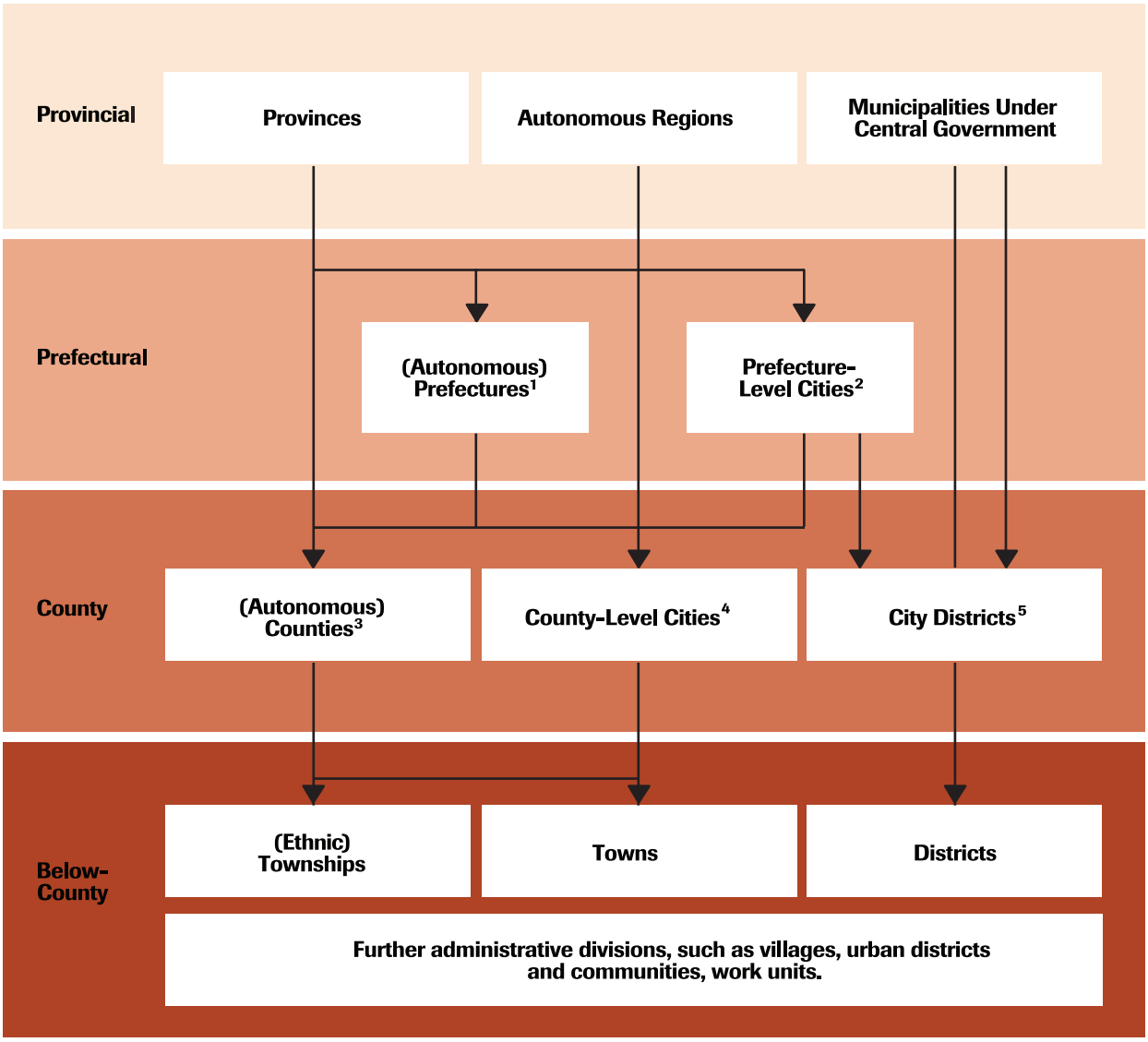
Figure 2–2. Provincial-level divisions [will replace this with a better map].

County-level government and divisions below primarily include *counties* (县; *xian*) and *autonomous counties* (自治县, *zizhi xian*), *county-level cities* (县级市*s, xianji shi*), and *city districts* (市辖区, *shixia qu*). There are approximately 2,900 county-level designations in China, roughly half of which are counties.

Immediately below the county level, there are four government divisions: *districts* (区, *qu*), *towns* (镇, *zhen*), *townships* (乡, *xiang*), and *ethnic townships*. Townships are further divided into *villages* (村, *cun*). An important distinction between below- and above-county government is the accountability of local leaders to residents. The former holds elections, through which villagers appoint town and township leaders (usually local residents). By contrast, county government and Party leadership are appointed from above, and can be allocated from other regions (Menzies, 2011). Thus, below-county leaders are more accountable to residents, and will be sure that their needs are met through land protection projects. A difference amongst the below-county divisions is that districts (区, *qu*) and towns (镇, *zhen*) are considered urban, while

townships (乡, *xiang*) are rural. The rural/urban distinction roughly correlates to agricultural/non-agricultural lands, which is important to land protection efforts because it determines the bundle of property and other rights allowed to different individuals through individual residence permits (户口, *hukou*, see Chapter VIII, Use Rights). The below-county divisions can be interspersed; for example, Dengfeng City of Henan Province is a county-level city containing eight towns and four townships.

Figure 2–3. Administrative jurisdictions in mainland China



[1] For the Illi Kazakh Autonomous Prefecture, two additional sub-prefectures exist above the county level.
[2] Prefecture-level cities include both rural and urban territories.
[3] There are very few counties directly underneath provincial government.
[4] County-level cities within a municipality under the Central Government exist only in Chongqing Municipality.
[5] City districts can have multi-level sub-district systems.

Figure 2–4. Collectively-owned lands are managed by one or more villages, such as the Shigu Village area in Yunnan. Photo by Ami Vitale

IV. Land ownership

There are two types of land ownership in China: state and collective (国家所有, *guojia suoyou* and 集体所有, *jiti suoyou*). Constitutionally, all land in China belongs to "the people" (人民, *renmin*), so theoretically, land cannot be owned privately. Instead, *use rights* to state and collectively-owned lands are allocated to groups, individuals, or other entities, typically for 30-70 years (see Chapter VIII, Use Rights). As of 1996, state lands totaled 53% and collectively-owned lands totaled 46%; ownership was not determined for the remaining 1%, comprised mostly of pasture, forests, and unused lands (Ho & Lin, 2003). Collective ownership encompasses nearly all of the cultivated land (94%) and most of the forest (58%) (Figure 2–5) (Qian et al., 2004) (Zhu K., 2011).

Typically, one or more villages manage collectively-owned lands (Figure 2–4) (Chapter VI, Decision-Makers). The Constitution and legislation have yet to clarify exactly what constitutes a collective, leading to considerable confusion and conflict in land rights disputes (Menzies, 2011). Collective ownership is indefinite though the State retains the power of eminent domain (Zhu K., 2011). As the Constitution states, "The State may in the public interest take over land for its use in accordance with the law."[16]

Technically, the Constitution and the Land Administration Law distinguish between state and collective ownership of rural, suburban, and urban lands, versus ownership of natural resources. However, ownership is often unclear due to ambiguities and apparent contradictions in the laws and on-the-ground realities. According to law, the State can own land anywhere in the country and is the sole owner of urban land, while collectives can own land in suburban and rural areas.[17] As for natural resources, the State owns "[m]ineral resources, waters, forests, mountains, grassland, unreclaimed land, beaches and other natural resources . . .with the exception of [those] that are owned by collectives . . ."[18] The laws are confusing on two fronts. First, in reality, natural resources and land overlap with each other, so it may not be clear whether a given parcel in a rural area and the natural resources within it are under state and/or collective ownership. Second, the boundaries between rural/suburban/urban lands are not always clear; in fact, China is urbanizing so quickly that sometimes urban boundaries expand and surround collective land. Thus, these seemingly contradictory provisions beg the questions of whether and how land is registered in China, how often disputes occur, and how they are resolved. Later chapters provide answers to these questions. In short, registration is limited but increasing, and the resolution of disputes can often be open to manipulation, factionalism, or influence by the most powerful people or institutions (see Chapter IX, Tenure Security and Enforcement).

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[16] Constitution Article 10

[17] Constitution Article 10, Land Administration Law Article 8, Property Law Article 47

[18] Constitution Article 9, Property Law Article 48. Grassland Law Article 9 states that the State owns grasslands (except those owned by collectives) and the Forestry Law Article 3 states the same for forest resources.

Figure 2–5. Collective forest area ownership by province (Miao and West, 2004)

V. Tenure reform

"Give it today and take it back tomorrow."
—Chinese epigram critiquing changes in forest property rights (Grinspoon, 2002)

China is no stranger to redistributions of land and use rights; major land reforms have swept the nation for the past century. Understanding China's land reform history and trends provides important context for protection efforts. The last 60 years have witnessed particularly significant transitions in both urban and rural land policies, as the government has experimented with different tenure schemes for cultivated lands, forests, and grasslands to increase their productivity and improve local livelihoods. Starting with the rise of the Communist Party, initially under the leadership of Chairman Mao Zhedong, there have been three major waves of reforms.[19] In very general terms, they include (Figure 2–6):

1. **Private ownership (1930s/1940s to early/mid 1950s):** The State granted individuals full ownership of agricultural land and forest land within this time period, also known as Mao's First Land Reform. Private property rights were not instated for grasslands, which were still managed as a common property resource.

2. **Collectivization/No individual rights (early/mid 1950s to late 1970s):** The State rescinded ownership rights of individuals for agricultural lands, forests, and grasslands through collectivization.

3. **Decollectivization/Private and increasing use rights (late 1970s to present):** The State granted individuals limited and short-term use rights, but not ownership, during a period of initial decollectivization in the late 1970s to mid-1980s. Since that time, the State generally has been increasing use rights granted to individuals with the exception of forests during the 1980s and 1990s. During that period, the State exerted significant control over timber harvest and other forest activities in response to the mass deforestation that occurred after use rights to forests were first distributed to households in the early 1980s.

Thus, for the last 30 years individuals have, for the most part, enjoyed increasing use rights which are heading in the general direction of privatization, though there is significant uncertainty regarding the term "privatization" due to political and ideological factors.

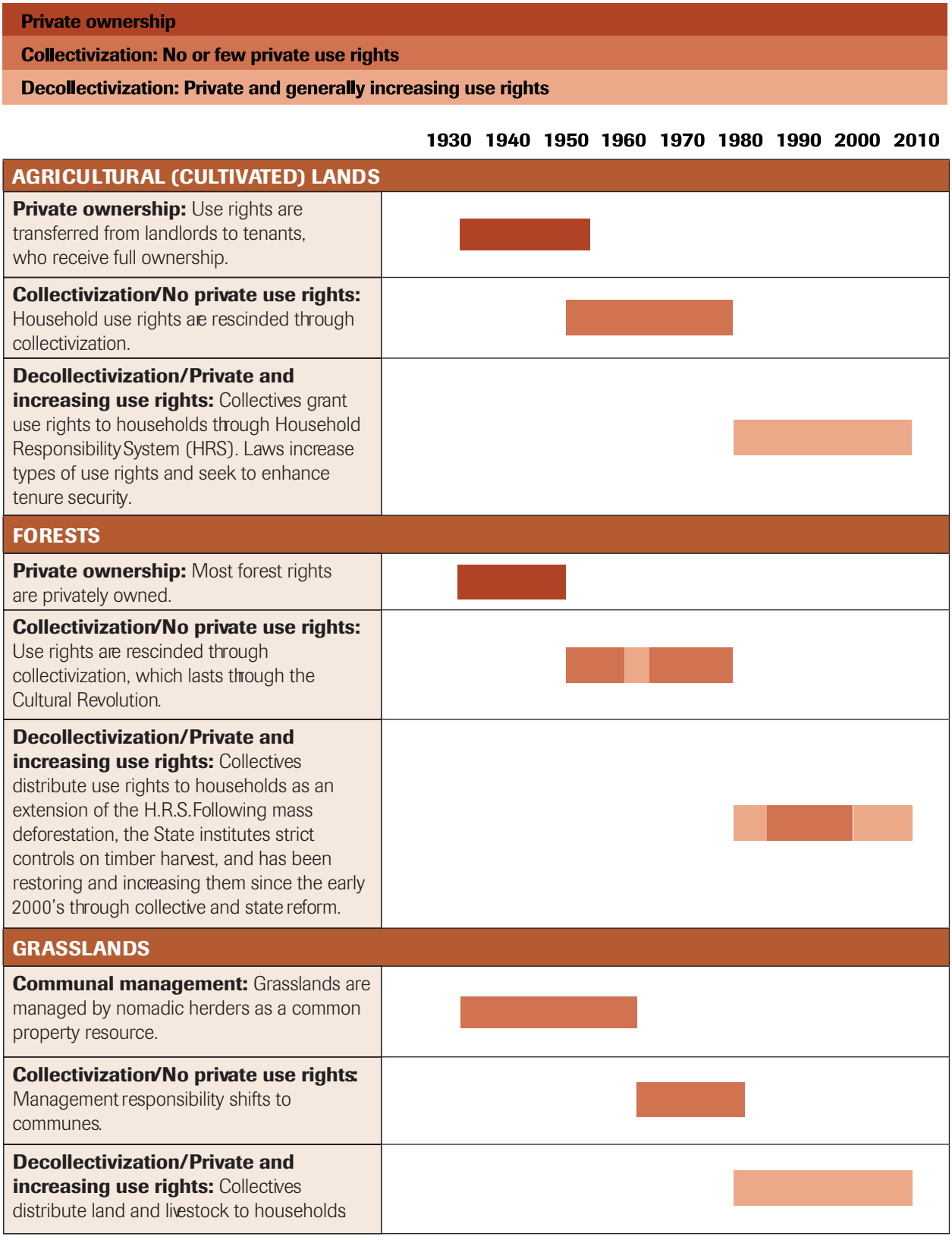
[19] There is some debate about the number of reforms that have occurred. One could argue, for example, that the third reform period could be split into two, with the third occurring during initial decollectivization, and the fourth occurring afterwards and through the present.

The government has implemented these reforms differently across land uses such as agricultural lands, forests, grasslands, residential lands, and urban lands; there are also differences across ethnic minority regions (see Chapter X, Other Tenure Factors Affecting Land Protection). The reforms have had varying degrees of success in terms of improving productivity and benefiting local livelihoods, with the agricultural reform as the most successful. In fact, China boasts the greatest poverty-alleviation achievement in the world in the last 30 years, primarily because of the land reform that granted farmers certain use rights in the late 1970s and 1980s (Ravallion & Chen, 2004) (Zhu & Prosterman, 2007).

A key lesson emerges from all of China's various land reform efforts: Tenure security is fundamentally important to improved land management. So long as people are confident that they will have the right to use, dispose of, and make decisions about using the land, it is more likely that land and natural resources will be managed for long-term productivity. For this reason, the current trend is to grant longer-term use rights and increasing types of rights to households and individuals. This is a step in the right direction, but implementation of the law, and especially creation and enforcement of contracts, remains major challenges. Abuses of land use rights remain common (see Chapter VIII, Use Rights and Chapter IX, Tenure Security and Enforcement).

The remainder of this chapter begins with a discussion of agricultural reform because it has set the trend for the reform of other land uses. It then describes forest tenure reform and grassland tenure reform because they are highly relevant to land protection efforts aimed at conserving biodiversity. At present, the Central Government is concentrating reform efforts on forests.

Figure 2–6. Summary—Waves of land tenure reforms in China for agricultural lands, forests, and grasslands



A. Agricultural Reform

"Agricultural" in this context means cultivated land. After 32 years of relative turmoil under collective management from 1956-1978, the government started transferring use rights to households. The trend has been towards increased land use rights and improved livelihoods.

i. Past

Private ownership—One of the first actions the Communist authorities took in areas that came under their control was to initiate Chairman Mao's first massive land reform. It transferred use rights from landlords to tenant farmers and resulted in the deaths of hundreds of thousands, if not millions, of landlords. Farmers were given full private ownership, and by 1952, nearly half of all agricultural land was redistributed to approximately 60% of China's farmers or 300 million people (Vendryes, 2010). The reform started at different times in different places; for example, in Jinggangshan City in Jiangxi Province and Yanan City in Shaanxi Province, it started in the late 1930s or early 1940s, whereas in some parts of Yunnan and Hainan Provinces, it started in the early 1950s (Menzies, 2011).

Collectivization/No private use rights—Beginning as early as 1951, there were successive phases of collectivization characterized by different forms of cooperatives. By 1956, Mao issued a call for wide-reaching collectivization, creating large agricultural communes, and extinguishing all individual or household property rights in favor of collective control. The land reform associated with this initiative, known as the Great Leap Forward, aimed to transform China into an agrarian and egalitarian economy by creating collective farming and large agricultural communes, with collectively-controlled property rights. Unfortunately, farm productivity plunged. From 1958-1961, thirty million people died of starvation (Dikotter, 2010), and collectivization was associated with the disastrous policies of the Great Leap Forward (1958-1961). Following the Great Leap Forward, the structure and management of communes were adjusted several times, but by the late 1970s, persistent problems with production remained. The government started forming smaller collective units in hopes they would be more likely to invest in the land and increase productivity.

Decollectivization/Private use rights—By 1978, based on experiments to lease farmland to households, the Central Government moved back to household-based agricultural production, instituting the Household Responsibility System (HRS) (Menzies, 2011) (Ash, 1988). Under the HRS, collectives transferred use rights—though not ownership—to individual households for three-year blocks of time. In addition, households gained the right to the residual profit on agricultural yields, which was considered the single most important factor in the success of land reforms in the early 1980s (Lin, 1992) (Vendryes, 2010). Also, "Document No. 1" in 1984 gave households the right to subcontract land to other parties, though few did so until years later. As a result of these changes, productivity increased rapidly at first but then stagnated, in part because of tenure uncertainty. With only three-year use rights, farmers had limited incentive to make major investments in their agricultural plots. Also, the use rights were subject to frequent changes through land readjustments, which collectives initiated in order to ensure equality amongst their members.

ii. Present

Increasing private use rights—For the last 20 years, the government has taken steps toward increasing the security of use rights with the intent of increasing agricultural productivity and improving peasants' livelihoods. In 1993, the State gave managers of collective lands the option (though not the requirement) of granting farmers 30-year use rights (Figure 2–7). In 1998, the Land Administration Law actually *required* the granting of 30-year use rights through written contracts. The Rural Land Contracting Law (2002) further delineated farmers' rights, the contents for written contracts, and dispute resolution procedures. It also reiterated farmers' ability to circulate land use rights to third parties, through "subcontract, lease, exchange, or swap." In 2008, the "new" rural reform policy reiterated the principles laid out in the 2002 law, though it received much greater publicity (Zhu K., 2011) (Prosterman & Zhu, 2009) (Rural Development Institute, 2010).

Figure 2–7. Today, farmers such as these rice and tobacco farmers near Lijiang, Yunnan, enjoy 30-year use rights to cultivated lands. Photo by Ami Vitale

B. Forest Reform

Compared with agricultural land reform, forest reform arguably has been much more complicated and less successful in improving land management and local livelihoods. The current reform is attempting to bring the forest sector "up to date" with the agricultural sector (Xu et al., 2010). Past reforms dealt primarily with collective forests, while current reform is addressing both collective and state-owned forests.

i. Past

Private ownership—During Mao's First Land Reform (1949-1952), households received ownership rights for trees and forested mountainsides (Grinspoon, 2002). Approximately 10 years later, these rights were reversed.

Collectivization/No private use rights (with a brief interlude of some private use rights)—By the end of the Great Leap Forward in 1961, the State had rescinded all ownership and use rights from individuals and either kept forests in state ownership or gave them to communes. At the same time, the State instituted a massive campaign to produce iron and steel for construction projects. Villages and even households were told to produce steel. This campaign led to severe deforestation as forests were cut to supply fuel (wood or charcoal). In coal-mining areas, trees were cut to provide timber for props in the mines (Menzies, 2011). In some locales, workers clear-cut forests without regard for property rights.

Peasants enjoyed some restored use rights to private forest plots during a few years of retrenchment from 1961-1964. However, these were lost during the Cultural Revolution, which was Chairman Mao and the Communist Party's effort to cement socialism through major political, economic, and social reforms from 1966-1978 (Grinspoon, 2002). During this time of extreme social upheaval, according to one village leader, "No one managed forests . . . [it was a time] of fierce struggle, uproar, and confusion." As Grinspoon (2002) notes, "Villagers were concerned with survival—not forest management."

Decollectivization/Private use rights—The de-collectivization of agricultural lands through the Household Responsibility System was so successful that the State extended it to forests. In 1981, the State issued the "Resolution on Issues Concerning Forest Protection and Development," also known as the "Three Fixes Policy," to "fix forest landownership, fix ownership of use rights to mountains, and fix responsibility for forest management" (Liu, 2009). This policy authorized collectives to allocate forest use rights to households on a contractual basis in order to increase forest coverage and improve local livelihoods. Experts disagree as to how large an area was shifted from collective to private management as a result of the Three Fixes Policy. According to one author, an average of 69% of collective forests were transferred to individuals by 1986 (Lu et al., 2002); another author states that 95% of collectively owned forest farms implemented the policy by 1984 (Wen, 2009); and a third asserts that by the mid-1980s, the six provinces with the most collective ownership had allocated use rights to more than 70% of their forests to households (Xu et al., 2010).

Amount aside, the transfer of use rights had unintended and devastating consequences: Households felled timber across vast tracts of collective forest land. There were several causes of this widespread deforestation including tenure uncertainty (which caused households to seek short-term profits), deregulation of forest harvesting, and a growing demand for timber with the beginning of the economic boom. There was widespread belief that the State would rescind the rights it had just given (which is exactly what it did), thus reinforcing the uncertainty and lack of confidence in government land policy. Thus, there was little incentive for households to make long-term investments in tree planting and forest management (Menzies, 2011).

Restricted use rights—In response to these impacts, by the mid-1980s the State instituted strict controls on timber harvest through a permit system and, technically, rescinded household use rights. This action marks a distinct difference between forest tenure reform and agricultural tenure reform, through which use rights of individuals have increased steadily throughout the third wave of land reforms. The next 20 years of strict forest control fomented frustration among rural people, and protests became more frequent. Change was needed.

ii. Present

Increasing private use rights—In today's China, at the national policy level, there are three major and sometimes competing objectives for the forestry sector: (1) promoting the growth of the forestry industry to satisfy the demand for timber and other forestry products; (2) reducing tenure insecurity and clarifying rights for hundreds of millions of rural people who depend on forestry as a source of livelihood, in order to promote private investment and effective management; and (3) preserving the quantity and quality of forests to ensure an ecologically sustainable environment for the nation (CPC Central Committee and State Council, 2008). Since the late 1990s, China has adopted a series of initiatives and programs to meet these objectives by reforming both state- and collectively-owned forests.

The most prominent initiative towards the objectives of enlarging the forestry industry and reducing tenure insecurity is the "collective forestry tenure reform" (Figure 2–8). This current reform is basically the resurrection of the reform measures instituted from the early- to mid-1980s. Collective forestry tenure reform started in 2003 in a handful of provinces (Fujian, Jiangxi, Zhejiang & Liaoning) and was expanded to the rest of the country in 2008. It should be completed by 2013, according to a 2008 policy announcement (Central Committee and State Council, 2008). Under it, collectively-owned and managed forestland and forests are being distributed to individual households. Post-distribution, farm households enjoy ownership rights over forests (i.e., the trees and vegetation) and use rights of 30 to 70 years over forestland. Several recent laws have improved the scope of "use rights," to include the right to occupy, manage, develop, transfer, and profit from the distributed forestland.[20] A forestland rights certificate is issued to each household to confirm these rights as well as the size and location of the underlying forestland (see Chapter VIII, Use Rights).

[20] Rural Land Contracting Law (2002), Property Rights Law (2007)

Figure 2–8. The collective forestry tenure reform distributes the use rights from collective forestland to individual households, such as the one shown here in Mingzhu Village, Sichuan. Photo by Steve Blake

A second front of the reform deals with state-owned forests. This front follows the same pattern of decentralization and devolution as the collective forestry tenure reform, in that both involve efforts to move forest management and decision-making closer to the people who, in one way or another, depend on the forests or interact with them regularly. Historically, state-owned forest farms and enterprises have suffered from low productivity and ineffective bureaucracy, and most of them have become financially unsustainable. They suffered another blow when a large-scale forest logging ban was instituted in the 1990s thus reducing harvests (see Part 1, Lay of the Land).

As a result, a small number of state-owned forest farms have begun the "dismantling" process in which forestland is distributed and leased to former employees. In Yichun (a city in northeastern China), a pilot program has been hailed as the reform model—each employee's family leases about 10 hectares of forestland for a term of up to 50 years and pays annual rent to the State (about 40 RMB per hectare per year); in exchange, the employee receives rights to develop and

manage the forest, similar to what farm households receive in collective forestry tenure reform (Xinhuanet.com, 2006). This model has been sanctioned by the Central Government and will soon roll out to other areas.

Additionally, rules have been relaxed so that many types of private transactions involving forestland and forests are now permissible. For instance, in Fujian and Jiangxi provinces, households may use their rights to collective forestland and forests as collateral for bank loans. Another emerging trend is that large corporations and multi-national companies such as Stora Enso, Weyerhaeuser, Asia Pulp and Paper Co. have begun to lease large amounts of collective and state forestland for pulp or timber production, often with encouragement and help from local governments.

In the past three decades of the reform era, China has made substantial progress in the forest sector. Current reforms and initiatives, however, still face many great challenges. First, tenure insecurity remains a serious problem. As farmers or state forest farm employees become forest operators, their rights are often ambiguous and susceptible to interferences or threats from village or state forest farms who still own the underlying forestland. Use rights need to be further clarified and strengthened so that individuals have greater confidence in the security of their tenure and thereby make long-term investments in the forests. In addition, a large number of farm families have yet to receive forestland rights certificates, a task that will require serious government effort (Zhu K., 2011) (see Chapter VIII, Use Rights and Chapter IX, Tenure Security and Enforcement).

In addition to addressing tenure security, the logging quota system needs to be reformed. Individuals and companies must obtain a logging permit to harvest trees (with some rare exceptions). The Central Government decides on the overall logging quota each year, but demand far exceeds the permissible quota (see Part 1, Lay of the Land). Because there is little accountability and transparency in quota distribution, the process has become a rent-seeking tool for local forestry officials and agencies in many regions. Additionally the system leads to illegal logging.

A related issue arises from the Natural Forest Protection Program (NFPP) logging bans. While the collective forest tenure reform and the state-owned forest farm reform are intended to make farmers or employees true "owners" and operators of forests, in NFPP forests the government does not compensate affected operators for their lost rights to harvest trees and otherwise economically benefit from the land. The objectives of the tenure reforms and the NFPP program must be reconciled, and the logging quota system needs to be changed to accommodate these competing considerations. Otherwise, the effectiveness of the reforms could be seriously undermined (Zhu K., 2011).

C. Grassland Reform

The transfer of grassland rights to households (rather than to villages or small groups of households) has been much less common and has occurred much more slowly than the transfer of agricultural and forest rights—and with arguably disastrous consequences for the local people and the landscape (Menzies, 2011).

i. Past

Management as a common property resource—China's grasslands are home to 39 million people, many of whom are minority pastoralists (Williams, 2002). Since grasslands lie mostly in minority areas, they have been regarded very differently from agricultural and forest lands—as "wasted land," in fact. "To central authorities," writes Williams (2002), "even marginal farmland was better than natural pasture." Thus, from the 1950s to the 1980s, government policy was focused on settling Han farmers in grasslands and converting them to agricultural land (Menzies, 2011).[21] The first wave of land reforms, which transferred forests and agricultural lands from landlords to tenants, did not affect to grasslands in the same manner. Instead, grasslands were managed by nomadic herders as a common property resource until the era of collectivization (Williams, 2002).

Collectivization/No private use rights—During collectivization, herding households were forced to curtail their nomadic lifestyles and settle into communities (Williams, 2002). At the same time, guidance from the Central Government allowed the allocation of grassland use rights to communes. Modern Chinese law made its first mention of grassland use rights in the Rangeland Regulations of Inner Mongolia (1965). Then in 1975, the Central Government extended the regulations to 11 provincial-level governments to allow the allocation of use rights to communes, but not individuals (Ho, 2001).

ii. Present

Decollectivization/Private use rights—By the early 1980s, the rural land reforms that started with cultivated land had spread to pastoral regions, and in 1985 the Central Government adopted the Grassland Law. Individual households acquired livestock formerly owned by the communes, while the government reorganized communal forms of land ownership and tenure. Use rights to the land itself were, for the most part, allocated to the administrative or natural village (collective tenure) or to small groups of households that were often related (group tenure). The Central Government has also been accelerating the replacement of traditional pastoral people with commercial livestock operations.

[21] "Han Chinese" refers to the decedents of the early Chinese dynasties. The majority of China's population is considered to be Han (see Chapter X, Other Tenure Factors Affecting Land Protection).

Reports vary regarding transfers of grassland use rights to households (Figure 2–9). As of 2003, official statistics claimed that the major pastoral provinces such as Inner Mongolia and Xinjiang had transferred most grassland use rights to households. However, studies show that in many parts of western China, household tenure "remains the exception rather than the rule" (Banks et al., 2003). In some places, the tenure arrangement varies by seasonal use. For example, in western Sichuan it is common for groups of households to share summer pastures while individual households manage winter pastures.

In any case, as a result of decollectivization, grassland households were fixed to specific plots of land for the first time in history, with detrimental impacts to the landscape and local people (Williams, 2002). Unlike foresters and farmers, private tenure was a new concept for herding households. Private enclosures became common as households or groups of households attempted to exclude others' animals. With the enclosures, a host of ecological and social challenges have emerged. For example, socioeconomic gaps have widened between households who can afford fences and those who cannot. Households who can afford fencing tend to graze their livestock outside of their enclosures as long as forage is available on the open range; thus, they "pick clean the grass of those too poor to fence, saving their own for hay production or emergency grazing during winter and spring" (Williams, 2002). According to Williams (2002), "Every last household manager that I interviewed asserted that the productive capacity of unenclosed rangeland has declined significantly since privatization." Households with lesser means have been further challenged by local policies, such as those in at least one area of Inner Mongolia, requiring that land be productively managed or confiscated and redistributed to households capable of doing so. As a result of this production pressure, desertification has also become a major ecological issue (see Part 1, Lay of the Land). "Mud rain" and dust storms in Beijing are often attributed to the improper use of grasslands in nearby Inner Mongolia (Williams, 2002).

Given these challenges, group rights arrangements could result in more sustainable grassland management than individual household arrangements. A key to success is the enforcement of stocking rates. The problem is that while some county agricultural bureaus set stocking rates, rarely do they monitor and enforce them. Thus, if villages or groups of households jointly manage pasture lands, the "tragedy of the commons" can prevail and grassland resources can become depleted. But if and when stocking rates are better regulated, continued management by villages or groups of households may be the best arrangement for grassland viability and individual benefits (Banks et al., 2003). Group tenure arrangements can provide more equal access to higher quality pastoral resources, particularly where the distribution of forage and water varies greatly across the landscape. Group arrangements may also allow for fewer kilometers of fencing than if individual households fenced their plots, which is more cost-effective and better for wildlife. Finally, they can allow for more flexibility and better herd management in terms of moving cattle across the landscape based on the available forage and water (Banks et al., 2003) (Ho, 2000).

Figure 2–9. Reports vary regarding the transfer of grasslands to individuals, such as to this Tibetan herder in Qinghai. Photo by Li Baoming

VI. Decision-makers

Any project affecting land use in China will inevitably involve a myriad of government agencies; collective land managers; companies, individuals, and/or other use right holders. The array of potential players can seem overwhelming. This chapter attempts to enhance the readers' understanding of the players most likely to be involved in land conservation transactions. Because the government is such a significant player in determining Chinese land tenure, this chapter also provides a primer on government structure.

A. Government

Two entities work in tandem to govern China: the Communist Party of China (CPC) and the Central Government. As a single-party state, the CPC handles general strategic direction, provides leadership in formulating national policies, and controls employment for government positions. The Central Government formulates and executes policy. According to Zhao (2010), the CPC is primarily focused on economics and civil affairs, and less so on environmental issues. Therefore, the Central Government may play a bigger role in land use decisions and policy formation, though there is no question that the CPC and the Central Government are intertwined. The most obvious link is that "Paramount Leader" of the country (currently Hu Jintao) serves dual roles as the President of the Central Government and the General Secretary of the CPC.[22] Furthermore, policy approval involves both the Central Government and the CPC. The State Council (within the Central Government) formulates policies; the CPC's Central Committee (the "workhorse" of the Party) reviews and endorses the State Council's recommendations; and then the National People's Congress (also within the Central Government) considers them for approval.[23]

The State Council, which is headed by the Premier[24] (currently Wen Jiabao), develops and implements laws through the 90 or so agencies that it manages. The agencies most frequently involved in land use decisions include:

- **Ministry of Land and Resources**—Responsible for the planning, administration, protection and "rational utilization" of land, marine, mineral, and other natural resources, and for administering the conversion between different land uses. The State Oceanic Administration under its supervision is responsible for designation and management of marine protected areas, including some coastal wetlands.

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[22] The General Secretary is the highest-ranking official within the CPC. The Paramount Leader also serves a third role, as Chairman of the Central Military Commission.

[23] The National People's Congress is the highest power of the State and consists of up to 3,000 individuals from provincial-level government, militaries, and minority groups. The NPC meets once a year and typically follows the recommendations of the State Council (Zhao, 2010).

[24] The titles "Premier" and "Prime Minister" may be used interchangeably.

- **Ministry of Agriculture**—Responsible for the management and development of agricultural resources such as arable land, fisheries, grasslands, beaches, and wetlands which are "suitable for agriculture." Also responsible for the management of nature reserves that protect aquatic wildlife resources.

- **State Forestry Administration**—Responsible for the management of forests, wetlands, deserts. Also manages protected areas including all forest parks, and some nature reserves, wetland parks, etc. Responsible for implementing afforestation and anti-desertification initiatives.

- **Ministry of Housing and Rural-Urban Development**—Responsible for the management of construction lands and the construction market for housing, commercial and other development, well as some protected areas such as National Scenic Areas and World Heritage Sites. Formerly known as the Ministry of Construction.

- **Ministry of Environmental Protection**—Responsible for the supervision and coordination of ecological protection including the development of ecological protection plans, the assessment of environmental quality, the monitoring of natural resource exploitation activities that may pose risk to ecological quality, and the monitoring of ecological reconstruction and the restoration of damaged ecosystems—particularly as related to pollution. MEP also provides overall coordination of the designation and management of national nature reserves, as well as management of some nature reserves directly under its jurisdiction.

Other agencies with potential involvement in land use decisions include the Chinese Academy of Science, Ministry of Railways, Ministry of Transportation, Ministry of Water Resources, the National Development and Reform Commission (NDRC), and the National Bureau of Energy. The NDRC formulates strategic economic and development goals and plans for the country, including for sustainable development, through the Five-Year Guidelines and other mechanisms. A number of other agencies also relate to natural resources and include the State Administration of Grain, the State Bureau of Surveying and Mapping, the State Oceanic Administration, and the National Natural Science Foundation.

Several factors determine which agencies are likely to be involved in land use-related policies and projects: current natural land cover, current and potential land use, and protected area designation (Table 2–1). For any one plot of land, multiple agencies may be involved in land use decisions. For example, the following agencies may be involved in land use decisions affecting a nature reserve, grassland vegetation and roads: Ministry of Agriculture, State Forestry Administration, Ministry of Environmental Protection, Ministry of Land and Resources, the Chinese Academy of Sciences, and the Ministry of Transportation.

Table 2–1. Agencies commonly involved with land use decisions

	Agencies commonly involved with land used decisions					Other agencies				
Factors determining agency involvement	**Ministry of Agriculture**	**State Forestry Administration**	**Ministry of Environmental Protection**	**Ministry of Land and Resources**	**Ministry of Housing & Urban–Rural Devel.**	**Chinese Academy of Sciences**	**National Development & Reform Commission**	**Ministry of Transportation**	**Ministry of Railways**	**Ministry of Water Resources**
Natural land cover (major types)										
Deserts		X								
Forests		X								
Grasslands[25]	X	X								
Rivers and streams										X
Wetlands		X								
Land use										
Cultivated land	X									
Energy development				X			X			
Forests		X								
Grasslands/pasture	X									
Mining				X						
Orchards and Nurseries	X	X								
Residential and industrial					X		X			
Transportation								X	X	
Unused lands				X			X			
Other										
Protected areas										
Biosphere Reserves		X			X					
Forest Parks		X								
National Parks[26]		X	X							
Nature Reserves	X	X	X	X		X				
Scenic Areas					X					
World Heritage Sites					X	X				

* The list includes major types of terrestrial protected areas only; see Part 3, Land Protection.

[25] The State Council makes decisions about state-owned grasslands.

[26] National Park designation is in a pilot stage. There is no centralized guidance for National Parks at present, and SFA and MEP have both played a role in the creation of China's two existing National Parks. See Part 3, Land Protection Tools.

Each agency maintains offices at each level of government below it, including a provincial bureau, prefectural bureaus (where they exist), and county bureaus (Figure 2–10). County bureaus have the vast majority of responsibility for land management and administration. Below-county jurisdictions such as towns, townships, and villages do not have their own bureaus per se, though towns at least have offices responsible for bureau activities, such as planning. Each government bureau reports to the level above it. For example, the Pingwu County Forestry Bureau reports to Mianyang City Forestry Bureau, which reports to the Sichuan Provincial Forestry Bureau, which reports to the State Forestry Administration. Thus, typically the county would be the primary level of government involved in land protection projects, but review and approval of potential projects by the other levels of government is also likely.

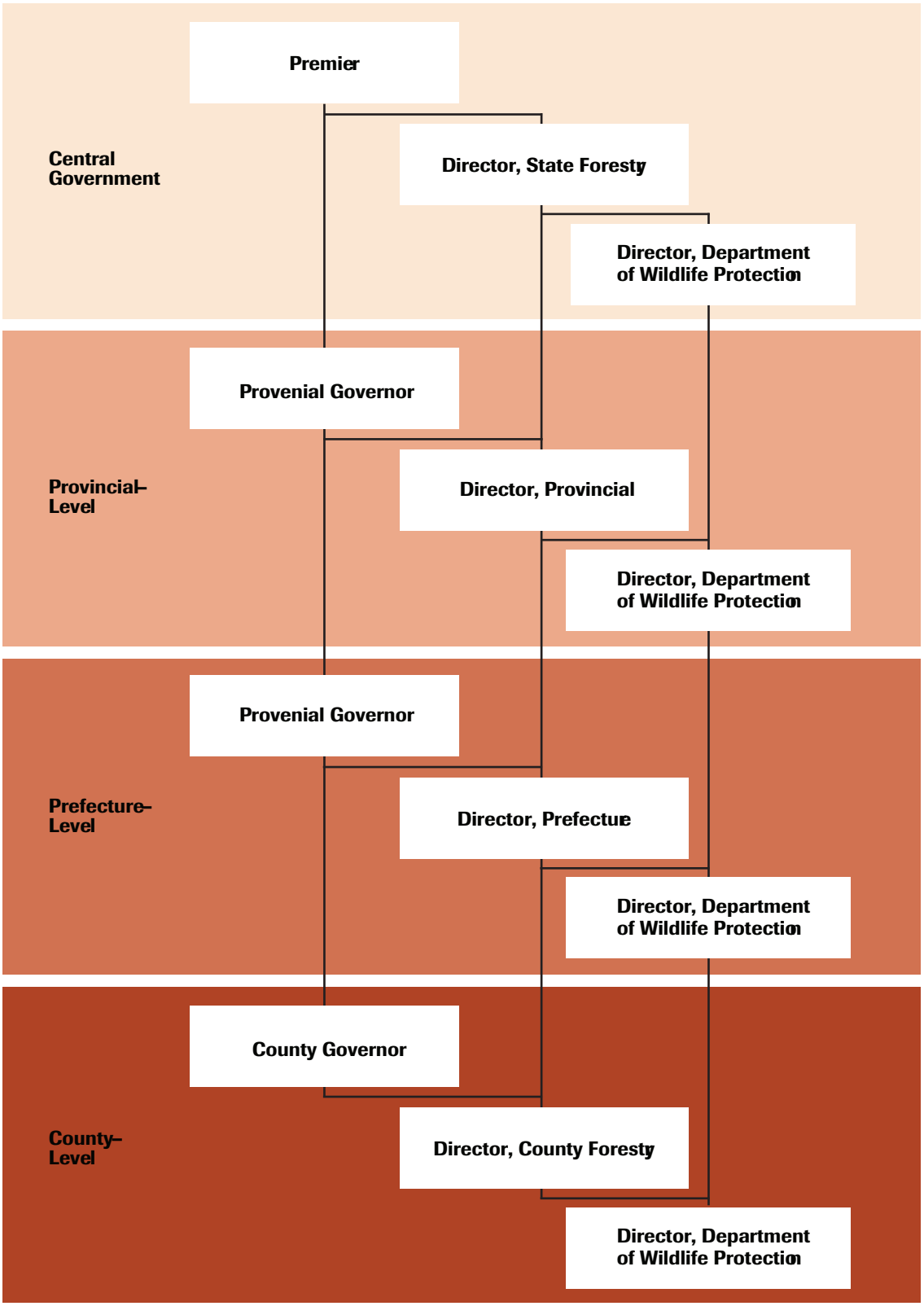
Figure 2–10. Examples of agencies at different levels of government

Level of government	Forestry agency	Environmental protection agency	Land & resources agency
Central	State Forestry Administration (SFA)	Ministry of Environmental Protection (MEP)	Ministry of Land & Resources
Province	Provincial Forestry Bureau	Provincial Environmental Bureau	Provincial Land & Resources Bureau
Prefecture*	Prefectural Forestry Bureau	Prefectural Environmental Bureau	Prefectural Land & Resources Bureau
County	County Forestry Bureau	County Environmental Bureau	County Land & Resources Bureau

* Prefectures do not exist within all provinces.

Key decision-makers include the agency leadership at each level of government and the heads of local government (e.g., Provincial Governor). Agency leadership is focused on technical issues such as environmental protection, while the local government (i.e., administrative) leadership is focused on economic growth and maintaining social order. The director of each agency answers to at least two different people in a "matrix" reporting structure—the director of the agency at the level above and the head of the government at the relevant level. Typically within each level of government (provincial, prefectural, or county) each agency has a director, vice-directors that oversee multiple bureaus, bureau heads, etc. In addition, the Premier and the heads of local government (e.g., Provincial Governor) can also play important roles in agency decision-making. For example, the director of a provincial forestry bureau would answer to the head of the State Forestry Administration as well as to the provincial governor. Similarly, the head of a county forestry bureau would answer to the director of the prefecture forestry bureau and the prefecture governor. Where prefectures do not exist, the county would report up to the province (Figure 2–11).

Figure 2–11. Sample simplified reporting relationships at different levels of government, State Forestry Administration



B. Collective Land Managers

The individuals with decision-making authority over collectively-owned lands can vary from place to place. In general practice, one or more villages or sub-villages manages collectively-owned lands and distributes use rights to villagers for farming, residence, forest use, or other purposes (see Chapter IV, Land Ownership).

The names of administration units for collective lands have changed over time. During the Great Leap Forward, the State aggregated agricultural cooperatives into massive people's communes and instituted a three-level system of ownership and production including communities, brigades, and production teams (Grinspoon, 2002). Upon decollectivization in the 1980s, the commune became the present-day township/town (乡, *xiang*/镇, *zhen*), the brigade became the administrative village (行政村, *xingzheng cun*), and the team became the natural village (自然村, *ziran cun*) and the villagers' group (村民小组, *cunmin xiaozu*) (Figure 2–12) (Ho, 2001). Townships/towns encompass multiple administrative villages, which in turn encompass multiple natural villages.

Figure 2–12. Change in names of collective land administration (Liu D. , 2001) (Ho, 2001)

Collectivization (mid/late 1950s-late 1970s/early 1980s)		Decollectivization (late 1970s/early 1980s-present)
Commune	→	Town/township
Production brigade	→	Administrative village
Production team	→	Natural village and villagers' group

Modern Chinese law is not clear about which of these levels—township/town, administrative village, or natural village and villagers' groups—actually owns and manages the land. In 1962, the Eighth National Party Congress made a clear statement in the "60 Articles" that the production team was the owner of collective lands. However, that clarity disappeared upon decollectivization and the associated invalidation of the term "production team." The Land Administration Law mentions two potential owners—the village collective organization and the villagers' committee.[27]

In practice, the administrative village most frequently forms a villagers' committee, which exercises ownership rights and is the key decision-maker for collectively-owned lands. The Organic Law of the Villagers Committees (1998) states that the town or township proposes the establishment of these three-to-seven-member bodies and the lands under their jurisdiction,[28] and makes them responsible for land management. According to the law, "The villagers committee shall . . . administer the affairs concerning the land . . . owned collectively by the peasants of the village and disseminate knowledge among the villagers about rational utilization of the natural resources *and protection and improvement of the ecological environment*"[29] (italics added).

[27] Land Administration Law Article 10

[28] Organic Law of the Villagers Committees Article 8

[29] Organic Law of the Villagers Committees Article 5

The villagers elect the committee once every three years via secret ballot, which suggests that committee members make land management and land protection decisions in accordance with community interests.

C. Holders of Use Rights

While all land lies in state and collective ownership, the State and managers of collectively-owned lands (typically villagers' committees) can decide whether and how to transfer *use rights* for their respective lands to various parties.[30] Technically, these transactions require documentation such as contracts, as subsequent chapters describe. The State can transfer use rights to anyone such as collective land managers (i.e, for the right to use state land in addition to the collectively-owned land), state- or private-owned enterprises, and individuals. Collective land managers can transfer use rights to households or other entities for farming, housing, or other purposes. Collective land managers and households can, in turn, circulate use rights to others in or outside of the collective, with certain restrictions (see Chapter VIII, Use Rights). Anyone can hold use rights, including, but not limited to, foreign entities. In fact, many multi-national companies now own use rights across huge tracts of land, on the order of millions of *mu*[31] (Zhu K., 2011). For example, Pepsi leases agricultural lands and, as of 2005, was China's largest private potato grower (for potato chips), while Weyerhaeuser has leased at least 21,000 ha of commercial forests in Fujian Province (Terhune, 2005) (Weyerhaeuser, 2010).

Household use rights are determined in part by individual residence permits (户口, *hukou*). *Hukou* is an important consideration for land protection efforts, since projects that change land use or access may require changing the *hukou* status of local people, without necessarily changing their place of residence. Every Chinese citizen holds such a permit, which specifies his or her status, agricultural or non-agricultural, and which specifies where individuals can live and work. Non-agricultural *hukou* gives open access to social security systems such as jobs, housing, and educational resources; agricultural *hukou* gives access to only limited or no social security, but provides rights to agricultural land. Each individual *hukou* specifies in which locality the bundle of rights defined by the individuals' status can be accessed. So, for example, one can have, in a township administratively defined as rural, agricultural and non-agricultural *hukou* holders, with different bundles of rights.

[30] Land Administration Law Article 9

[31] 1 Chinese mu is equivalent to 1/15 of a hectare or approximately 1/6 of an acre.

VII. Land use planning

Land use planning is an important component of land tenure because it determines which use rights are allowed in which places, which can in turn affect the selection of land protection projects. The Central Government supports a variety of planning and zoning efforts for cultivated land, forests, energy development, transportation, and other land uses. Technically, plans are binding to individual holders of use rights and land users. If someone proposes to use land for a purpose that is incompatible with a land use plan, the agency which originally approved the plan must approve the proposed changes.[32] For example, changing land from forestry use to cultivated land use would first require approval of the forestry bureau above the county level, and then of the land and resources. The State Council approves all large-scale energy, transportation, water management, and other infrastructure construction projects. Provincial government approves these same projects if they are less significant in scale (Zhao, 2010).

Despite the intent of plans to be binding in nature, their implementation and enforcement is highly variable, and unplanned development is a common occurrence. Nonetheless, those pursuing land protection projects should be aware that available plans could help or hinder project implementation, depending on the planned land uses that pertain to a project site. This chapter describes the nationwide planning efforts that are most closely related to biodiversity protection including "general land use planning" and conservation planning. It does not describe more detailed planning efforts for the planning and management of specific natural resources such as forests and grasslands, which the law also requires.[33]

A. General Land Use Plans

"General land use planning" is the Central Government's term for its planning efforts that focus on three major categories of land use: agricultural land, construction land, and unused land (Part 1, Lay of the Land; Figure 2–13).[34] Together, these uses cover the entire country. The Ministry of Land and Resources (MLR) manages general land use planning in accordance with the Land Administration Law (2004). Specifically, the MLR identifies quantitative targets for agricultural, construction, and unused lands to provinces; provinces then issue more specific targets to lower levels of government, and county government is responsible for ensuring the targets are met through planning and zoning or other means.

To date, China has created two General Land Use Plans—one covering 1995-2010 and one covering 2006-2020. The State Council determines the planning period according to need. According to law, local governments should also publish annual land use plans in accordance with

[32] General land use planning provides an example. See Land Administration Law Article 26

[33] Grassland Law Chapter III, Forest Law Article 16. Of significance to land protection projects seeking to protect biodiversity, Grassland Law Article 18 specifically identifies "improving the ecological environment, preserving the diversity of living things, and promoting the sustainable use of grasslands" as one of four principles to which management plans must adhere.

[34] Land Administration Law Article 4

these longer term plans.[35] However, much of rural China is still not zoned. To date, the government has concentrated planning and zoning efforts on the urban environment. The result of this vacuum has been patchwork, unplanned development throughout much of the rural countryside, which has had deleterious environmental effects and uneven economic impacts, particularly in regard to providing comprehensive livelihood improvements for local villagers (Devine, 2010).

Figure 2–13. Categories of land use for general land use planning[36]

- **Agricultural land**—land "directly used" for agricultural production, including cultivated lands, woodlands,[37] grasslands, land for agricultural water conservation, and aquaculture.
- **Construction land**—land on which buildings and structures can be built, including land for urban and rural housing, public facilities, industrial and mining use, communications infrastructure, water conservancy facilities, tourism, and military installations.
- **"Unused" land**—land other than that used for agriculture and construction.

1. Priorities

Through general land use planning, the Central Government emphasizes maintaining farmland while accommodating urban and industrial development, as well as major national land use change campaigns. The *2006-2020 National General Land Use Plan* encourages planning according to the four main geographical policy regions: West, Northeast, Central, and Eastern. This division allows the provincial-level governments to account for the different ecological and social conditions in their respective regions. For example, western regions rely primarily on farming and are more prone to drought, erosion, and other climatic threats, whereas industrial and urban development are far more common in the east (Pieke, 2002).

The Five-Year Guidelines are the biggest drivers of the priorities and contents of General Land Use Plans (see Chapter II, Legal Framework). As part of setting economic and development goals, these plans include land use targets, which are concurrent with National General Land Use Plans. For example, the *11th Five-Year Guideline* called for the maintenance of 120 million hectares of farmland for year 2010, which was the same target included in the *2006-2020 National General Land Use Plan* (Central Government, 2006).

Arguably, retaining and enhancing cultivated lands for grain production was the sole objective of general land use planning between the founding of the People's Republic of China in 1949 and the beginning of the reform era in 1978; it remains a focus today. To quote a foreign analyst, "…

[35] Land Administration Law Articles 24 and 25

[36] Land Administration Law Article 4

[37] Based on the Chinese characters, woodlands are not the same as forests in this context.

the 1998 Land [Administration] Law involves a powerful mix of modern land use planning, environmental protectionism, state socialist economic planning *and a Maoist preoccupation with basic food production at the expense of everything else* [italics added]" (Pieke, 2002). Over the last decade, the Central Government has become increasingly willing to accept foreign grain imports, which has reduced some of the pressure on domestic cultivated lands. However, the most recent version of the Land Administration Law (2004) maintains a clear focus on cropland. As the law strongly states, ". . . the total amount of cultivated land shall not be lower than the controlled targets set in the general plans for land use at the next higher level."[38] Furthermore, provinces, regions, and municipalities directly under the central government must maintain at least 80% of farmland as "basic farmland."[39] Lower governments are responsible for maintaining the total area under cultivation by designating areas for reclamation to replace farmland that gets converted to other uses, mostly industrial and residential (Pieke, 2002).

Despite the emphasis on maintaining cultivated land, the law does acknowledge the need to integrate priorities other than agriculture into General Land Use Plans. For example, the law explicitly forbids destroying forests and grasslands to create farmland,[40] though this does occur in practice (see Part 1, Lay of the Land). The law also places limits on what wasteland can be designated for reclamation and requires "scientific assessment" of the reclamation proposal (Pieke, 2002). This stipulation, in theory, protects fragile marginal lands from development. However, in practice, land use allocation is directly connected to the local government revenue and therefore the government has a vested interest to attract as much development and encourage as much active land use as possible (Pieke, 2002).

General Land Use Plans must also reflect the priorities and requirements of national economic and social development programs, national land consolidation, environmental protection, carrying capacity, and the requirements of construction projects.[41] Thus, the land use planning system accommodates campaigns and other priorities that are intended to alter land use and development patterns. Grain to Green, the Natural Forest Protection Program, and Open up the West are currently the largest and most far-reaching initiatives. As Part 1, Lay of the Land describes, Grain for Green provides grain and financial subsidies for reforesting meadows, steep slopes, and barren lands and the Natural Forest Protection Program seeks to protect and enlarges China's forests through logging bans and financial compensation for forest management and reforestation. Open Up the West encourages economic development of 12 western and northwestern provinces and the 3 Autonomous Prefectures through preferential policies, government spending, and technology transfer from eastern provinces (Xinhua News, 2005). Other regional and local efforts include anti-desertification campaigns and city greening efforts, among others.

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[38] Land Administration Law Article 18

[39] Land Administration Law Article 34

[40] Land Administration Law Article 39

[41] Land Administration Law Article 17

2. Targets and Maps

General land use planning at the county level and above can be said to be target-based and not spatial, whereas local plans are spatial. The Ministry of Land and Resources at each level of government is responsible for this work. These efforts originate with quantitative targets that the Central Government (Ministry of Land and Resources) hands down to county government, through provincial and prefectural governments. County-level governments develop spatially explicit plans based on the targets, delineating land use zones for agriculture, construction, and unused land. Local governments can and often do delineate zones for sub-categories under agriculture for cultivated land, orchards and nurseries, grasslands, and forests. Further divisions are also possible.

Consider the General Land Use Plan for Lishui Township in Foshan City in Guangdong Province: The *2006–2020 National Land Use Plan* requires that Guangdong Province maintain 2.9 million hectares of arable land for 2010 (Table 2–2). The "Guangdong Land Use Plan" then obligates Foshan City to maintain 56,086 hectares of arable land for 2020 (Table 2–3). Foshan City and Lishui Township then made maps of land uses to accommodate the agricultural targets (Lishui Township).

Table 2–2. Excerpt of national arable land target for provinces, 2006-2020 National General Land Use Plan, highlighting Guandong Province (Ministry of Land and Resources, 2008)

Province	2010 Cultivated land in ha	2020 Cultivated land in ha	Basic farmland protection area in ha
Guandong	**2,914,000**	**2,908.700**	**2,556,000**
Henan	7,914,700	7,898,000	6,783,300
Hubei	4,658,000	4,631,300	3,833,300
Hunan	3,787,300	3,770,000	3,235,300
(others)	…	…	…
National Total	**121,200,000**	**120,333,300**	**104,000,000**

Table 2–3. Excerpt of "Guandong Province General Land Use Plan" (Ministry of Land and Resources, 2010)

Area within Guandong Province	2010 Cultivated land in ha	2020 Cultivated land in ha	Basic farmland protection area in ha
Foshan	56,086	55,983	48,663
Guangzhou	128,270	128,037	112,345
Shenzhen	4,296	4,288	2,000
Hunan	27,668	27,617	24,408
(others)	…	…	…
Guandong Total	**2,914,000**	**2,908,700**	**2,556,000**

B. Conservation Plans

Loosely defined, *conservation planning* is the process of identifying high priority ecological values and important areas for their protection and management. For land protection efforts, it can be useful to know whether potential project sites lie within such areas by providing justification for project establishment. Conservation planning can be, and often is, a component of any type of land use planning and zoning effort. For example, zones for development and industrial uses may also identify areas for conservation activities. Related, China's general land use planning efforts identify forests and other areas that are ecologically important.

For the last decade and not including general land use planning, the Central Government has supported at least four efforts to identify important areas for ecological values across the country: public benefit forests, Ecological Function Conservation Areas (EFCAs), Priority Areas for Biodiversity Conservation, and Major Function Zoning. There is some degree of spatial overlap between these areas, but they vary in terms of purpose, implementation status, and practical protections they offer to ecological values. Public benefit forests are forests in which timber harvest and other activities are either banned or limited; note that all forests are either public benefit or commercial. Compared with the other types of conservation planning efforts, public benefit forests are the most comprehensively established and have the most policy guidance for their management. EFCAs are regions where limited development is encouraged. Limited guidance is available for their management and their effectiveness in conserving ecological functions is to be determined. Priority Areas for Biodiversity Conservation are areas that are important to biodiversity values, and which the Central Government has included in its *National Biodiversity Conservation Strategy and Action Plan (2011-2030)*. Finally, Major Function Zoning identifies, among other zones, a series of banned exploitation zones and limited development areas across the country, including existing protected areas. All of these efforts are steps in a positive direction for additional biodiversity conservation, but all still require additional guidance and action to ensure meaningful and enforceable protection for ecological values.

1. Public Benefit Forests

As Part 1 (Lay of the Land) describes, the Forestry Law (1998) identifies five types of forests: shelter forests, special-purpose forests, timber forests, economic forests, and fuelwood forests. Public benefit forests include the first two, while commercial forests include the latter three.[42] There are state-, provincial-, prefectural-, and county-level public benefit forests; there are also "key" public benefit forests and "general" public benefit forests. The mapping of public benefit versus commercial forests varies from place to place, but according to Zhang (2010), local people and government agencies know the boundaries for any one forest area.

[42] Guidance on forest management includes the Forestry Law (1998); Technical Regulation for Non-Commercial Forest Construction GB/T 18337.3-2001 (2001); Regulations on the Delineation of State Non-Commercial Forests (2010); and other regulations or management methods for local provinces, cities, and counties.

County forestry bureaus, with direction from higher levels of government, initiated a forest land use zoning system in the mid-1990s and created the "public benefit" category in the early 2000s (Xu et al., 2010). The government issued guidance defining "public benefit forest" entitled Delineation of Non-Commercial Forests in 2001, and then updated it in subsequent years. The purpose was to increase protection for natural forests, as opposed to plantation forest, through the NFPP and in response to the flooding of the Yangtze River. Since then, the State Forest Administration at various levels has made and continues to make adjustments to public benefit/commercial designations. Currently, 43% of the forests are public benefit while 57% are commercial (State Forestry Administration, 2010). The government may decrease the amount of public benefit forest; according to the Delineation of State Non-Commercial Forests (2010), the government is planning to classify 30-40% of forestry lands as public benefit forests. This shift may stem in part from the pressure that the government has been receiving from local people seeking to generate more income from forest lands (Zhang, 2010).

Activities in public benefit forests are more restricted than those in commercial forests, but "public benefit" does not necessarily mean that use is banned altogether. For example, Jiangsu Province's regulations for public benefit forests allow tourism, recreation, and other non-timber consuming activities if the local government issues permits for those activities. Jiangsu's regulations also explicitly prohibit activities such as cutting fuelwood; collecting pine sap; hunting; making fires; mining sand, soil and stones; discharging pollutants and disposing solid waste; and harvesting trees from scenic areas, nature reserves, and slopes greater than 25 degrees.

Truly protecting public benefit forests is a challenge. Holders of use rights are eligible for compensation through a "forest ecological benefit compensation fund" but it provides negligible income to local people. The fund supports tree planting and tending, protection, and management of public benefit forests.[43] For state-owned forests, on average the government pays 1.75 RMB/*mu*/year, the price of a small bottle of water, to those holding use rights in public benefit forests (china.com.cn, 2011).[44] For national and provincial public benefit forests, the Central and provincial governments jointly pay 5 RMB/*mu*/year (Chen, 2010). By comparison, a single piece of bamboo could be sold for 10 RMB while economic development would generate 1000-1200/*mu*. Needless to say, the compensation does little to discourage timber harvesting and other potentially damaging and illegal uses of public benefit forests (Zhang 2010). Note that the compensation varies from place to place and can change over time.

For example, in Guandong Province, the initial compensation standard was 2.5 RMB/*mu*/year, increased to 8 RMB in 2007, and may increase to 12 RMB/*mu*/year. In Guangzhou City, the capital of Guandong Province, compensation was much higher, averaging 25 RMB/*mu*/year in 2008, 39 RMB/*mu*/year in 2009, and 41 RMB/*mu*/year in 2010 (Guangdong Forestry Bureau, 2010).

[43] Forestry Law Article 8; Management Approach on Central Government Forest Ecological Benefit Compensation Fund (2004, 2007).

[44] Of the 1.75 RMB, the Central Government pays 1.41 RMB. For the next phase of the program, which as of October 2011 had been proposed but had not yet been approved, the Central Government would pay 5 RMB/*mu*/year.

2. Ecological Function Conservation Areas

In 2000, the State Council directed the Ministry of Environmental Protection (MEP) to create Ecological Function Conservation Areas (EFCAs) in order to protect water and soil, control floods, maintain biodiversity, and provide other ecological functions. EFCAs are regions thatencourage limited development, and may in fact be the same or similar to as the limited development areas that are part of Major Function Zoning. They differ from traditional protected areas such as nature reserves and scenic areas in that they allow more development, are potentially less permanent, tend to be larger, and cross more jurisdictional boundaries. In fact, they often overlie and expand well beyond existing protected areas, and include settlements and a wide range of land uses (Xu & Melick, 2007). EFCAs range greatly in size; for example the Headwaters of Dong River EFCA is approximately 3,500 hectares while the Poyong Lake EFCA is more than 162,000 hectares.

The MEP works with relevant central and local government agencies to delineate EFCAs. Typically, provincial environmental protection bureaus submit applications to the State Council for establishing EFCAs. From 2001-2009, MEP established 18 national-level pilot EFCAs while provinces such as Hebei, Shanxi, Shandong, and Jiangsu began to pilot local-level EFCAs. MEP aims to establish 50 EFCAs by 2020 (Figure 2–14).

Guidance for EFCAs includes "Guidance for Nomination and Approval of Ecological Function Conservation Areas" (2002) and "Guidelines for National-Level Key Ecological Function Conservation Area Planning" (2007). The guidance outlines the planning process for EFCAs, including the identification of 5-year, 10-year, and 15-year social, economic, and environmental goals. It also encourages the creation of nature reserves and planning and zoning to protect ecological values. It does not, however, include any "teeth" for ensuring the effective protection and enforcement of conservation actions.

3. Priority Areas for Biodiversity Conservation

The *National Biodiversity Conservation Strategy and Action Plan (2011-2030)* identifies 35 Priority Areas for Biodiversity Conservation. The Ministry of Environmental Protection identified these areas by incorporating technical support from The Nature Conservancy, through the Conservation Blueprint project (Figure 2–15) (The Nature Conservancy, 2007) (The Nature Conservancy, 2011). These areas reflect both species and ecosystem diversity and are intended to conserve a China's array of biodiversity values, from deserts to alpine areas, and from rare plants to Siberian tigers.

To protect these values, the *National Biodiversity Conservation Strategy and Action* identifies a host of actions, such as developing incentives for biodiversity conservation (funding, policy, etc.), improving laws and regulations, creating land use planning demonstration projects, establishing a national biodiversity information management system, strengthening the management of nature reserves, and establishing "ecological demonstration projects for alternative livelihoods" (Ministry of Environmental Protection, 2011). Provinces are developing their own, more detailed plans. For example, Sichuan has already done so, and aims to create five new protected areas and has committed 930 million RMB toward their management (Watts, 2010). See Part 3, Land Protection in Practice.

Figure 2–14. Ecological function conservation areas (through 2020)

Figure 2–15. Priority Areas for Biodiversity Conservation (The Nature Conservancy, 2007)

MEP and TNC worked together to identify these areas through the Conservation Blueprint project (The Nature Conservancy, 2007). They became the basis for those identified in the *National Conservation Strategy and Biodiversity Action Plan (2011-2030).*

1. Daxinanling Area
2. Hulun Buir Grassland
3. Three Rivers Plain Wetland
4. Xiaoxinanling Area
5. Altai Mountainous Area
6. Tianshan-Southwest Edge of Junggar Basin
7. Songnei Plain Wetland
8. Changbai Mountainous Area
9. Tarim River Basin Deserts
10. Altun Mountainous Area
11. West Ordos-Helan-Kageyama Mountainous Area
12. Qilian Mountainous Area
13. Liupan-Ziwuling-SouthTaihang Mountainous Area
14. Qiangtang-Three River Source Area
15. Minshan-North Hengduan Mountainous Area
16. Qinling Area
17. Dabashan Area
18. Dabieshan Area
19. Southeast Himalayas Area
20. Zhejiang-Jiangxi- Anhui Mountainous Area
21. Hunan-Hubei-Chongqing-Guizhou Mountainous Area
22. Zhejiang-Fujian-Jiangxi Mountainous Area
23. Poyang Lake Area
24. Dongting Lake Area
25. South Hengduan Mountainous Area
26. Naling Area
27. Western Guangxi-South Guizhou Limestone Area
28. West Guangxi Limestone Area
29. Xishuangbanna Area
30. South Central Hainan
31. Xilinguole
32. Liupan-Ziwuling-SouthTaihang Mountainous Area

4. Major Function Zoning: Banned Exploitation Zones and Limited Development Areas

In 2006, the State Council initiated "major function zoning" for mainland China to facilitate sustainable development throughout the country. The State Council issued the final plan in December 2010 and proposes its completion by 2020 (State Council, 2010). To develop the plan, a working group comprised of different agencies delineated four types of zones across the country: banned exploitation, limited development, prioritized development, and optimized development. From a land protection perspective, the zones of greatest interest include the banned exploitation and limited development zones. The former covers more than 1,300 existing protected areas including, but not limited to, world cultural and natural heritage sites, national-level protected areas, and provincial-level protected areas. The limited development areas, which may be the same as Ecological Conservation Function Areas (see above), include major agricultural producing areas and ecologically important areas such as headwaters. Factors influencing the zone designations include environmental carrying capacity, existing development density and development potential, anticipated population distribution, and land use. Implementation of the zoning, including allowable and prohibited uses, is to be determined.

VIII. Use rights

A. Duration and Renewal

Contracts for use rights vary by land use/land cover type, with terms from 30 years to upwards of 70 years (Figure 2–16, Table 2–4). According to law, contractors "may continue" to operate under expiring contracts.[45] The Grassland Law explains that upon contract expiration, the original contractor has the priority for contract renewal "under equal conditions."[46] With the exception of this provision, however, the laws do not provide guidance for renewals such as process, fees, or the number of extensions that are possible. The latter condition suggests that one may be able to hold use rights in perpetuity, thereby enabling the privatization of use rights. Contract renewals under the law currently in effect have not yet been tested; however, it is less a question of whether contracts will be renewed, and more a question of how (Zhu K., 2011). As previously discussed, in 1998 the Land Administration Law required collectives to contract to farmers 30-year use rights of lands "for use in crop farming, forestry, animal husbandry, and fisheries production."[47] Therefore, the original 30-year contracts may start to expire sometime around 2023, and the renewal process will be implemented at that time.

Figure 2–16. The duration of use rights varies by land use/land cover type, such as 30–70 years for forests. Photo by Li Baoming

[45] Property Law Article 126

[46] Grassland Law Article 14

[47] Land Administration Law (1998 and 2004), Article 14

Table 2–4. Contract duration for rural land

This table includes all land use/land cover types for which the law provides specific contract durations.

Land use/land cover type	Contract duration
Agricultural lands	
Arable land	30 years[48]
Grassland	30-50 years[49]
Forestland	30-70 years[50] Contracts can be longer than 70 years with SFA approval[51]
Construction lands	
Residential use of collective land	No duration specified. Households registered with a collective lose the right to use their residential land once they cancel their registration with the community.
Residential use of state land	Up to 70 years[52]
Industrial use of state land	Up to 50 years
Educational, scientific, cultural, sanitary, and sports land	50 years
Business, tourism, and recreational land	40 years
General and other land	50 years
Unused lands	
"Waste hills, land or beachland whose use rights have not been ascertained for crop cultivation, forestry, animal husbandry or fisheries."[53]	Contracts may be given for "long-term use."[54] The law does not specify an actual duration.
Desertified land for purposes of rehabilitation	Up to 70 years.[55]

[48] Land Administration Law Article 14, Rural Land Contract Law Article 20, Property Law Article 126

[49] Rural Land Contract Law Article 20, Property Law Article 126

[50] The Land Administration Law states that the term for forestry land is 30 years. Rural Land Contract Law Article 20 and the Property Law Article 126 state that the term is 30-70 years.

[51] Rural Land Contract Law Article 20, Property Law Article 126

[52] Interim Regulations of the People's Republic of China Concerning the Assignment and Transfer of the Right to the Use of the State-Owned Land in the Urban Areas (1990). This same source is used for the duration of all types of uses of construction lands, not including residential use of collective lands.

[53] Land Administration Law Article 40

[54] Land Administration Law Article 40

[55] Law on Prevention and Control of Desertification Article 34

B. Contractual Rights and Obligations

Together, the Land Administration Law, the Property Law, and the Rural Land Contract Law describe rights and obligations associated with use right certificates and contracts. These provisions pertain to all land uses including but not limited to cultivated lands, forests, and grasslands.[56] The obligations and land use rights with the greatest relevance to land protection efforts include the following:

- **Right to make decisions**—An owner of use rights has the right to independently make decisions about "production and operation" of the land[57] in conformance with the contract.

- **Right to make a profit**—An owner of use rights can "possess, utilize, and obtain profits" from the land and its natural resources in accordance with the provisions of the contract.[58]

- **Right to mortgage "barren land"**—An owner of use rights can mortgage "barren land" that is contracted through "bidding, auction, and discussion."[59] In general, however, it is not permissible to mortgage collective land.[60]

- **Right to circulate the rights to other parties**— An owner of use rights can transfer them to another party or parties through means such as subcontracting, leasing, exchange, transfer, inheritance, and pooling of rights as shares.[61] Certain restrictions apply. For example, outright purchase or sale of use rights is not possible —the original "owner" of the use rights continues to own them even upon circulation. Furthermore, the term of circulation must be within the original contract term.[62] In other words, if someone has already used 20 years of forest use rights under a 70-year contract, the contract for the circulation must be less than or equal to 50 years. As another example, if a collective wants to circulate use rights to an entity outside of the collective, the transfer requires consent from more than a "two-thirds majority vote" of the villagers' congress or villagers'

[56] The Rural Land Contract Law applies to "arable land, forestlands and grasslands owned collectively by the peasants and by the State and used collectively by the peasants according to law, as well as other lands used for agriculture according to law." The other two laws have broader application to other lands, such as construction lands.

[57] Rural Land Contract Law Article 16

[58] Property Law Articles 117, 118, and 125

[59] Property Law Article 180

[60] The Property Law Article 184 states, "The following property may not be mortgaged: Land use right to the land owned by the collectives such as cultivated land, house sites, private plots, and private hills, with the exception of those provided by law."

[61] Rural Land Contract Law Articles 31, 32 and 49

[62] Rural Land Contract Law Article 33, Grassland Law Article 15, Property Law Article 161

representatives, and the township must ultimately approve the contract.[63] An individual holding use rights can also circulate them to third parties, and consent from the collective may or may not be required depending on the nature of the transaction.[64] There is no language prohibiting ownership of use rights by anyone, including by foreigners. Also, the law does not explicitly state whether a third party contractor can pass the rights to fourth parties, and fourth parties to fifth parties, and so on. In the absence of such guidance, such transfers are theoretically allowable within the terms of the contract.

- **Obligation to conform to available land use plans**—The owner of use rights must adhere to available county and township land use plans.[65] The government would need to approve any proposed changes to the land use plan. See Chapter VII, Land Use Planning.

- **Obligation to honor the contract**—While this may seem like common sense, this obligation is very important to tenure security and, therefore, the success of land protection projects. The law explicitly requires contracting parties to honor contracts[66] and describes dispute resolution procedures. For example, the party issuing the contract cannot rescind the use rights within the contract term.[67] Furthermore, the party issuing the contract may stop a contractor from damaging the contracted land.[68]

Although the contracting parties must adhere to the contract, Chinese law authorizes the government to expropriate land and rescind contracts, if it is in the public interest. The law entitles the owner of use rights to compensation for any land that is "requisitioned or occupied according to law."[69] This is standard to most countries; for example, the U.S. has laws regarding "eminent domain." What is critical is the transparency of the process by which the government utilizes this authority and the level of compensation that it provides. The problem in China is that the compensation is grossly inadequate and the definition of "public interest" too broad (Zhu K., 2011). See Chapter IX, Tenure Security and Enforcement.

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[63] Land Administration Law Article 15, Rural Land Contract Law Article 48, Grassland Law Article 13

[64] Rural Land Contract Law Article 39

[65] Rural Land Contract Law Article 15

[66] Grassland Law Article 12, Forest Law Article 7, Land Administration Law Article 13

[67] Rural Land Contract Law Articles 14 and 24, Property Law Article 131

[68] Rural Land Contract Law Article 13

[69] Rural Land Contract Law Article 16, Land Administration Law Article 2

C. Allowable and Prohibited Uses

1. Cultivated Lands

The Land Administration Law (2004) provides the primary guidance for the use of cultivated lands. Of relevance to land protection efforts, the law requires that cultivated lands be maintained in terms of quality and quantity, and that cultivated lands that are approved for conversion to other uses be farmed until construction occurs. These are important provisions for projects that may consider the use of cultivated land for other purposes, such as reforestation or tourism development.

Protection—Chinese law places great emphasis on maintaining farmland as farmland, stating that the State "strictly controls the conversion of cultivated land into non-cultivated land."[70] Provincial-level governments are responsible for ensuring that the total amount of cultivated land is equal to or greater than the targets established in General Land Use Plans (see Chapter VII, Land Use Planning).[71] In particular, the Regulations on the Protection of Basic Farmland (1994) emphasize the protection of "basic farmland protection areas" which provincial-level governments must designate for at least 80% of all cultivated lands, a regulation which was later incorporated into the Land Administration Law.[72] Holders of use rights may convert cultivated land only with the approval of the government. One-to-one replacement of cultivated land is required: If the government allows for the conversion of cultivated land, the "units occupying the cultivated land" must provide for the same amount and quality of land elsewhere. If such land is not available, the unit must pay a land reclamation fee set by provincial-level governments.[73]

Active use—Not only must cultivated land be maintained, but it must actually be used for its specified purpose. "No unit or individual is allowed to let the [cultivated land] idle or go wasted," states the Land Administration Law.[74] On cultivated lands that the government approves for non-agricultural construction, the land must be cultivated until construction occurs. If construction fails to begin for more than a year, the government charges land idling fines. And if construction fails to begin for two successive years, local government must revoke the use rights and return the land to the managers of the collectively-owned lands for re-cultivation.[75]

Other activities—The law prohibits certain activities on cultivated lands such as building houses, removing soil, mining, digging sand, collecting stones, or digging graves.[76] It requires the maintenance of irrigation and drainage infrastructure, thereby implying that constructing such

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[70] Land Administration Law Article 31

[71] Land Administration Law Articles 18 and 31

[72] Regulations on the Protection of Basic Farmland Article 9, Land Administration Law Article 34

[73] Land Administration Law Article 31

[74] Land Administration Law Article 37

[75] Land Administration Law Article 37

[76] Land Administration Law Article 36

facilities is allowed. The law also requires soil improvements "to raise fertility and prevent desertification, salinization, water loss, and soil erosion and pollution."[77] This requirement helps explain China's heavy use of fertilizers.

2. Forests

The Forestry Law (1998), forest planning guides, and other forest-related policies dictate allowable and prohibited uses in forests. The law is fairly ambiguous about allowable and prohibited uses, with the exceptions of strongly encouraging afforestation and restricting timber harvests.

Timber harvest—The State requires timber quotas which set a "ceiling" on maximum harvests and requires that the annual rate of timber growth exceeds consumption.[78] To control timber harvest, permits are required for anyone except rural residents intending to harvest "scattered trees owned individually and growing on plots of land for their personal needs."[79] The law provides limited direction about where and how timber harvest may occur. For example, the law implies that clear-cutting is undesirable but does not prohibit it.[80] The law does "strictly prohibit" timber harvest in certain types of special purpose forests, namely those in nature reserves, at ancient and historic sites, and in revolutionary memorial places.[81]

Afforestation—The Forestry Law explicitly encourages afforestation, going so far as to identify it as "an obligation that citizens should fulfill." In fact, the law recommends that the government set afforestation goals in light of local conditions and organize tree-planting projects for citizens.[82]

Other activities—The Forestry Law is ambiguous about other activities in forests. For example, it does not expressly state that livestock grazing and fuelwood harvest are allowed, but implies such by specifying that these activities are prohibited only in "young forest lands." It prohibits the occupation of forest for mining and construction, yet identifies the necessity to obtain approval for "the occupation or requisition of forest land" for construction purposes.[83] Similarly vague, it prohibits the export of rare and precious trees and their products and derivatives and the hunting and catching of wild animals under state protection, but adds instructions for export and hunting, such as the need to file permits. Other activities are not addressed at all, such as tourism, recreation, energy development, and management activities such as thinning.

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[77] Land Administration Law Article 35

[78] Forestry Law Article 29

[79] Forestry Law Article 32

[80] Forestry Law Article 31 states, "Total felling [in mature timber forests] shall be strictly controlled and renewed afforestation shall be completed within the same year of felling or the following year."

[81] Forestry Law Article 31

[82] Forestry Law Articles 11 and 26

[83] Forestry Law Article 18

3. Grasslands

The Grassland Law (2003) guides the use of the grasslands. While the law provides some direction as to allowable and prohibited uses such as livestock grazing, a close read demonstrates that just about any activity is allowed. The law does emphasize the need to re-vegetate and protect grassland resources.

Livestock grazing—The Grasslands Law includes a variety of provisions that are designed to protect the environment while allowing for livestock grazing. The law prohibits exceeding livestock carrying capacity, as formulated by "the competent administrative department for grasslands under the State Council." It is prohibited to graze in grasslands "that suffer serious degeneration, sand or rock encroachment, or salinization [or] in ecologically fragile areas." The law also requires livestock grazing practices such as "regional rotation grazing, rational distribution of herds and balanced use of grasslands," though these terms are not defined. Other protective practices are encouraged but not required, such as rearing livestock in pens and utilizing manmade grasslands, as opposed to natural grasslands, for at least some grazing.[84]

Re-vegetation and new grassland creation—The Grasslands Law explicitly encourages the development of "man-made grasslands, improvement of natural pastures and development of bases for forage grass and fodder" to increase grassland carrying capacity (Figure 2–17).[85] The State supports restoration of cultivated lands to grasslands.[86] To assist with efforts, the law requires local government to "mark the areas for special control and improvement" and encourages local government to create seed banks.[87]

Protection—The law explains that certain types of grasslands are "essential grasslands" and must "be placed under strict control." Essential grasslands include, for example, those that provide ecosystem services such as water conservation and wind shelters, habitat for state-protected wild animals and plants, and bases for grassland research and experiments. While the phrase "strict control" implies outright protection, the State Council has the discretion to determine the measures for protection and control.[88] Protection of rare and endangered plant species "is required, and the local government may establish grassland nature reserves.[89]

Other activities—Whether grasslands are "essential" or not, in general, the law requires adherence to the "relevant plans for grassland protection, development, and use." Certain activities are prohibited, including conversion of grasslands to cultivated land,[90] digging plants, or engaging in other activities that would harm sensitive grasslands, such as desert or semi-desert

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[84] Grassland Law Articles 33-35, 45, 47

[85] Grassland Law Article 27

[86] Grassland Law Article 48

[87] Grassland Law Articles 29, 31, 32

[88] Grassland Law Article 42

[89] Grassland Law Article 43, 44

[90] Grassland Law Article 46

grasslands.[91] The Grasslands Law discourages but does not prohibit mineral exploration, statingthat "no grasslands, or as little grasslands as possible, may be occupied for exploiting mineral resources."[92] Other activities are allowed, with local government approval, such as construction (with compensation to holders of use rights and payment of restoration fees to the local government);[93] mining sand, soil and stone;[94] and profit-making tourist activities.[95]

Figure 2–17. The Grasslands Law encourages grassland restoration, such as this project in Hulunbeir, Inner Mongolia. Photo by Li Xinhai

4. Unused Lands

The Land Administration Law provides limited guidance as to unused lands (huang di), such as deserts and high alpine areas. Basically, it encourages unused lands to be used. For example, as the law states, "[Cultivated] Land shall be used sparingly for non-agricultural construction purposes. Whereas wasteland can be used, no cultivated land shall be occupied; whereas poor land can be used, no good land shall be occupied."[96] The term "unused land/wasteland" often underestimates its true value. As a result, local (or higher) authorities may sell it or require other uses, when in fact the land might be valuable for grazing, medicinal harvesting, biodiversity conservation, or other productive purposes (Menzies, 2011).

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[91] Grassland Law Article 49

[92] Grassland Law Article 38

[93] Grassland Law Article 39

[94] Grassland Law Article 50

[95] Grassland Law Article 52

[96] Land Administration Law Article 36

D. Non-Use Rights

Chinese law is unclear as to whether it is permissible to acquire use rights but not use them (i.e., "non-use rights"). An exception is the core areas of nature reserves, in which human activities are prohibited by the Nature Reserve Regulations. The ambiguity around non-use rights is an important consideration for land protection efforts in areas that are zoned for specific uses, since NGOs or other entities may want to protect land by acquiring the rights and limiting or refraining from use activities that could impact biodiversity values. In possible support of a non-use right the Land Administration Law states, "Units or individuals using land shall be responsible for the *protection*, management, and a rational use of the land"[97] [italics added]. The law is clear, however, that cultivated land at least must be productive, stating, "No unit or individual is allowed to let the land idle or go wasted."[98] The legal ambiguity around non-use rights for lands other than cultivate lands may leave decisions to the discretion of the government and other stakeholders.

E. Perceptions of Use Rights

While Chinese law identifies use rights and obligations—some more clearly than others—in practice, allowed use rights and perceptions thereof vary greatly, even within villages. Such divergent understandings may pose challenges to those seeking to acquire use rights for conservation or other purposes. Consider transfer rights as an example. A survey of eight provinces showed great variance in perceptions of the right to transfer use rights within or outside of villages, even though the law explicitly allows for this right. Some participants felt that individuals had autonomous authority to make transfer decisions; others thought that transfers were allowed with village approval, and still others did not think that transfers were allowed at all (Xu et al., 2009). Differences of opinion about who has the right to make decisions about which use rights will affect whether and how quickly land protection projects can be implemented.

F. Documentation of Use Rights

1. Types of Documents

Thorough documentation of ownership and use rights, combined with a land registration system, can reduce variable perceptions of use rights and associated challenges. Land transactions, including those related to land protection efforts, may occur more smoothly for parcels with established written contracts than for parcels that lack documentation. As the Registration in Practice section below describes, the Chinese government is working toward consistent documentation of ownership and use rights across the country. In the meantime, a variety of laws do describe requirements for documenting ownership and use rights, variably implemented though they may be: The Land Administration Law, Property Law, Rural Land

[97] Land Administration Law Article 9

[98] Land Administration Law, Article 37

Contract Law, Forestry Law, and Grassland Law. Together, these laws identify two main types of documents to convey ownership of rural land and use rights: ownership certificates and use right certificates/contracts. The latter takes a variety of forms (Table 2–5).

The government issues **ownership certificates** to managers of collective lands only, since state and collective ownership are the only types of land ownership in China. County land and resources bureaus issue these certificates for arable land (including grasslands) and residential land, while county forestry bureaus issue the certificates for forests.

Use right certificates/contracts take various forms and are issued by different parties. In general, the government issues "certificates" while managers of collective lands issue "contracts." Thus, anyone receiving use rights directly from the State should receive a use right certificate from the local government. Anyone receiving use rights for collective lands should receive at least two documents—a certificate from the local government and a contract from the collective land managers. The contract should be signed by a representative of the collective lands and a representative of the household. The certificate should contain "substantially the same content as the contract but [be] issued and sealed by the county level or higher and not bearing local signatures" (Prosterman et al., 2009).

Contracts may take several forms according to law: a **household contract** for agricultural land such as arable land, forestland, and grassland and a **contract in other forms** for unused lands such as barren mountains and beaches. The Rural Land Contract Law also requires written contracts for the circulation of use rights to a third party.[99] This contract may take the form of an **easement**, which is a type of use rights certificate/contract that the Property Law identifies.[100] For example, a household transferring forest use rights to a timber company would need to establish a contract (e.g., easement) with that company. The law implies that easements may cover all or part of a parcel, and some or all of the use rights.[101] Therefore, it would be possible for multiple parties to hold different use rights to the same plot of land. The law is unclear as to whether the conveyance of use rights to third parties must be reported to the local government and whether the third party must actually obtain a use rights certificate/contract from the local government. As the Rural Land Contract Law states, "Where the parties to the circulation . . . *request registration*, they shall apply for registration to the local people's government at or above the county level" [italics added].[102] The law does not address subsequent transfers of use rights such as from third parties to fourth parties.

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[99] Rural Land Contract Law Section 5

[100] Property Law Chapter XIV Easement

[101] Property Law Article 157

[102] Rural Land Contract Law Article 38. Property Law Article 158 contains a similar clause: "Where the parties concerned require registration, the application for easement registration may be filed with the registration departments."

Table 2–5. Types of official documents for ownership and use rights

Type	Purpose	Issuer	Recipient
Ownership certificates	To confirm collective land holdings	County government: land and resources bureau for arable and residential land; county forestry bureau for forests	Managers of collectively-owned lands
Use rights certificates	To confirm ownership of use rights (not the land itself)	County government or higher; agency varies based on land use	Individual households for collective lands "Units or individuals" for state lands
Use right contracts	To confirm ownership of use rights (not the land itself)	Collective land managers or other	Primarily to households, but also to third parties
• **Household contracts**	To confirm ownership of use rights for collective lands including "arable land, forestlands and grasslands . . . . as well as other lands used for agriculture . . ."		
• **Contracts in other forms**	To confirm ownership of use rights for lands "not suited to household contract" such as "barrens mountains, gullies, hills, and beaches"		
• **Easements**	To convey a subset of someone's use rights to another party for all or part of a parcel		

2. Registration in Practice

Although the law requires documentation of ownership and use rights, in practice such documentation varies widely and the validity of documents is not always guaranteed (Table 2–6). The government "pursues a uniform registration system" and requires registration for real property including but not limited to land.[103] The law also requires survey and mapping of "the estate boundary location lines of lands, buildings, structures and other aboveground objects attached to the land."[104] Despite these goals and provisions, at present there is no robust,

[103] Property Law Article 10

[104] Survey and Mapping Law Article 19

consistently-implemented land registration and cadastral system for land in rural China.[105] (Ho, 2001). The registration regime of urban lands is better defined than that for rural lands due to the passage of the Urban Real Estate Law in 1995.

Contents of certificates or contracts vary widely, and in reality many transactions occur without documentation. Many people may not know what documents are required or valid (Menzies, 2011). Somewhere between 40-55% of rural Chinese households lack certificates and/or contracts validating their land rights (China Law & Practice, 2009) (Deininger et al., 2004) (Prosterman & Zhu, 2009) (Rural Development Institute, 2010). It is more common for households to hold either a certificate or a contract, rather than both, despite the requirement by law and policy. For example, a survey of nearly 1,600 households in 17 major agricultural provinces found that for arable lands, 63% have received a certificate and 53% have received a contract, but only 44% have received both (Prosterman et al., 2011). Documentation of ownership and use rights varies by land use (Table 2–6).

Table 2–6. Documentation of ownership and use rights, by land use, and including agencies responsible for issuing the documentation (Landesa, 2009)

Land use	Rights	Responsible agencies	Percent with documentation
Arable land and grasslands	Collective ownership	Ministry of Land and Resources	54%
	Household use	Ministry of Agriculture	71%[106]
Residential land	Collective ownership	Ministry of Land and Resources	54%
	Household use	Ministry of Land and Resources	79%
Forest land	Collective ownership	State Forestry Administration	90%
	Household use	State Forestry Administration	< 50%

Where certificates or contracts exist, many are incomplete or inaccurate. For example, a 2003 survey of 1,100 villages in China's 12 provinces showed that only 40-45% of contracts included contract terms or some sense of the physical boundaries of the land. Of these documents, 75% included a seal from the province or county, which is important because it lends a higher level of security than if only signed by the village leader or another local official (Deininger et al., 2004).

[105] *Land registration* is the process of creating an official record of land ownership, use rights, and chain of circulation through titles, deeds, or contracts. Related, a *cadastre* is a methodically-arranged public inventory of land registration records. Worldwide, typical components of land registration records include descriptions of parcels such as location, size, and value; ownership and property rights such as use rights, control rights, and transfer rights; and parties involved the transaction including names, date of births, living addresses, professions, and other identifying information. Cadastres usually include maps with parcel identifiers that provide links to land registration records. Government agencies typically maintain land registration records and cadastres (Henssen, 1995)

[106] The RDI/Landesa draft states 59%, but one of the authors of the document reported that the percentage is now 71% based on a nationwide survey completed in 2009 (Zhu K., 2011).

Even when certificates and contracts are complete and accurate, their validity is not always guaranteed. With changing policies, people (including officials) do not necessarily know how to address conflicting claims for use rights. For example, a contract from 1992 may have granted a farmer rights to village forest land, while a 1999 policy might have given the collective the right to auction the entire forest, which was then leased to a company in 2005. Who is the valid holder of the use rights in this example? (Menzies, 2011).

Registration efforts are also hindered by ambiguity in the laws. For example, the law requires that the government at the county level or above record and issue ownership and use right certificates[107] in the "Real Property Register."[108] However, the law does not define the Real Property Register nor does it specify the agencies responsible for registration. As a result, both the Ministry of Agriculture and the Ministry of Land and Resources have become involved in registering arable land and grasslands, which has led to inconsistencies and inaccuracies from place to place. Furthermore, the law provides limited guidance as to the process for registering land rights and how transfers of use rights to third parties should be recorded.

To resolve these and other registration issues, the Central Government is taking steps toward common land registration and cadastral systems for rural lands. Examples include the following:

- The Ministry of Land and Resources is sponsoring an effort to map collective and state lands across the country. This effort will not map use right boundaries for households, but individual local governments may do this on their own accord (Li, 2010).

- A pilot project in Anhui Province seeks to create and maintain a functional land registration system for farmers' land use and contracting rights. Participants have drafted a manual for a rural land registration system, including parcel mapping, and have identified next steps toward larger-scale registration. The Ministry of Agriculture also conducted approximately six pilot programs in the last two years and plans to do more (Landesa, 2009).

- The government is encouraging stronger registration practices through the current collective forest reform. An official government document announces a goal of achieving "clear property rights and tenure" by 2013. "Contract[s] or transfer[s] of contract[s] . . . have to be perfect," describes the document, and must be corrected if they do not meet legal requirements. Furthermore, the document encourages consistent registration procedures and contract contents, as well as clearly defined duties such as "afforestation, protection and management, forest fire prevention, pest control, and responsibility to promote sustainable management of forest resources" (CPC Central Committee and State Council, 2008).

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[107] Land Administration Law Article 11, Rural Land Contract Law Article 23, Property Rights Law Article 127, Forestry Law Article 3, and Grassland Law Article 11

[108] Property Law Article 16

Despite these efforts, a full registration system will not likely be implemented anytime soon. According to one estimate it could take 30-50 years for the Chinese government to create a land registration system covering the 1.5 billion parcels of rural land in China (Landesa, 2009). In the meantime, the wide variance in registration efforts will continue to cause tenure security issues, land disputes, and relatively slow and inefficient land transactions—all of which affect land protection efforts.

IX. Tenure security & enforcement

Tenure security has been and continues to be a major challenge in China, and is a major consideration for land protection efforts. Certainly it has improved over the last several decades as the Central Government has extended the duration of use rights, started requiring written contracts, and ramped up enforcement mechanisms, through the issuance of the Law on Mediation and Arbitration of Rural Land Contract Disputes in 2010. However, security and enforcement varies widely across the country. There are differences from one province to another, from one county to another, from one township to another, and even from one village to another village within the same township (Rozelle & Li, 1998) (Prosterman et al., 2009). Widespread challenges include inadequate documentation of land rights (discussed in Chapter VIII, Use Rights), land reallocations and takings, and variable enforcement (discussed below). These issues leave holders of use rights susceptible to changes on their lands, even when they hold well-written contracts. Land protection projects must proactively address these vulnerabilities to ensure long-term success.

A. Land Reallocations and Takings

Both land reallocations and takings have created tenure insecurity in China. The former refers to (administratively-led) reallocations of land among households, whereas the latter refers to land conversions by local leaders. Both are influenced by challenges with documentation: When people do not know what documents are required or valid, it is easy to effectuate reallocations and land takings (Menzies, 2011). Reallocations of land were the main cause of conflicts during the 1990s, while land takings have been taking the lead since the beginning of the 2000s (Vendryes, 2010).

Land use rights may be allocated to households for a set number of years, but "most villages in China have adopted the practice of periodically readjusting or reallocating landholdings," according to Zhu & Prosterman (2007). Readjustments may range from a village augmenting or diminishing a household's landholding based on changes in family size, to a village reclaiming and redistributing all the land in a village. The practice of readjustment is illegal under the law, except in cases of "natural calamities."[109] However, according to a survey of 17 provinces, 30% of villages still carry out the practice (Zhu & Prosterman, 2007).

Land takings—also known as "tear down and relocate"(拆迁, *chaiqian*) or "government coercive land expropriation" (政府强行征地, *zhengful qiangxing zhengdi*)—may have an even greater impact on rural households than reallocations (Habitat International Coalition) (Guo, 2001). Skyrocketing real estate prices have spurred industrial growth and urban expansion, and it is not uncommon for local government and village officials to purchase or outright take land from

[109] Rural Land Contract Law Article 27

peasants, regardless of use rights, and sell it at a much higher price to developers. As Hessler (2010) writes, "Profits are individual, but the risk is communal; local cadres benefit from land sales while villagers are stuck with the ramifications." The number of reported mass protests has escalated from a few thousand in the mid-1990s to 80,000 in 2006, most of which focused on land takings (Xu et al., 2010) (Lee, 2009). Some of the takings have resulted in violence, with peasants being injured or killed (Schiller, 2010). In fact, land confiscation is the most common complaint registered by Chinese farmers, followed by village finances and environmental pollution (Xinhua, 2007). Statistics vary regarding the number of takings but suggest they have been increasing in frequency. For example:

- From 1990-2002, approximately 66 million farmers lost their land because of "collection of land" (*zhengdi*) for resale and development purposes (Li, 2009).

- The number of illegal land confiscations by local officials rose by approximately 2 million per year from 1999-2009, for a total of 40 million by the end of that time period (Lee, 2009).

- Based on a 2003 survey of 1,100 villages in 12 provinces, reported incidents of villages experiencing land takings increased from 18-19% of villages during 1995-2000 to 29% of villages during 2001-2003 (Deininger et al., 2004).[110]

It is important to distinguish between perceptions of takings and actual takings based on the law. According to law, the State has the authority to expropriate land "for the public interest" and with compensation.[111] The law does not define the "public interest," which makes it very hard to challenge expropriations and effectively gives the State *carte-blanche* to purchase and develop land as it sees fit. However, expropriation can become illegal and may constitute a taking, if compensation is less than the amount required by law[112] or if collective land managers sell land to the State without following decision-making procedures established by law.[113] As one example of a taking, residents in a village in Zhejiang Province learned that their village committee had sold land to developers only after bulldozers started leveling a nearby hill (Radio Free Asia, 2009). Takings vary across the country and correlate to development opportunities. Accordingly, they are more common along the coast, where there is higher demand for development, than in the remote areas of the country (Deininger et al., 2004).

Local governments have strong incentive to develop land, through takings or legal mechanisms, because it has become a major source of revenue. From 1987-2006, income from land sales by local government rose from less than 0.1% of total local government revenue to 35% of total revenue (China Translated, 2009). Chinese law requires that all commercial development occur

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[110] It is unclear whether the actual number of villages experiencing takings increased, or whether village inhabitants simply became more vocal in the 2000s.

[111] Land Administration Law Article 2

[112] Land Administration Law Article 47

[113] Organic Law of the Villagers Committees (1998)

on state-owned land, not collectively-owned land,[114] and typically local governments expropriate land from collective land managers at a much lower price than for what they sell it to developers. For example, in Zhangjiakou City, Hebei Province, more than 3,000 *mu* of land was collected in 2009 for the purposes of real estate development. The county land and resources bureau offered villagers 7,000 RMB/*mu*, while the real estate developer paid the bureau more than 45 times that amount—320,000 RMB/*mu* (Ren & Zhao, 2010). Similarly, 330 *mu* in the Daxing district of Beijing was collected for a compensation fee of 5,000 RMB/*mu* and sold to PetroChina for 38 times that amount, at a price of 191,200 RMB/*mu* (Wu, 2010). If and when developers in turn sell their projects, the government earns additional and significant revenues through the land value appreciation tax. In 2009-2010, this tax constituted the single largest source of local government revenue (CCTV, 2010).

One possible solution to "land grabs" is allowing peasants to sell their use rights directly to developers. Another is clearly defining the ″public interest.″ The government is taking action on these fronts. In January 2011, the State Council issued an Urban Takings Regulation on takings of private houses in cities. These new regulations include higher compensation standards, a narrower definition of ″public interest,″ and more procedural rights for affected individuals. It is widely expected that the revised Land Administration Law, which is undergoing revision, will absorb these and other improvements (Zhu K., 2011).

B. Enforcement, *de jure* and *de facto*

There is a very large discrepancy between the official and actual land rights of households. Variable documentation of ownership and use rights, the lure of development profits, and, as this section describes, variable enforcement, have combined to create a system where the potential gains of illegal land deals outweigh the risks. Like so many other aspects of Chinese land tenure, there is a difference between *de jure* and *de facto* enforcement. The laws expressly address enforcement, but as one author observes, ". . . the problem in rural China is not bad legislation but enforcement. No number of new laws and procedures passed—no matter how elegantly rewritten—can improve their enforcement" (Lee, 2009). For land protection projects, it is important to understand both the law and practical realities of enforcement in terms of responsibilities, penalties, and dispute resolution.

1. Responsibility

Responsibility for enforcement typically falls to counties but can also fall to other administrative divisions depending on the situation. Villages or townships may, for example, help resolve disputes involving individuals. The specific bureaus involved in enforcement and dispute resolution depend in part on the land use. For example, farming and animal husbandry bureaus (i.e., within agriculture bureaus) are responsible for grasslands while forestry bureaus are

[114] Land Administration Law Article 43. Specifically the law states, "Any unit or individual that needs land for construction purposes shall apply for the use of land owned by the State according to law, except land owned by farmer collectives used by collective economic organizations for building township enterprises or building houses for villagers or land owned by farmer collectives approved according to law for use in building public facilities or public welfare facilities of townships (towns)."

responsible for forests. At the same time, the law also requires the land administrative departments (i.e., within the land and resources bureau) to supervise and examine violations to the Land Administrative Law.[115] The potential for multiple agencies to be involved makes it challenging to know who has ultimate responsibility for enforcement. In any case, unresolved disputes may be escalated to the courts.

The law encourages the policing of forests and grasslands. The Forestry Law encourages local government to assign forest guards to patrol the forest and stop illegal activities within "forest protection responsibility areas."[116] The Grassland Law states that local government "shall make efforts to build competent contingents of law-enforcing officers and help raise the political and professional quality of the grassland supervisors and inspectors."[117]

Those responsible for enforcing the rules do not always do so, partially due to diffuse responsibility, as described above. Furthermore, bribery is a normal part of business in China (Mattis, 2008). Corruption and bribery are on the rise, though the courts prosecute at least some offenders. From 2003-2010, the number of cases involving government officials increased by 13%. In 2009, there were more than 32,000 bribery cases, some of which involved billions of RMB (Zhang Y., 2010).

2. Penalties for Violations

Chinese law describes many circumstances that authorize or require the government to issue penalties; whether responsible officials accept bribes in their stead is another story. In any case, breaches of contract, illegal requisitions of land; and the use of land for non-approved purposes (see Chapter VIII, Use Rights) may invoke criminal investigation and could require fines, prison time, forced labor, and/or payment of compensation for damages.[118] Penalties apply to any offenders, including, but not limited to, government employees.[119] For agricultural lands, the law delineates penalties based on the manner in which they are converted or used for non-agricultural purposes.[120] For grasslands, the law describes consequences for withholding or misappropriating grassland improvement funds; illegal transfer, use, reclamation, or requisition of grasslands; and failure to restore grasslands if the government requires such.[121] For forests, the law emphasizes the ramifications of illegal harvest and other illegal commercial timber activities.[122]

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[115] Land Administration Law Article 66

[116] Forestry Law Article 19. The law also identifies "forest public security organs" responsible for the "maintenance of social order" and an "Armed Forest Police Force" whose duties are to prevent and extinguish forest fires and embark on rescue operations. The law does not specify whether these three entities—forest guards, forest public security organs, and Armed Forest Police Force—are three separate entities or one in the same.

[117] Grassland Law Article 56

[118] Criminal Law Articles 228 and 410, which are attached as an appendix to the Land Administration Law

[119] Rural Land Contract Law Articles 59-61, Land Administration Law Article 70

[120] Land Administration Law Articles 73-84

[121] Grassland Law Articles 61-72

[122] Forestry Law Articles 40-44

3. Dispute Resolution

In 2010, the Central Government put into effect the Law on the Mediation and Arbitration of Rural Land Contract Disputes. This law expands upon the dispute resolution procedures identified in the Grassland, Forest, Rural Land Contract, and Land Administration laws. It explains that parties involved in a dispute have the option of resolving the issue amongst themselves or requesting meditation by the villagers' committee, the township government, or another government-sanctioned entity. If negotiations fail, the next step is to apply to the "rural land contract arbitration commission" or to file a lawsuit in the people's court.[123]

The effectiveness of this new law is to be determined, but as with any law, it is only as good as its implementation. And implementation of dispute resolution procedures has, historically, been substandard. Many farmers are "gravely" unaware of their rights, including options for dispute resolution (Zhu & Prosterman, 2007). Those who seek relief may or may not find it. As one article describes, "Many peasant farmers go to Beijing to file petitions and complain to higher government offices about their losses [of land]. But local governments often set up checkpoints to block the petitioners, or send officials to Beijing to round them up and lock up the leaders when they return home. Other villagers seek legal help, but even if the court rules in their favour, the rulings are sometimes totally ignored and the bulldozers continue to roll in" (Griffeths, 2005). Another challenge is that judges are not always neutral parties, as local government officials hire, pay, and fire them (Cohen, 2006).

[123] Law on Mediation and Arbitration of Rural Land Contract Disputes Articles 3 and 4

X. Other tenure factors affecting land protection

A. Funding for Land Protection and Management

Rarely are detailed budget numbers publicly available in China. However, the limited figures available suggest that funding for environmental protection is substantial and is generally increasing. For example:

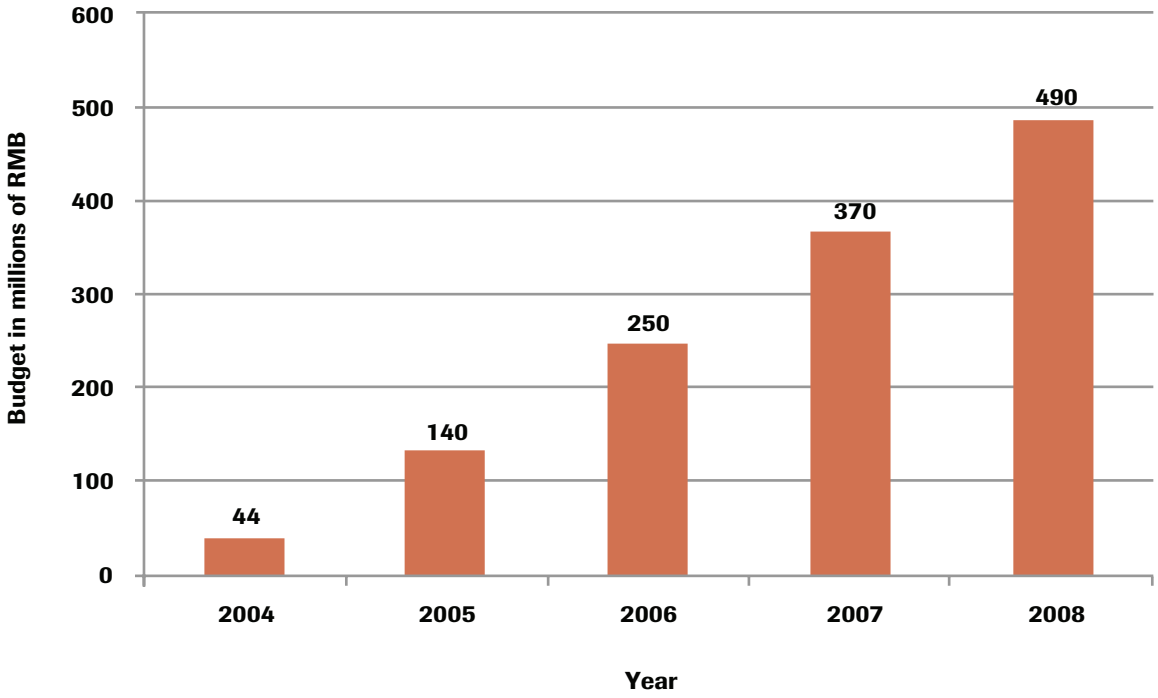
- China is investing upwards of 1 trillion RMB (approximately US$142 billion) to implement ecological conservation and restoration programs such as Grain to green and the Natural Forest Protection Program (see Part 1, Lay of the Land).

- The Central Government's expenditures on environmental protection activities increased by 19% from 2008-2009, from 104 billion to 124 billion RMB. The amount spent on environmental protection as a percentage of total government spending decreased slightly over the same time period, from 2.9% in 2008 to 2.8% in 2009 (Shik & Yim, 2009). Presumably these statistics include expenditures by agencies such as the Ministry of Environmental Protection and the State Forest Administration. They include funding for land and protected area management and a host of other activities such as pollution prevention.

- The budget for the Sichuan Environmental Protection Bureau increased from 44 to 490 million RMB from 2004-2008 (Figure 2–18).

While overall expenditures on environmental protection are not insignificant in China, those for protected areas may be low compared to other countries. There is little up-to-date or reliable global data on protected area funding; according to IUCN, the most recent global survey of protected area budgets was published in 1999 and was based on data collected in 1993 and 1995 (Emerton et al., 2006). In any case, this survey identified an average global budget for protected areas of $893 per km² (in 1996 US$), with the mean for developed countries totaling $2,058 per km2 and the mean for developing countries totaling $157 per km² (James et al., 1999). This survey was not able to publish figures for China due to insufficient data. However, based on a separate survey of 85 nature reserves, a different source estimated that China's average protected area funding totaled $113/km², with local reserves receiving only $53/km² (Liu, et al., 2003). In other words, the funding for China's nature reserves was approximately 13% of the global average and less than the average for developing countries.

Figure 2–18. Budget of the Sichuan Environmental Protection Bureau, 2004-2008 (Sichuan Environmental Protection Bureau)



The main agencies involved in the budget process include land management agencies (e.g., State Forestry Administration), the National Development and Reform Commission, and the Ministry of Finance. The NDRC and the Ministry of Finance work together at each level of government (county, prefectural, provincial, and Central) to authorize project lists and budgets, and allocate funding to all the agencies within the State Council. Technically, the National People's Congress and the Local People's Congresses have ultimate budget approval authority.[124] However, in practical terms the legislative approval "remains largely a formality" primarily because the NPC has very limited time to review the budget. Thus, the State Council and its agencies more or less develop, approve, and execute their own budgets (Deng & Peng).

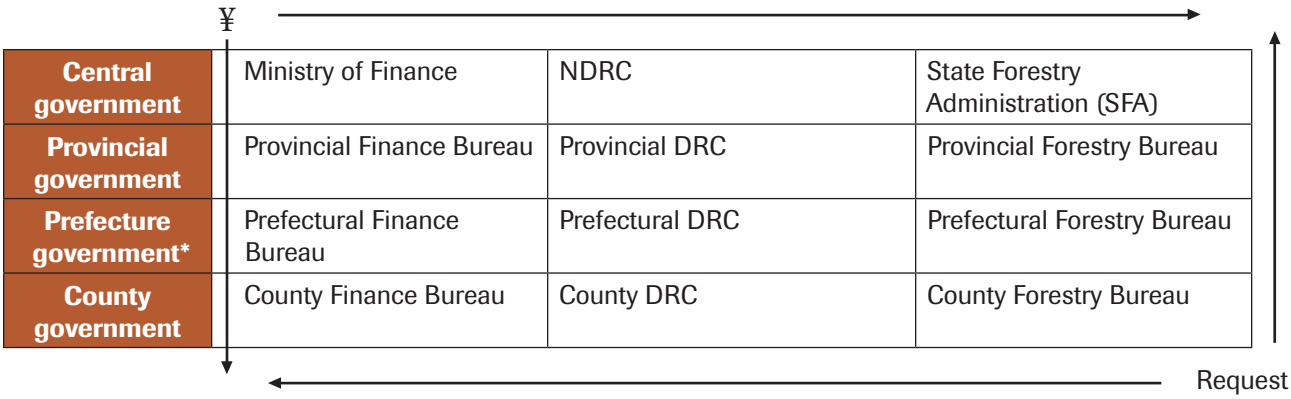
There are two main budget cycles—annual budgets and five-year budgets associated with each Five-Year Guidelines. The Five-Year Guidelines identify overall funding priorities and approximate budgets, while the annual budgets identify the year-to-year anticipated revenues and expenditures. The government may also fund projects independently of either process, particularly in the event of unanticipated budget surpluses.

China's fiscal year runs from January 1 to December 31. For the annual budget process each land management agency, at each level of the government, creates an annual project list and budget request. Typically the agencies start building their budgets in October. The agency submits the request both "up" within any one agency and "across" to the same-level finance bureau and

[124] Budget Law (1994)

NDRC bureau. Similarly, the funding allocations go "down" the levels of government within any one agency and "across" from the Ministry of Finance to the NDRC to the land management agency within any one level of government (Figure __). For example, a county-level nature reserve managed by a county forestry bureau would request funding "up" from the prefectural or provincial forestry bureau, as well as "across" from the county-level finance bureau and county development and reform commission. The exact funding path and how far "up the chain" the funding request must travel depends on the nature of the project (Zhao, 2010).

Figure 2–19. Generalized path of funding requests and allocations, using the State Forest Administration as an example land management agency



B. Protected Species

Different government entities have developed several lists of species warranting protection: State Key Protected Species lists, Red Data Books, and the China Species Red List (Table 2–7). There is overlap between these lists, though they are based on different classification schemes and, as a result, identify different species and numbers of species.

From a legal perspective, only the State Key Protected Species lists have any "teeth." Policies such as The Law on the Protection of Wildlife (1988) and the Regulations on Wild Plants Protection (1997) pertain to the Key Protected Species lists. If, for example, a proposed construction project would impact a species on the State Key Protected Species List—or its habitat—the developer must describe the possible effects in an Environment Impact Assessment (EIA), in accordance with China's EIA Law (2003). The local environmental protection bureau would then review the EIA together with the wildlife protection agency (i.e., forestry bureau and agriculture bureau) to evaluate the potential effect and prescribe actions to minimize impacts before deciding upon project approval. In reality, however, this process rarely, if ever, results in modifications to construction plans. The other species lists have no official legal function, but they may aid in the formulation of new legislation and in enforcement of existing laws.

Table 2–7. Government-created lists of species warranting protection

Title	Author	Year of release	Classification
The State Key Protected Wild Animals List	Joint effort by the State Forestry Administration and Ministry of Agriculture	1989	Classifies 256 species and genus/class/orders as protected as either Class I (96) or Class 2 (160)
The State Key Protected Wild Plant List	(same)	1999	Classifies 419 species are identified as either Class I or Class II(same as above)
China Red Data Book of Endangered Animals	Ministry of Environmental Protection, Endangered Species Scientific Commission, P. R.C	1998	Based on IUCN Red List guidelines, classifies 533 species (birds 183, mammals 133, amphibians and reptiles 125, fishes 92) as extinct (EX), extirpated (ET), endangered (E), vulnerable (VU), rare (R) or indeterminate (I)
China Red Data Book of Rare and Endangered Plants	Ministry of Environmental Protection together with the Chinese Academy of Sciences	1992	Based on IUCN Red List guidelines, classifies 388 plant species as endangered (121), rare (110), or vulnerable (157).
China Species Red List	Biodiversity Working Group of China Council for International Cooperation on Environment and Development	2004	Based on IUCN Red List guidelines, includes 10,211 species including 5,803 animals (mammals, birds, amphibians and reptiles, fishes, insects, mollusks) and 4,408 vascular plants

C. Autonomous Areas and Minority Populations

More than 60% of China's territory is inhabited by minority populations, although recognized ethnic minorities comprise just 8% of China's population (National Bureau of Statistics, 2011). Ethnicity (民族, *mínzu*) is an important aspect of modern Chinese society and can affect land protection efforts. Given the vast areas inhabited by ethnic minorities and the high conservation value of many minority autonomous administrative areas, ethnicity and ethnic autonomy is likely to be a significant aspect of land protection projects. Despite China's unitary political system, including universal state land ownership and largely uniform land use law, the presence of ethnic minorities or the ethnic autonomy status of a project location may require accommodations to local customs and conditions. Local language use, spiritual traditions, and potential ethnic tensions and sensitivities must be taken into account.

All citizens are assigned one of the 56 officially-recognized ethnicities upon birth, the majority being identified as Han (Figure 2–20). Han Chinese are generally recognized as being descendents of the early Chinese dynasties, particularly the Han Dynasty (202 BCE to 220 CE), which were located in current Central China.[125] Populations of ethnic minorities vary considerably in numbers and distribution (Table 2–8). Some live in small and dense communities, while others inhabit vast areas in different parts of the country. As of the 2010 census, the majority of ethnic minority individuals lived within China's five autonomous regions. These regions are comprised entirely of autonomous jurisdictions including most of China's 30 autonomous prefectures, 120 autonomous counties (known as "banners" in Mongolian areas), and more than 1,200 ethnic townships. Each administrative area at the regional, prefectural, county, and township level is named after its geographical location and the most dominant ethnic group; for example Xinjiang Uygur Autonomous Region is the provincial-level administrative unit that includes all of Xinjiang and is inhabited mainly by the Uygur ethnicity.

Outside of the five autonomous regions, 11 (non-autonomous) provinces contain one or more autonomous areas at the prefectural, county, or village level. They are located mainly in the south and northwest of China as well as in the northeast; examples include Deqing Tibetan Autonomous Prefecture in Yunnan and Yanbian Korean Autonomous Prefecture in Jilin Province (Central Government, 2005). In addition, although autonomous areas are established only if a dense community of the titular ethnicity is present, in most of the autonomous areas other ethnic groups have a significant presence and may even constitute the majority of the population. For example, in Ningxia Hui Autonomous Region only about 35% of the population are Hui Muslims, while the remaining 65% is comprised of mostly Han Chinese.

[125] From 1949-1979, the Communist government completed a national-scale ethnic categorization project. Of the 400 groups considered, the government identified 56 unique nationalities (Central Government, 2005). Using language, physical appearance, cultural habits, and occupation, as well as historical data, ethnologists decided whether each group should be considered as separate from the Han majority, and then whether it was an ethnicity of its own or part of another minority group (Fei, 1981).

Figure 2–20. Tibetans, such as this woman in Qinghai, are one of 56 officially-recognized minorities. Photo by Li Baoming

The government may designate autonomous areas in "areas where people of minority nationalities live in compact communities."[126] This compact community requirement does not have a legal definition, but in practice it means that the ethnic community can be clearly discerned from other ethnicities by living arrangements or other segregating conditions. The area inhabited by such a community is granted a level of social, cultural, and economic autonomy. For example, the Qapqal Xibe Autonomous County exercises autonomy for the Xibe people, even though it lies within the Illi Kazakh Autonomous Prefecture (which is managed largely by the Kazakh people and promotes Kazakh language and culture), which in turn is part of the Xinjiang Uyghur Autonomous Region (which is managed by the Uyghur people and promotes Uyghur culture and language). At each level these different ethnic groups enjoy a level of fiscal and cultural autonomy, such as dedicated media outlets and some education in their language. While the degree and exact meaning of autonomy is unclear, the continuous establishment of autonomous areas, even after no new ethnicities were recognized, suggests that ethnic autonomy is seen as preferable by local governments (Gladney, 2004).

[126] Constitution of the P.R.C. Article 4

Many autonomous areas have unique land use history and patterns. All five autonomous regions are marked by environments that are adverse to human habitation. Tibet, Guangxi, and parts of Xinjiang are high alpine regions, whereas Xinjiang, Ningxia, and Inner Mongolia are very arid. Unlike the rest of China, these areas are sparsely populated, with as few as 1.8 people per square kilometer in Tibet for example. Living standards and income levels in most minority areas are below those of the national average (Central Government, 2005) (Xinhua News, 2005).

Land reforms in autonomous areas tend to be delayed compared to the rest of the country. Most of the ethnic groups in northeast and the western China historically have been herders who managed their lands collectively. Prior to the establishment of the Communist government, the land was owned by big landowners, or, as in Tibet, by monasteries (Miller, 2005). The Communist government gradually transferred land to state and collective ownership. Unlike the drastic land reform in the 1950s in the non-autonomous areas of China, land ownership in most minority areas was reformed later and more gradually in a process called "democratic reform." Similarly, assigning land to individuals through individual household contracts in the autonomous regions started only after successful implementation in the eastern (non-autonomous) provinces (Miller, 2005).

Unique to the Xinjing Uyghur Autonomous Region, an important consideration for land use is the role of the Xinjiang Production and Construction Corps (also known as 兵团, *bingtuan*). The *bingtuan* is a military-organized farming and development organization. With approximately 2.5 million members, it is responsible for managing 7.5 million hectares of land for agriculture, forestry, and other purposes. *Bingtuan* land holdings are located throughout Xinjiang. *Bingtuan* reports directly to the Central Government but acts as local government in the areas under its jurisdiction, performing land use planning activities and farm land conservation (Entering Bingtuan).

Beyond land tenure and usage patterns, conservation in minority areas can affect, and be affected by, ethnic community values and interethnic relations. An example of ethnically-driven direct and positive conservation impact is Meili Snow Mountain, which is not only a major site for medicinal plant and harvesting of other non-timber forest products, but also a major sacred site and pilgrimage destination for Tibetan Buddhists, who are dedicated to protecting the mountain. Similarly, one of China's most famous protected areas, the Kekexili Nature Reserve, was established in 1995 after the film *Kekexili: The Mountain Patrol* publicized the efforts by a volunteer Tibetan vigilante patrol to combat the poaching of endangered Tibetan antelopes. On the other hand, political tensions within ethic groups locally, nationally, or even internationally can make non-governmental conservation work tenuous. Environmental groups have been known to ask members to resign for holding supportive attitudes towards "separatist activities" (Economy, 2004), and ethnic minority environmentalists have been found guilty of separatism, a charge punishable by imprisonment and possibly capital punishment (Reuters, 2010).

Table 2–8. Ethnic minority populations of more than one million people

The table does not reflect the 1.2 billion Han Chinese majority that lives in every province and region. Ethnic groups are arranged in descending order based on population size in the year 2000 (National Bureau of Statistics, 2000) (National Bureau of Statistics, 1990).

English Name	Chinese Name	Population in 1990	Population in 2000	Location
Zhuang	壮 族	15,489,630	16,178,811	Guangxi, Yunnan, Guangdong, Guizhou, Hunan
Manchu	满 族	9,821,180	10,682,263	Liaoning, Heilongjiang, Jilin, Hebei, Inner Mongolia, Beijing
Hui	回 族	8,602,978	9,816,802	Ningxia, Gansu, Henan, Xinjiang, Qinghai, Yunnan, Hebei, Shandong, Anhui, Liaoning, Beijing, Inner Mongolia, Tianjin, Heilongjiang, Shaanxi, Jilin, Jiangsu, Guizhou
Miao	苗 族	7,398,035	8,940,116	Guizhou, Yunnan, Hunan, Sichuan, Guangxi, Hubei
Uygur	维吾尔族	7,214,431	8,399,393	Xinjiang, Hunan
Tujia	土 家 族	5,704,223	8,028,133	Hubei, Hunan, Sichuan
Yi	彝 族	6,572,173	7,762,286	Yunnan, Sichuan, Guizhou
Mongolian	蒙 古 族	4,806,849	5,813,947	Inner Mongolia, Liaoning, Xinjiang, Heilongjiang, Jilin, Qinghai, Hebei, Henan
Tibetan	藏 族	4,593,330	5,416,021	Tibet, Sichuan, Qinghai, Gansu, Yunnan
Bouyei	布 依 族	2,545,059	2,971,460	Guizhou
Dong	侗 族	2,514,014	2,960,293	Guizhou, Hunan, Guangx
Yao	瑶 族	2,134,013	2,637,421	Guangxi, Hunan, Yunnan, Guangdong, Guizhou
Korean	朝 鲜 族	1,920,597	1,923,842	Jilin, Heilongjiang, Liaoning
Bai	白 族	1,594,827	1,858,063	Yunnan
Hani	哈 尼 族	1,253,952	1,439,673	Yunnan
Kazak	哈 萨 克 族	1,111,718	1,250,458	Xinjiang
Li	黎 族	1,110,900	1,247,814	Guangdong
Dai	傣 族	1,025,128	1,158,989	Yunnan

Changbaishan Nature Reserve, Jilin Province. Photo by Shen Xiaohui

PART 3:
LAND PROTECTION IN PRACTICE

I. Tools & strategies

As Part 1, Lay of the Land, describes, China is a mega-diverse country and is home to more than 10% of the world's plant and animal species. At the same time, biodiversity is under increasing threat from the rapid conversion of China's rural countryside. With no sign of growth slowing, effective land protection is becoming progressively more important to the persistence of the country's, and the world's, wealth of biodiversity.

Fortunately, China has a history of land protection efforts. Two thousand years ago, the Qin Dynasty (221-207 BCE) protected mountains for imperial hunting grounds (Xu & Melick, 2007). More recently, in the 1920s the government began establishing scenic areas, and in 1956, the government designated the Ding Hushan Nature Reserve in southern China's Guandong Province as the country's first official protected area. Today, protected areas (particularly nature reserves) are the most widely-recognized and most frequently applied means for protecting land in China. They are not, however, the only means.

While China boasts a relatively extensive protected area network, there is general acceptance that it is not effectively conserving the full suite of species and ecosystems that represent the nation's biodiversity. In the mid-1990s and in response to becoming a signatory to the Convention on Biological Diversity, China developed a Biodiversity Action Plan that recognized the inadequacy of the protected area system at that time (Ministry of Environmental Protection, 1994). Expanding on and updating the first plan, the government released a second national plan in 2010: *The National Biodiversity Conservation Strategy and Action Plan (2011-2030)*. The plan assesses the progress of China's environmental initiatives over the last two decades through the use of systematic planning that incorporates technical support from conservation organizations like The Nature Conservancy. The plan sets forth an ambitious agenda for future conservation, including (Ministry of Environmental Protection, 2011):

- Identifies 35 Priority Areas of Biodiversity Conservation;
- Requires that 90% of China's critical species and key ecosystems be protected by 2015; and
- Requires that China's biodiversity be "effectively protected" by 2030.

Each province in China is developing its own more detailed plan. Sichuan has already done so and aims to add at least five new protected areas and has committed 930 million RMB toward their management (Watts, 2010). Qinghai is in the process of developing a plan and others will likely follow.

Achieving the "effective protection" goal of the Biodiversity Action Plan has been, and will continue to be, a challenge given China's current land tenure regime and tradition of land tenure reforms (see Part 2, Land Tenure). Effective land protection requires lasting and enforced restrictions on activities that may negatively impact biodiversity. Yet perpetual protection in China is complex because tenure security and enforcement are highly variable, and use rights have limited durations of 30-70 years. Over the last 60 years, tenure security and enforcement have improved, but still vary widely throughout the country. Use rights have been trending toward longer durations and greater enforceability, but there is still limited certainty of stability for the tenure of any one piece of land over time. Even protected areas are vulnerable to withdrawals and illegal developments (see Chapter 11, Protected Area Reference Guide). Even within the core areas of nature reserves, which are the most restrictive zones within the most stringent protected areas in China, it is not uncommon to find buildings, resource extraction, or unauthorized tourism. To be effective, future land protection efforts must address these challenges.

There are, in fact, a variety of ways to achieve more effective protection of biodiversity in China. In April 2011, The Nature Conservancy (TNC) held a land protection conference in China, during which participants characterized the conservation opportunities in China as follows:

- Strengthen the management of existing protected areas
- Designate new protected areas, including National Parks
- Support new private tools outside of protected areas

The first opportunity—strengthening the management of protected areas – is well-documented in the literature. The second strategy is currently being tested by provincial governments in Yunnan and Heilongjiang. The third strategy is the least explored and applied on the ground to date. To be successful, all of these opportunities will require public-private partnerships and careful consideration of stakeholder needs.

This chapter explores all of these possibilities with the hope of sparking additional land protection efforts by the Chinese government, NGOs, and/or private developers. Subsequent chapters provide a protected area reference guide and case studies, which offer real-world examples of these tools. The discussion involves broad concepts and ideas, seeking to open the door to conversations rather than to explain in detail how all of the tools might be applied in China.

Figure 3–1. China has an extensive protected area network, including Sichuan Province's Wanglang Nature Reserve. Wanglang is one of China's most famous nature reserves and protects giant pandas. Photo by Jiang Shiwei

A. Strengthen the Management of Existing Protected Areas

China's protected area network covers a wide range of biological values, including terrestrial ecological resources, geological areas, freshwater, oceans, and others (Figures 3–1 and 3–2).[127] The most common types of terrestrial protected areas include nature reserves, forest parks, and scenic areas, which total more than 5,000 units and cover approximately 19% of the country (Table 3–1). Nature reserves are the most common in terms of number (2,541) and area (148 million hectares or 15% of the country). The area covered by nature reserves alone exceeds the global average of 12.2% of land area covered by protected areas (Figure 3–3) (UNEP WCMC, 2008).[128] There are nearly as many forest parks as nature reserves, but nature reserves cover far more area (Table 3–1). National parks were new to China as of 2006. Section II, Opportunities, describes national parks in more detail. There are also two types of international designations designed to protect terrestrial ecological resources: Biosphere Reserves and World Heritage sites. These designations typically overlay other designations in whole or in part. There are 28

[127] A protected area is defined as, "a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (IUCN, 2008).

[128] Based on an assessment of 236 countries.

biosphere reserves covering nearly 8 million hectares, and 12 World Heritage Sites designated wholly or partially for natural values (plus 29 additional sites designated for cultural values. These designations frequently overlap with domestic designations, and are thus not counted in the total (see Chapter II, Protected Area Reference Guide).

Figure 3–2. Types of protected areas in China, grouped by primary resource protection goal.[129] Adapted from (Wikipedia)

Terrestrial ecological resources

- Biosphere Reserves*
- Forest Parks
- Nature Reserves
- National Parks (new)
- Scenic Areas (literal translation is "National Parks")
- World Heritage Sites*

Geological areas

- Typical Earthquake Sites
- Geoparks
- Mineparks

Freshwater

- State-Protected Wetlands
- Urban Wetland Parks
- Wetland Parks
- Aquatic Germplasm Resources Conservation Areas
- Water Parks
- RAMSAR Wetlands*
- Special Marine Protected Areas

Other

- Domestic Animal Genetic Resources Conservation Area
- Grass Germplasm Resources Conservation Areas
- In-situ Conservation Areas for Major State-Protected Agricultural Wild Plants
- Thematic Gardens
- State Key Parks
- Soil Erosion Prevention and Control Areas
- Wild Medicinal Material Resources Conservation Areas

* International Designations

[129] Note that protected area designations can and often do overlap in whole or in part. The overlap is especially true for international designations. Rarely, if ever, does an international designation standalone without overlying a "Chinese-defined" protected area. For example, the Three Parallel Rivers of Yunnan Protected Areas World Heritage Site encompasses Pudacuo National Park and surrounding areas, and all 28 Biosphere Reserves cover nature reserves. Over time, the government has learned that such overlap creates management complexity. Therefore, overlap is less common now than in the past.

Table 3–1. Area and number of protected areas for terrestrial ecological resources
The protected areas are listed in descending order of number by designation type

Type	Number	Thousands of hectares	Percent of land in China*	Source
Nature Reserves	2,541	147,735	15.5%	(Ministry of Environmental Protection, 2009)
Forest Parks	2,458	16,525	1.7%	(Zhang & Long, 2010)
Scenic Areas	906	18,240	1.9%	(Xinhua News Agency, 2009)
National Parks	2	80	0.01%	(MacLeod, 2008) (Wang, 2010)
Total	**5,907**	**182,580**	**19.11%**	

* Assuming a total land area of 956 million hectares

There are a number of ways to distinguish amongst the different types of protected areas (Table 3–2). For one, they vary by managing agency; for example, SFA manages most nature reserves while the Ministry of Housing and Urban-Rural Development (MOHURD) manages scenic areas. In terms of ease of establishment, which is a fundamental consideration for land protection, it may be easier to create forest parks than the other protected areas because SFA has the independent ability to designate them. Interestingly, perceived popularity of these areas among Chinese vs. foreign tourists also differs. Whereas scenic areas seem to attract the most domestic tourists, it is expected that foreigners may be more attracted to nature reserves and national parks based on name recognition. Such perceptions are important for the revenue-generating potential of an area. Finally, potential for biodiversity protection differs between areas. Ambiguous guidance and illegal development notwithstanding, it is clear that the core areas of nature reserves are designed to provide the most stringent protection to natural resources, followed by the buffer zones of nature reserves. Outside of these areas, the experimental and outer protection zones of nature reserves and all other terrestrial protected area designations are more or less comparable in terms of protection (or lack thereof). This observation is reflected in IUCN ratings that Chinese experts have given to nature reserves, forest parks, and scenic areas (Table 3–3). (The Nature Conservancy, 2007) (The Nature Conservancy, 2008)

Figure 3–3. Location of nature reserves and the 51 model nature reserves (The Nature Conservancy, 2007) (The Nature Conservancy, 2008)

1. Gaoligongshan (Yunnan)
2. Chongmingdongtan
3. Yangzte
4. Songshan
5. Wulingshan
6. Dongzhai niaolei
7. Neixiangbaotianman
8. Shennongjia
9. Dafengmilu (Jiangsu)
10. Shuangtaihekou
11. Huanghesanjiaozhou
12. Pangquangou
13. Foping
14. Changqing
15. Baxianshan
16. Tianmushan
17. Wuyishan
18. Neilingding-futian
19. Zhanjianghongshulin
20. Jinggangshan
21. Fenglin
22. Liangshui
23. Huzhong
24. Sanjiang
25. Zhalong
26. Changbaishan
27. Dalaihu
28. Helanshanshuiyuanhanyanglin (Neimeng)
29. Zhumulangmafeng
30. Bayinbuluketiane
31. Hanasi
32. Jinyunshan
33. Maoershan
34. Fanjingshan (Guizhou)
35. Maolan
36. Dongzhaiganghongshulin
37. Bawangling
38. Shimenhupingshan
39. Dongdongtinghu (Hunan)
40. Poyanghuhouniao
41. Baimaxueshan
42. Xishuangbanna
43. Gansulianhuashan
44. Baishuijiang
45. Hanma
46. Helanshan (Ningxia)
47. Kekexili
48. Qinghaihuniaodao
49. Wanglang
50. Wolong
51. Tangjiahe

Table 3–2. Qualitative comparison of types of terrestrial protected areas (Guangzhi, 2010)

			Qualitative rankings (very high, high, medium, low)			
Type	**Primary focus[130]**	**Managing agency**	**Ease of establish-ment**	**Potential for biodiversity protection[131]**	**Popularity with Chinese tourists**	**Likely appeal to foreign tourists (based on name)**
Nature Reserves	Protect ecological values	Usually State Forestry Administration or Ministry of Environmen-tal Protection	Low	Very high	Low	High
Forest Parks	Protect forests	State Forestry Administration	High[132]	Medium	Medium	Low
Scenic Areas	Tourism and protection of beautiful places and ecological values	Ministry of Construction	Low	Low	Very high	Medium
National Parks	Protect ecological values	To be determined	To be determined	High[133]	High	Very high
Biosphere Reserves	Protect ecological values	?	Medium	Very High	Low	Very high
World Heritage Sites	Protect natural values	Ministry of Construction	Medium	Medium	Very high	Very high

[130] While there are some practical variations in the purpose of the different protected areas, is hard to distinguish them based on the Chinese characters in the available guidance.

[131] If managed according to law.

[132] Forest Parks may be somewhat easier to establish than nature reserves and scenic areas because SFA is the sole agency with the authority to establish them. Biosphere reserves and World Heritage sites, the international designations, may also be relatively easy to create because they typically overlap existing designations and do not necessarily require changes of use within them; however, only protected areas with high resource quality may qualify.

[133] At present, there is no national guidance for the creation and management of national parks – only provincial-level (Yunnan). That being said, according to the standard for national parks developed by the Yunnan Forestry Bureau, in theory national parks should have the same status as national parks in the U.S. and be classified as IUCN category II (i.e., high, on this chart). They are expected to offer somewhat more development and therefore somewhat less protection than nature reserves, but less development and more protection than scenic areas.

Table 3–3. IUCN Categories for forest parks, nature reserves, and scenic areas, adapted from (Rao, 2004) (Jiang, 2004) (Guangzhi, 2010)

Type of Protected Area	IUCN Category
Forest parks	**II, V, VI**[134]
Scenic areas	**II, III, V**[135]
National parks	**II**
Nature reserves	**varies by type and management zone**
Nature reserves by type	
• Natural ecosystems	I, II, V, or VI
• Species	IV
• Natural relics	III
Nature reserves by management zone	
• Core	Ia
• Buffer	Ia or Ib
• Experimental	II or VI
• Outer protection	V

IUCN categories include: 1a—Strict Nature Reserve; 1b—Wilderness Area; II—National Park; III—Natural Monument or Feature; IV—Habitat/Species Management Area; V—Protected Landscape/Seascape; VI—Protected Area with Sustainable Use of Natural Resources (IUCN, 2008).

[134] Rao (2004) identified forest parks as II or VI. Jiang (2004) identified them as III.

[135] Rao (2004) identified scenic areas as V. Jiang (2004) identified them as II, III, or V.

Figure 3–4. Operational funds in protected areas are often limited, which challenges the ability to prevent poaching. Photo by Xu Jian

Effective management of protected areas has been a challenge since their inception. "The Chinese government has often been more concerned with the numbers and total area of reserves rather than their effectiveness," write Xu & Melick (2007). From 1956-1978, under Chairman Mao's direction, the Central Government designated protected areas according to a national protected area plan, focusing on quantity over quality and providing limited resources for protected area management. Central authorities appointed key staff, and rarely did local governments or local communities actively participate in designation and administration. As a result, there was little local buy-in for these early protected areas, and local governments were reluctant to help manage them. Furthermore, the Central Government was "unwilling and unable" to finance the new protected areas (Jim & Xu, 2004).

Starting in 1978, the Central Government made fundamental changes to protected area creation and management as part of its broader economic reforms. Chairman Deng recognized the revenue-generating potential of protected areas, and pressure was growing internationally and domestically for nature conservation. In response, the government identified quantitative goals for protected area designation which local governments were responsible for meeting.

Figure 3–5. Conflicting needs for land use in protected areas can result in construction, such as in the Upper Yangtze Fish Nature Reserve below. Photo by Yang Yong

Unfortunately, although local buy-in was greater for these new protected areas, many were still ineffective in protecting resources. They were designated with limited or no guidance; many were established without a scientific basis, there were significant funding limitations, and unresolved tenure issues abounded (Jim & Xu, 2004).

By the late 1990s, the Central Government reported that at least one-third of protected areas suffered from "the three withouts": recurrent funding, a management agency, and staff (State Council, 1998). These problems remain today. Other major challenges and associated opportunites are described below (Coggins, 2000) (Ervin, 2003) (Jim & Xu, 2004) (Liu, et al., 2003) (MacKinnon & Xie, 2008) (Protected Areas Task Force, 2004) (Xu & Melick, 2007):

Increase funding and staffing—Funding for protected areas has increased over time, but remains inadequate, particularly for operational costs. Protected areas can receive significant funding for their creation, but there is limited funding for ongoing maintenance and basic operations, including patrolling (Figure 3–4). As recently as the year 2000, the funding for China's nature reserves was approximately 13% of the global average for developed and developing countries combined, and less than the average for developing countries (see Part 2, Land Tenure). Most funds are spent on national-level, high-profile sites while the majority of sites receive next to no funding. Some of the most important protected areas for biodiversity lie in the most cash-strapped provinces and counties, which are responsible for funding operations and maintenance. Where funds do exist, the bulk is typically expended on infrastructure development rather than conservation activities such as monitoring and patrolling. Because operational budgets are often inadequate and staffing is limited, it is not uncommon for profit-making enterprises to be established in nature reserves, legally or illegally.

Figure 3–6. Logged and grazed area inside Dafengding Nature Reserve, Sichuan. Photo by Steve Blake

Resolve tenure issues—Boundaries for nature reserves are rarely marked on the ground, and are often ignored in practice. As a result, protected areas may not provide any better protection than the areas outside of their boundaries. In some cases, protected areas are established without regard to household use rights or traditional uses, and resettlement is not uncommon. There are even instances when forest bureaus have identified potential nature reserves without actually going to the field to learn about tenure. Furthermore, conflicting needs for land uses may take precedence over nature reserve protection (Figures 3–5 and 3–6). For example, a policy requiring the construction of a road to every administrative village has trumped protected area tenure restrictions in many places. In many instances, intermixed collective and state lands can also challenge reserve management. For example, in Meihuashan Nature Reserve in Fujian Province, the government controls less than 25% of the area within the reserve boundary, while collective land managers control the remainder.

Improve community support—Local people living around and, sometimes, in protected areas depend on the resources within them, such as fuelwood, timber for construction, fish, or grazing lands. Therefore, protected areas can effectively conserve nature only with the support of local people. However, rarely are these key stakeholders involved in the identification, planning, or

management of protected areas. Lack of community buy-in can prompt local people to abandon sustainable uses and accelerate natural resource extraction once an area is established as protected, as they fear that their access will be prohibited altogether. Conflicts of interest between the local government, local communities, and the managing agency are not uncommon.

To resolve these challenges, over the last 20 years, the government has started to emphasize the quality of protected areas—not just quantity—through the passage of legislation. For example, the government has drafted (but not adopted) several laws to create a comprehensive "protected area law" that would apply to all types of protected areas (Figure 3–7). Additionally, starting in 1991, the Central Government issued policies to enhance the consistency of nature reserve designation and management.[136]

Figure 3–7. Sample provisions of the Protected Areas Act (Draft 2006) designed to improve the management of protected areas

- Included the conservation of biodiversity in the stated purpose: "to strengthen the establishment and management of Protected Areas, conserve natural resources, ecosystems and biological diversity; maintain ecological security; promote harmony between man and nature; and guarantee sustainable economic and social development of China" (Article I).
- Stated that scenic areas and nature reserves are not allowed to overlap, and that planning should be coordinated to address any overlap issues [for already-established protected areas] (Article XI).
- Encouraged the involvement of the public—including "domestic and foreign" persons—in the management of protected areas (Article XII).
- Recommended that protected area managers sign agreements with local people regarding any restrictions of use, and that "reasonable compensation" be provided to any residents who must move out of protected areas (Article XV).
- Allowed nature reserve authorities to accept donations from foreign organizations and individuals for the establishment and management of protected areas.(Article XIV).

[136] Examples include: The Application, Assessment, and Ratification Method for Protected Areas Seeking a National Rank; National Principles for Categories and Grades for Protected Areas; and Protected Areas Regional Demarcation Scheme. Note that although the direct translation for all of these titles is "protected areas," Guangzhi (2010) belives that all of the policies pertain to nature reserves specifically.

Figure 3–8. The Chongming Dongtan Nature Reserve near Shanghai is one of the 51 model reserves. Photo by nature reserve staff

Efforts are also being made to strengthen protected area management on the ground. In addition to the government's issuing of the Biodiversity Action Plan, which is designed in part to strengthen nature reserve management, the State Forestry Administration and TNC created 51 model nature reserves across the country (Figures 3–3 and 3–8) (The Nature Conservancy, 2010). This effort was an outgrowth from a partnership between the Beijing Garden & Forestry Bureau and TNC. In 2007, these organizations began discussing opportunities for "global-standard interpretation" in Chinese nature reserves, starting with **Songshan Nature Reserve** outside of Beijing (see Chapter III, Case Studies). SFA or other agencies could consider expanding the network of model nature reserves, potentially with the continued involvement of TNC and/or other NGOs. The government might also consider private management of protected areas, recognizing that any private party would need to have a vested interest in maintaining the values for which the protected area was established.

B. Designate National Parks and Other New Protected Areas

In addition to strengthening the management of existing protected areas, the government may designate additional protected areas to reach its goals under the *National Biodiversity Conservation Strategy and Action Plan (2011-2030)* (Ministry of Environmental Protection, 2011). Ideally, such designation would be based on a nationwide and systematic analysis to identify the right places for new protected areas (Niu, 2011). Theoretically, designations may include traditional forms of protected areas such as nature reserves, and could include new types of protected areas such as National Parks.

The National Park concept is relatively new to China. There are two national parks in China at present—**Pudacuo National Park** established in 2006 by the Yunnan Forestry Administration , with the assistance of TNC (Figure 3–9; see Chapter III, Case Studies), and **Tangwanghe National Park** in Heilongjiang Province, which was jointly proclaimed by the Ministry of Environmental Protection and the National Tourism Administration in 2008. These efforts are the same in name only—they were completed by different agencies in different locales and under different guidance. With more than 5,000 nature reserves, forest parks, and scenic areas in place throughout China, not to mention the myriad of other types of protected areas, one might wonder why the government created a new model with national parks. Why not just change the rules governing the existing models in order to solve problems?

National parks provide an opportunity to generate much more income than nature reserves, while protecting biodiversity more effectively than scenic areas. Scenic areas and nature reserves/forest parks are perceived to lie at opposite ends of the conservation and income generation spectrum, and no other traditional Chinese protected area models lie in between. Scenic areas tend to be tourist magnets, especially among Chinese natives. They generate significant revenue and are therefore generally supported by governments and local people. But they typically provide only limited conservation benefits because they emphasize tourism development—not biodiversity protection. At the other extreme, nature reserves can provide much greater protection to biodiversity since no human use is allowed, at least not in core areas, but they can drain local government budgets. With the exception of popular reserves such as those protecting pandas, nature reserves tend to generate little if any income; this is generally true for forest parks as well. As a result, they are often rife with illegal activity and lack the funding and motivation to stop it.

National parks can provide a "middle ground." They can protect biodiversity and generate substantial income, in part because they offer a fresh new name to attract investment and tourists (Figure 3–10). In recognition of this opportunity, TNC promoted the national park concept to the Yunnan Provincial Government in the late 1990s. In 2006, Pudacuo National

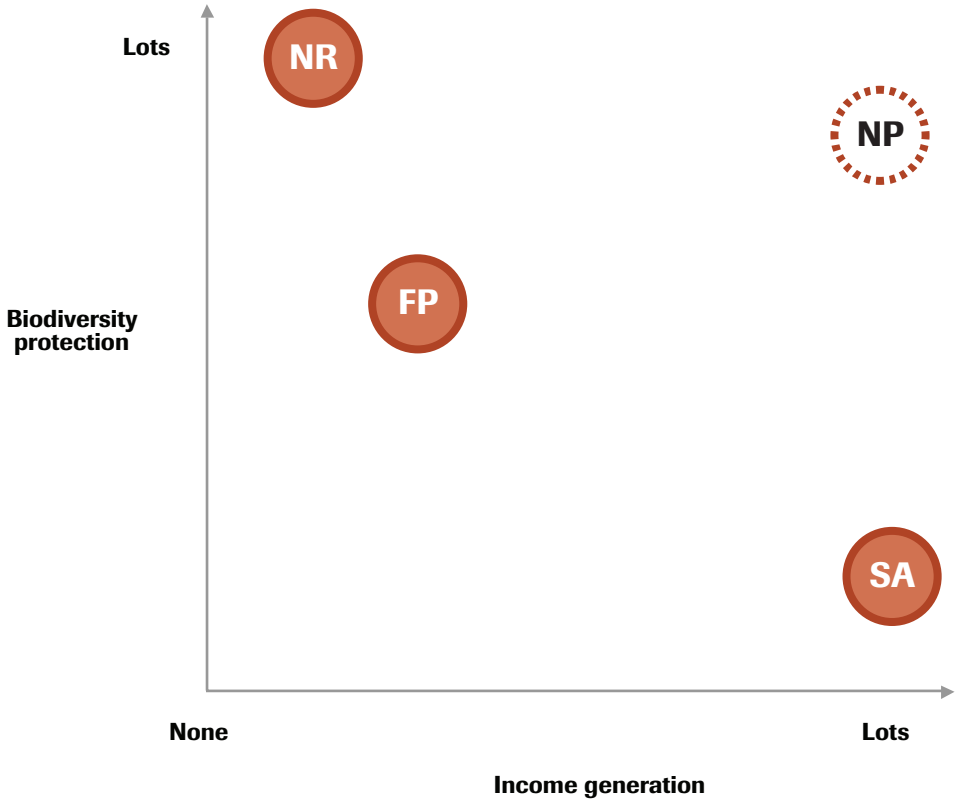
Park opened its doors to the public as China's first national park,[137] generating much revenue in the process—117 million RMB in 2009 alone (up from 6 million RMB in 2005) (chapter III, Case Studies).

Under direction from the Central Government, in 2008 Yunnan was designated as the pilot province for national parks (State Forestry Administration, 2008). Yunnan plans to create 11 more national parks by 2020, the next 4 of which are Meili Snow Mountain, Lijiang Laojun Mountain, Xishuangbanna, and Pu'er (State Forestry Administration, 2008). However, national parks will not truly be "national" until the Central Government fully embraces them. While the Ministry of Environmental Protection and the State Forestry Administration have approved the parks in Heilongjiang and Yunnan, the Central Government as a whole must create guidance and a management structure to support the creation of parks across the country.

Figure 3–9. Pudacuo National Park aims to protect resources while generating revenue through tourism. Photo by Zhu Li

[137] In 2008, the Ministry of Environmental Protection and the National Tourism Administration announced the creation of Heilongjiang Tangwanghe National Park as China's first (People's Daily Online, 2008). However, in terms of timing, Pudacuo would be the first national park since it was created in 2006.

Figure 3–10. How local governments and conservation practitioners likely view the values of an average Nature Reserve (NR), Forest Park (FP), Scenic Area (SA), and National Park (NP) in terms of biodiversity protection and income generation



C. Support New Private Tools Outside of Protected Areas

To date, land protection efforts in China have almost exclusively been led and managed by the government. However, the increasing transfer of use rights from the government and collective land managers to individuals presents new opportunities for conservation by private parties such as NGOs and developers, who can acquire use rights for extended periods of time in order to protect natural values. Models for such efforts include private reserves, conservation developments and certification projects. All of these tools may involve the acquisition of use rights through conservation leases or easements.

There is immense opportunity for increased use of these tools in China. Environmental NGOs were new to the country less than 20 years ago, with the establishment of Friends of Nature in 1994. Today, more than 3,500 environmental NGOs tackle issues from pollution control to environmental education to public involvement (People´s Daily Online, 2008) (Wu, 2002), but few have direct involvement in land protection. Some of the larger organizations such as The Nature Conservancy, World Wildlife Fund, and Shan Shui Conservation Center have the greatest involvement, but due to limited budgets and staff, as well as political constraints, they

are mainly conducting small-scale demonstration projects in cooperation with local or central government. Only if tools or models consistently generate positive results, will it be possible to secure stronger and more widespread government support for land protection efforts and policy changes that may be applied at larger scales and have greater conservation impacts. Thus, although the use of private tools, where applied, has been promising in conserving biodiversity, such efforts are still relatively few and far between as this section illustrates.

There are some key similarities and differences between the tools described herein. Private reserves and conservation developments are similar in that they include a small amount of development while protecting the majority of a parcel for its conservation values. The main difference between them is the source of income: Private reserves rely primarily on private financing and donations, while conservation developments include a significant commercial revenue generation component. Certification projects, by contrast, typically secure income from the sustainable management and harvest of natural resources, such as forests, over most or all of a parcel, under recognized standards such as those from the Forest Stewardship Council. For any of these tools, private acquisition of use rights could take one of two forms – long-term conservation leases or conservation easements, though only the former has been applied in China at present.

It should be noted that there are risks to the use of any private conservation tool in China. Politically, the tools may be perceived as a way to help rich people to grab lands in the name of conservation. Technically, there is no good legal or policy basis for regulating and monitoring the impact of private development activities, so conservation achievement all depends on the goodwill of the developers and conservation organizations (Niu, 2011).

i. Private Reserves

For the purpose of this book, we define private reserves loosely as areas that non-governmental entities establish to protect ecological values, and that rely largely on private—not governmental—financing and donations. The governmental may or may not recognize these areas formally as protected areas. Unlike some other countries around the world, such as many Latin American countries, China does not have a private reserve law (Environmental Law Institute, 2003). Nonetheless, while private reserves are believed to be few and far between in China, there are examples of established and newly forming projects.

As one example, an individual by the name of Huang Nubo has acquired the use rights to millions of hectares surrounding a mountain called **Mustagh Ata** (meaning "father of all icepeaks") in the Xinjiang Autonomous Region in rural northwestern China. Huang, a philanthropist and an impassioned mountaineer, was concerned about the vast amounts of litter he observed on Mustagh Ata, which is the second highest of the mountains that form the northern edge of the Tibetan Plateau. Huang saw an opportunity to clean up the mountain while aiding the local nomads and farmers, who were competing with each other for the scarce resources of the arid environment. He worked with the local people to establish a tourist guide service that prohibited vehicles in the area, required that tourists use camels and be guided by the local people, and stipulated that all human waste be packed off of the mountain. By charging a rate of 100 RMB per camel trip, a guide working for three months can feed his or her family

for the year. And by tying the locals' incomes to the tourist attraction, the locals have had an interest in cleaning up and maintaining Mustagh Ata. Huang profits little, if any, from this venture—his conservation vision and passion fueled the project (Huang, 2011).

A very different scenario prompted the creation of the **Yu Jia Shan Nature Reserve** by Liu Yong. Unlike the Mustagh Ata project, which has no protected area status, Yu Jia Shan is now an official protected area recognized by the Chinese government. Yu Jia Shan covers 1,000 hectares in the heart of panda country in Pingwu County, Sichuan Province, near the world-famous Wanglong and Wolong Nature Reserves. Yu Jia Shan's claim to fame is that it is China's first, and perhaps only, private nature reserve in the country (see Chapter III, Case Studies). Creation of a nature reserve was not, in fact, the original intent of Liu, the Nature Reserve Manager. Liu originally purchased the use rights of the area for timber harvest in 1997, and in 1998 the Central Government issued the timber ban. Unable to generate meaningful income on the site through natural resource extraction Liu created a nature reserve, with local government approval, essentially as a last resort. The reserve is "private" in that it receives no regular funding from the government. Liu is operating and financing the reserve himself, and all staff are hired and funded by him—none are government employees (Liu, 2010).

Figure 3–11. Site of the Motianling Land Trust Reserve project. Photo by Steve Blake

Also located in Pingwu County, a third example of a private reserve is the **Motianling Land Trust Reserve Project**, led by TNC (Figures 3–11 and 3–12). This project is under development and will combine private management and government supervision. The Conservancy will acquire 50-year forest use rights to approximately 20,000 hectares of forests from the Gaocun collective, the Laohegou State-owned forest farm, and separate state-owned forest land. These entities are willing to sell the use rights to TNC because the area is subject to China's timber ban, so it is not generating much, if any, income at present. Once TNC holds the use rights, it will establish a private reserve and build the infrastructure necessary to support a limited number of visitors every year. To fund the project, TNC is pooling donations from private philanthropists and entrepreneurs to create a foundation funding source for long term leasing, forest restoration, and maintenance. The goal is to provide enough financial benefits to the local people that they will support the project's continuation beyond the initial contract term (Zhao, 2010).

Figure 3–11. Community meeting to discuss the Motianling Land Trust Reserve project. Photo by Zhao Peng

ii. Conservation Developments

Also known as limited development projects, conservation developments may be defined as "projects that combine land development, land conservation, and revenue generation while providing functional protection for conservation resources" (Milder, 2007). Such projects typically develop the lower-value areas of a project site in order to finance the protection and ensure the long term viability of the most ecologically vibrant areas of a site.

The main advantage of conservation developments over private reserves is that they have greater potential to be financially self-sustaining. Of the tools available to create a robust system of land protection in China, conservation development stands out in its ability to simultaneously generate revenue and to protect sensitive ecosystems. Well-suited for areas that would otherwise be beyond the financial reach of land trusts or conservation groups, conservation developments combine land protection, limited development, and revenue generation to form a comprehensive strategy to protect valuable natural land resources. In China, this combination is particularly attractive in light of growing and rampant speculation, acquisition, and development of pristine and ecologically sensitive landscapes. By allowing conservationists to compete financially with traditional, profit-driven developers for the control of land use rights while abiding by key conservation principles, conservation developments represent a powerful land protection tool for China. In the U.S., this tool has proven essential in undeveloped scenic regions with relative proximity to urban centers, where escalating land values attract well-financed real estate developers.(Milder 2007).

Conservation developments are thought to be relatively few and far between in China. One example of a project in-the-works is the **Great Wall Resort** (see Chapter III, Case Studies). On a parcel northwest of Beijing, partners Zhao Shan and Robert Devine intend to construct a luxury spa and eco-resort on less than 10% of their property while conserving the remainder for nature (Devine, 2010).

Another conservation development, already operational, is **Monkey Island** (see Chapter III, Case Studies). Through this project, developer Dai Guofu leased use rights and created a monkey park on 5.6 hectares of the Nanwan Monkey Island complex. It is the only tropical-type nature reserve for macaque monkeys in the world and covers 1,000 hectares in Hainan Province. Prior to Dai's involvement in 1995, the monkey population had dwindled to 100 monkeys and tourist visits to 30,000 per year. The fate of the monkeys—a state protected species—did not look promising and local residents were struggling to make ends meet. But thanks to the construction of the monkey park (and the sacrifices of some show monkeys), the monkey population has soared to 1,000, and the income of the local people has also been on the rise. The tourism attraction has been in operation for over a decade now, and is generating ever-increasing revenues—25 million RMB in 2009 alone. This highly profitable project provides an excellent example of how development on a small tract of land can fuel conservation over a much larger area, given the right market conditions and natural values.

iii. Certification Projects

Whereas private reserves and conservation developments protect the majority of a given project site for conservation purposes, certification projects focus instead on sustainable resource management across an entire project area, and may include "micro-sites" of protection. Co-benefits such as biodiversity enhancement or protection (or protection of carbon, soil, water or cultural resources) are rarely the primary focus of these efforts (Von der Heyde, 2011). Nonetheless, certification projects for timber harvest or other types of resource management present an opportunity for private involvement in biodiversity protection—even if that is not the primary intent – depending on the standards applied. Standards can protect land and water

by providing safeguards for sensitive natural values. For example, the Forest Stewardship Council requires the maintenance of "high conservation value forests," whereas China applies the concept of classified forest management, which is the spatial separation of production areas from protection/conservation areas (Forest Stewardship Council, 2002) (Mann, 2011).

Forest certification for timber harvest began in China in the early 2000s. The first forest management certificate was granted by SmartWood, a certification body accredited by the Forest Stewardship Council, to the **Changhua Forest Farm** in Zhejiang Province (Hinrichs, 2009). Today, there are upwards of 58 forest certification projects (Forest Stewardship Council, 2011). Establishing certified forests has been "relatively slow and difficult" in China, in part due to weak domestic demand for certified forest products[138] and unfavorable cost-benefit ratios (Yuan & Eastin, 2007) (Li, 2008). Currently three certification standards are utilized in China: Forest Stewardship Council (FSC), Programme for the Endorsement of Forest Certification (PEFC) and the China Forest Certification Council (CFCC). The first two are NGOs while the CFCC is a national organization. CFCC is the officially endorsed national standard, while other standards face legal barriers (Mann, 2011). Regardless, 18 forest management units were operating under CFCC principles as of 2008 (Yu, 2008), and 40 management units covering 2.6 million hectares were FSC-certified as of 2011 (Forest Stewardship Council, 2011). Of note, non-compliance with standards is punished in China. For example, in 2009, FSC suspended the label of a large State Forest Enterprise in Jilin and considers doing so for a large private forest estate in Fujian (Yang Lin, near Yong'an) (Von der Heyde, 2011).

Certified forest carbon offset projects are also relatively recent additions to China's conservation toolkit. In 2004, China initiated forest carbon sequestration pilot projects in 6 provinces. One of these pilots—in Guangxi—became the world's first forestry carbon sequestration project (Gao).[139] Also in 2004, TNC and Conservation International initiated a forest carbon offset project in Yunnan, called the **Tengchong County Carbon Offsets Project** (see Chapter III, Case Studies). Unlike most (or potentially all other) certification projects in China to date, this project includes biodiversity enhancement and conservation as primary objective. The TengchongCounty project is certified as the world's first "gold-level" project of the Climate, Community, and Biodiversity Alliance. Among other provisions, the gold level requires a "net positive impacts on biodiversity" as well as livelihood (Climate, Community, & Biodiversity Alliance, 2008).

iv. Conservation Leases and Easements

Any private parties involved with the projects described above have used leases to acquire use rights for specified periods of time. For the purpose of this book, the term "conservation lease" refers to the transfer of use rights from one party to another for a specified period of time, through contracts or use rights certificates, for conservation purposes (see Part 2, Land Tenure). The lease model is very well-suited to the current land tenure system in China, since leases can be written to coincide with the terms of 30-70+ year use rights contracts. Conservation

[138] International markets are much more likely than domestic (i.e., Chinese) markets to pay premiums for certified timber.

[139] Another source suggests that forest carbon projects in California may be older (Von der Heyde, 2011).

easements are similar to leases, except they are permanent and irrevocable (Figure 3–13). Thus leases provide more flexibility, while easements provide a greater guarantee of land protection over the long run. Leases are already being utilized in China, and easements may be ripe for application in the future.

Both leases and easements protect particular characteristics of a parcel of land, be they scenic, biological, historical, recreational, or some combination thereof. If property rights are conceived of as a "bundle of sticks," leases and easements would remove some of the sticks from the bundle of rights held by a landowner or holder of use rights, and would transfer them to a lessee or easement holder. For example, on a property containing both forests and grasslands, a lease or easement could cover the rights to use the forest but not the grassland, and could prohibit commercial development anywhere on the property while still allowing livestock grazing. In essence, long-term leases and conservation easements constitute a "non-use" right, as opposed to a use right such as the right to harvest timber or engage in energy development.

There are strengths and limitations to each tool. A strength of both is their flexibility in allowing conservationists to respond to the needs of individual landowners (or holders of use rights), and conservation opportunities on a case-by-case basis. Leases have the advantage (and, some may say, disadvantage) of providing greater flexibility for management once the lease expires, if not before. To secure permanent protection, however, leases must include provisions that allow for perpetual renewals. Ideally, the lease will include incentives for the grantor to renew, as well as protections for the grantee. Easements have the advantage (and, some may say, disadvantage) of providing permanent protection for biodiversity values. Some critics are concerned with the repercussions of permanently "locking-in" current conservation ideals and needs through a legal instrument that could be very costly to amend (Bray, 2010). For instance, conservation easements could limit the ability to use a parcel for conservation purposes such as carbon sequestration through afforestation, if not addressed in the easement.

Figure 3–13. Definition of a conservation easement according to the Uniform Conservation Easement Act of the U.S. (Uniform Conservation Easement Act §1, 12 U.L.A. p. 174, 2008).

> …a nonpossessory interest of a holder in real property imposing limitations of affirmative obligations the purposes of which include retaining or protecting natural, scenic, or open-space values of real property, assuring its availability for agricultural, forest, recreation, or open-space use, protecting natural resources, maintaining or enhancing air or water quality, or preserving the historical, architectural, archaeological, or cultural aspects of real property.

Easements would be a useful tool in China should the government ever adopt a true private property regime in which the land itself—not only the use rights—could be bought and sold. In that case, conservation easements would be a cost-effective alternative to the purchase of important conservation lands. In the meantime, it is still feasible that an easement could be created through some combination of incentivizes and penalties to which all key stakeholders

agree, and which future stakeholders would support from generation to generation. The easement grantors would almost certainly require some kind of significant monetary benefit in order to honor the terms of the easement. Ultimately, before easements can be an effective land protection tool in China, the government would need to enact policies and regulations to enable their application. Factors needed for the success of conservation easements include: a legal foundation, method of valuation, incentive system, clear tenure, clear conservation goals, and monitoring and enforcement (Bray, 2010) (Airey, 2010).

Figure 3–14. China's extensive network of nature reserves includes the Changbaishan Nature Reserve in Jilin Province. Photo by Shen Xiaohui

D. Ensure Project Success

There are a myriad of factors that will contribute to the success or failure of any given land protection project designed to conserve nature. Entities such as the IUCN/World Commission on Protected Areas (WPCA), the World Bank, and World Wildlife Fund (WWF) have identified such factors in their methodologies for assessing management effectiveness of protected areas and forests (Hockings et al., 2006) (World Wildlife Fund, 2007). The obvious need for more funding aside, there two key additional considerations that warrant explanation in the Chinese context—the importance of providing lasting benefits to all key stakeholders, and of creating opportunities for public-private partnerships.

i. Provide Lasting Benefits to Stakeholders

As discussed earlier, the greatest challenge to land protection in China is the variability of tenure security and enforcement. To be successful, any potential land protection project must proactively create its own tenure stability. One way to do so is to generate local support and buy-in by providing lasting and meaningful benefits to project stakeholders, particularly local governments and community members. If stakeholders have something to gain from a project—typically financial resources—they will ensure its longevity. The benefits must be greater than those offered by alternative uses of the land, and significant enough to transcend changes in elected officials, particularly local government and village leaders. Failure to meet stakeholder requirements leaves land protection projects vulnerable to failure. For example, just one individual in a position of power could decide that a project site would be better utilized for commercial activity, and the project could literally be run over by development.

The concept of incentivizing stakeholders to support conservation action is not new to China. Perhaps the most widespread use of this approach is the government's effort to restore and protect forests. As Part 1, Lay of the Land, and Part 2, Land Tenure, describe, the Natural Forest Protection Program (NFPP) seeks to protect and enlarge China's forests through logging bans and financial compensation for forest management and reforestation; similarly, Grain for Green provides grain and financial subsidies for reforesting meadows, steep slopes, and barren lands.

This approach is also commonly used at local scales for individual projects, by NGOs or other parties. One of the case studies in particular, Monkey Island Conservation Development, exemplifies how stakeholder buy-in is enabling the persistence of the project. The project is generating revenue through ecotourism; providing employment and financial benefits to local government, local communities, and the adjacent nature reserve; and as a result, it is effectively protecting a thousand rare Hainan rhesus monkeys and their habitat. Similarly, the Tengchong County Carbon Offsets Project is compensating local villagers for the use of their lands for carbon sequestration purposes, thereby enabling successful reforestation and land protection. The sale of carbon offsets is helping to finance the project (see Chapter III, Case Studies).

ii. Create Public-Private Partnerships

The Monkey Island and Tengchong County case studies also illustrate the benefits of public-private partnerships, another important element of project success. In China, as in many countries, projects involving joint partnerships may have greater likelihood of success than projects involving solely government entities or solely private parties. Government protection efforts in China, such as protected areas, have been hampered because they have not always fully accounted for stakeholder needs. For example, the government has not always respected customary uses such as fishing when creating protected areas (Herrold-Menzies, 2010), and compensation schemes for forest protection are often too low to deter timber harvest (Sheng, 2010). Government-only efforts are also highly vulnerable to changes in political or economic priorities. Finally, incentives in the Chinese government system are such that money allocated to protected areas or other conservation projects are likely to be diverted to other non-conservation uses.

At the same time, projects involving only private parties, such as NGOs or private developers, are not likely to succeed in China. "Purely" private protection efforts are unrealistic; it is difficult, if not impossible, to establish projects in China without the support and involvement of government. The government is involved in all aspects of land tenure in China, and it would be practically impossible to conduct a land protection project without the involvement of the county, at a minimum. Furthermore, government buy-in is a must because of the relatively large amount of land required for most land protection projects.

Given these considerations, projects involving partnerships between the government and private entities may have more success protecting biodiversity values than projects run by one of those entities alone. Partnership projects can leverage the legal support and land management expertise of the government, while capitalizing on the resources, flexibility, and commitment of private parties. Together, these elements are likely to result in creative land protection solutions that address stakeholder needs. For this reason, all of the case studies in this book provide examples of public-private partnerships (see Chapter III, Case Studies).

II. Protected Area Reference Guide

This chapter expands on Chapter I, Tools and Strategies, to provide more details about protected areas for terrestrial ecological resources, including nature reserves, forest parks, scenic areas, and international designations. Of the many types of protected areas in China, these types are most relevant to land-based biodiversity conservation. This chapter can serve as a reference guide for those interested in learning about these specific types of protected areas, and may inform decisions about which type of new protected areas to create, and where. The chapter does not address national parks, which are discussed in Chapter I, and have not yet been adopted by the Central Government. Nor does it address areas that can effectively protect biodiversity but are not commonly recognized as protected areas, such as public benefit forests and Ecological Function Conservation Areas (Part 2, Land Tenure). Such areas are the product of nation-wide planning and zoning efforts and may be more subject to wide-scale change than the protected areas covered in this chapter.

A. Commonalities Across Nature Reserves, Forest Parks, and Scenic Areas

i. Process for Establishment

Nature reserves, forest parks, and scenic areas can be created and managed by any level of the government—state, provincial, prefectural, or county. In general, the higher the level of government management, the more important are the resources within the protected area. For example, the Wolong National Nature Reserve was established as a county-level reserve in 1963 and was promoted to national-level in 1975 because it protected panda habitat. The guidance for each type of protected area specifies the requirements for national- versus local-level designation.

To establish a protected area (nature reserves, forest parks, and scenic areas), a sponsoring government agency must submit an application to its corresponding level of government. For example, county government approves proposed county-level protected areas; provincial government approves proposed provincial protected areas; and the State Council approves proposed national-level protected areas.

After a protected area is established, the managing agency will appoint a protected area manager, who then hires staff. Technically, one of the manager's first duties is to develop a master plan, since all protected areas are required to develop their own master plans to establish zoning (e.g., core, buffer, and experimental zones for nature reserves), plan infrastructure construction, and determine staffing (Guangzhi, 2010). However, in practice, plans are not always prepared due to funding shortages, staffing limitations, and other challenges. In recent decades, under the support of international organizations and bi-or multi-lateral governmental cooperative projects,

some protected areas and especially nature reserves have developed management plans, such as Baima Snow Mountain Nature Reserve. However, those management plans are generally "dust collectors" and are not being implemented due to resource constraints (Guangzhi, 2010).

ii. Withdrawal and Downgrading

Withdrawal or downgrading of protected area status can and does occur under existing guidance.[140] As an example of a withdrawal, the Longtan County-level Nature Reserve in Guangdong Province was eliminated because it lay within the boundary of a newly established city-level nature reserve, and the duplicate protected area status was not necessary. Local government may also withdraw a protected area's status if it wants to develop the area beyond what is allowable by law. In terms of downgrading, if a higher level protected area is not managed well, it may be downgraded to a lower level, e.g., from national scenic area to provincial. Under guidance, national-level nature reserves should be ranked as excellent, good, fair and poor, and those with poor ratings may be downgraded.[141]

The government may use the threat of downgrading to motivate local improvements in management. For example, in December 2007, MOHURD announced a list of scenic areas required to improve their management within specific timelines or face downgrading. Ten national scenic areas were on the list, such as Mengdong River in Hunan, Jinshitan in Liaoning, and Taoyuandong-Linyinshilin in Fujian.

iii. Triggers for Higher-level Government Involvement

Many changes to protected areas trigger review by higher levels of government above the managing level (e.g., the involvement of a province in a prefecture-level nature reserve). Examples include:

- Changing the level of a protected area—for example, moving "up" from county to provincial or moving "down" from national to provincial
- Changing the size of a protected area as a whole—for example, expanding a nature reserve
- Shrinking the size of a nature reserve's core zone and/or changing the uses within it—for example, building a road or a railroad

Such reviews have become the "norm" for protected area management. In fact, very few protected area changes would not involve higher-level government review; one example would be establishing a small-sized research building for better protected areas management (Guangzhi, 2010).

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[140] Nature Reserve Regulations Article 15, Forest Park Management Regulations Article 9

[141] Supervision and Inspection of National Nature Reserves (1996)

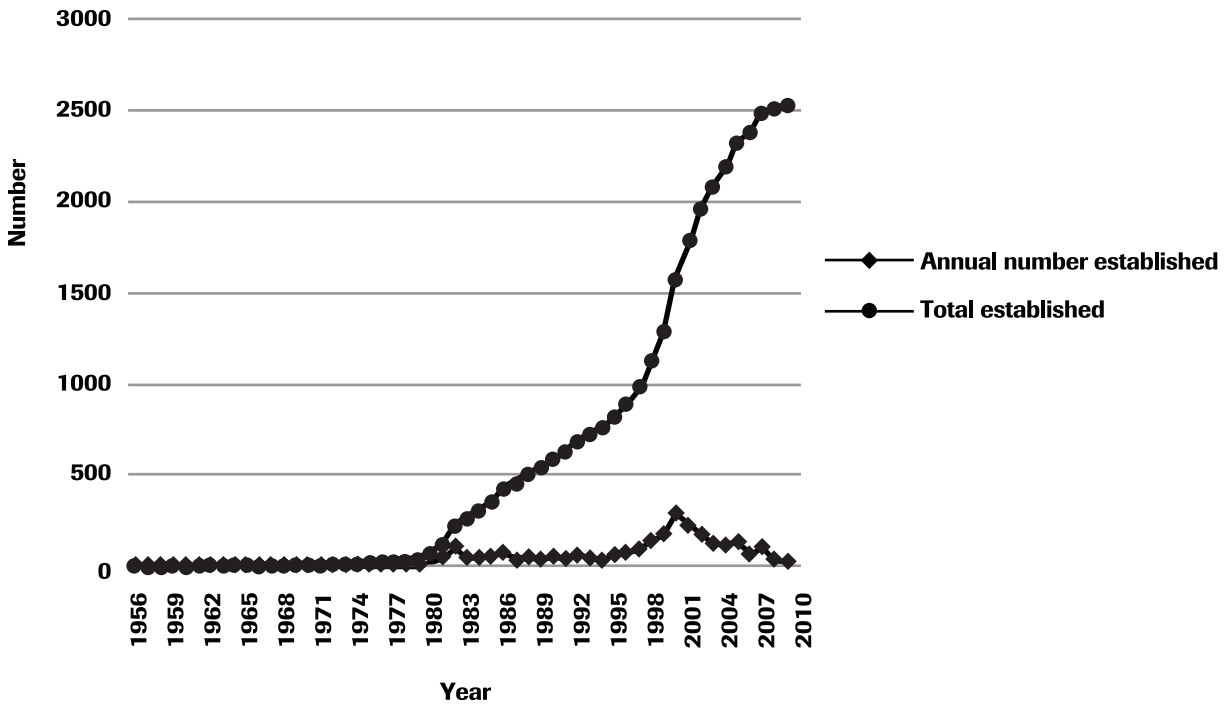
B. Nature Reserves

i. Purpose, Number, Extent

Nature reserves are the most common types of protected area and provide the most stringent protection to the values for which they were established, at least according to law. Unlike other types of protected areas, nature reserves include "core zones" where human entry is prohibited except for scientific purpose. In general, they are also less focused on tourism than are some of the other types of protected areas, particularly scenic areas (Figure 3–14).

At the recommendation of the Chinese Academy of Sciences, China established its first nature reserve in 1956 in Dinghushan, Guangdong Province, in order to protect the old-growth forest and associated wildlife for scientific research. Since that time, the number of nature reserves has increased exponentially (Figure 3–15). As of 2009, China had established 2,541 nature reserves across 148 million hectares or approximately 15.4% of the country.

Figure 3–15. Establishment of nature reserves at all levels, 1956-2009



ii. Guidance

- Regulations of the People's Republic of China on Nature Reserves (1994)
- Appraisal Standards for National Nature Reserves
- Local rules—some local governments create their own rules for nature reserves. Examples include Yunnan Provincial Nature Reserve Management Regulation (1997), Fujian Provincial forest Wildlife Reserve Management Ordinance (1995), and policies for individual nature reserves.

iii. Establishment

Nature reserves protect important ecological values and geologic features. Areas eligible for establishment as nature reserves must possess one or more of the following criteria:[142]

- Representative natural ecosystems—"Typical physiographic areas with representative natural ecosystems, and those similar areas where the natural ecosystems have been damaged to some extent, but can be restored through proper protection"
- Important areas for rare plants and animals—"Areas with a natural concentrated distribution of rare and endangered wild animal or plant species"
- Special protection values—"Those areas which are of special protection value, such as marine and coastal areas, islands, wetland, internal water bodies, forests, grassland, and deserts"
- Important landforms or geologic features—"Natural remains which are of scientific or cultural value, such as geological structures, famous karst caves, fossil distribution areas, glaciers, volcanoes, and hot springs"
- Other—"Other natural regions requiring special protection by the approval of the State Council or the people's governments of the provinces, autonomous regions, or municipalities directly under the central government"

The establishing agency classifies each nature reserve as one of nine specific types (Table 3–4). The types do not affect use restrictions or management. They could, however, influence funding if the government decides to give priority to one type over another, such as forestry ecosystem types over desert ecosystem types (Guangzhi, 2010).

[142] Regulations on Nature Reserves Article 10

Table 3–4. Types of nature reserves. Modified from Zheng and Zhu, 2004)

General type	Specific type	Example
Natural ecosystems	Forestry ecosystem	Songshan Nature Reserve, Beijing Municipality
	Grassland and meadow ecosystem	Yunwu Shan Nature Reserve, Ningxia Autonomous Region
	Desert ecosystem	Kekexili Nature Reserve, Qinghai Province
	Inland wetland and waters ecosystem	East Dongting Lake Nature Reserve, Hubei Province
	Marine and coastal ecosystem	Wangning Marine Ecosystem Nature Reserve, Hainan Province
Species	Wild animals	Alligator Nature Reserve, Anhui Province
	Wild plants	Chishui Nature Reserve, Guizhou Province
Natural relics	Geological remains	Yitong Volcano Cluster Nature Reserve, Jilin Province
	Paleontological remains	Dinosaur Egg Fossil Nature Reserve, Henan Province

Table 3–5. Management of all nature reserves by Chinese government agencies (Ministry of Environmental Protection, 2009)

Agency	Number	Percent of total number
State Forestry Administration	1,879	73.9%
Ministry of Environmental Protection	253	10.0%
Ministry of Oceans	102	4.0%
Ministry of Agriculture	85	3.3%
Ministry of Land & Resources	69	2.7%
Ministry of Water Resources	44	1.7%
Ministry of Urban Construction	11	0.4%
Other	98	3.9%
Total	**2,541**	**100.0%**

Nature reserves can be established and managed by any variety of agencies, at any level of government. They may also be managed jointly by different agencies to address managing different habitats within the reserve. For example, Qinghai Lake National Nature Reserve contains an inland lake, grasslands, and desert resources and thus requires support from the fishery bureau as well as the animal husbandry department, which is responsible for grassland management. The State Forestry Administration manages more than two-thirds of all nature reserves in terms of both number and area, followed by the Ministry of Environmental Protection (Table 3–5). If a proposed nature reserve boundary crosses multiple administrative jurisdictions (e.g., counties), all affected governments must reach an agreement.

Figure 3–16. TNC scientists monitor alpine ecosystems in Baima Snow Mountain Nature Reserve, Yunnan. Photo by Fang Zhendong

Although SFA manages the most nature reserves, the Ministry of Environmental Protection (MEP) holds the overarching responsibility for nature reserves across the country. Sample duties include formulating laws, regulations, and policies; identifying standards for nature reserve construction and management; and organizing expert review meetings to evaluate national nature reserve establishment. MEP also maintains a publicly available database of nature reserves.

To be considered for *national* nature reserve status, an area must have "typical significance in or out of the country, and have major international influence in science or are of special value for scientific research."[143] Only reserves that have been provincial-level for at least two years may be elevated to national status.[144] Designation of a national reserve requires that provincial-level government first file an application with the National Nature Reserves Appraisal Committee of the State Council. The Committee will conduct field visits and will assess the reserve against the Appraisal Standards for National Nature Reserves. Approval of the proposal by the Committee requires two-thirds affirmative votes by its members. Upon approval by the Committee, the Ministry of Environmental Protection gathers comments from other relevant agencies and submits them to the State Council. The State Council ultimately approves or rejects the application.[145]

Local nature reserves may contain less-significant resources from a national or international perspective. Typically, final approval rests with the level of government that is the same as the proposed level of the nature reserve (e.g., county-level or prefecture-level). Usually, the higher the level of the nature reserve, the more funding that is available, and national-level reserves are eligible for funding from the Central Government.

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[143] Regulations on Nature Reserves Article 11

[144] Appraisal Standards for National Nature Reserves

[145] Regulations on Nature Reserves Article 12

iv. Allowable and prohibited uses

According to regulation, nature reserves may be divided into core, buffer, experimental, and outer protection zones.[146] Allowable and prohibited uses are based on these zones (Figure 3–16, Table 3–6). In general, the core area is by far the most protected and prohibits human entry for any purpose except scientific research. The buffer is somewhat less restrictive than the core, and the experimental zone is even less restrictive.

Table 3–6. Allowable and prohibited activities in nature reserves

This table identifies the activities expressly allowed ("Yes") or forbidden ("No") in each of the core, buffer, and experimental zones, according to the Regulations on Nature Reserves (1994). The only mention of activities allowed/forbidden in the outer protection area states, "The projects constructed in the outer protection zone of nature reserves must not affect the environmental quality inside the nature reserves. If the damage has been done, the relevant units shall be ordered to eliminate and control the pollution within a prescribed period of time." The activities delineated below apply to all levels of nature reserves—national and local.

Activity	Core	Buffer	Experimental
Entry by humans	Yes, but for research only	Yes*	Yes
Scientific research	Yes, but "generally prohibited"	Yes	Yes
Educational activities	No	Yes	Yes
Specimen collection	No	Yes	Yes, for approved scientific research*
Tourism/visiting/sightseeing	No	No	Yes[147]
Facilities installations	No	No	Yes[148]
Domestication and breeding of rare and endangered wild animal or plant species	No	No*	Yes
Commercial activities[149]	No	No	No*
Felling, grazing, hunting, fishing, gathering medicinal herbs, reclaiming, burning, mining, stone quarrying, sand dredging, other resource extraction	No	No*	No*

*These activities were not specifically mentioned in the regulations, but a protected areas expert identified them as allowable ("Yes") or not ("No") (Guangzhi, 2010).

[146] Regulations on Nature Reserves Article 18

[147] Regulations on Nature Reserves, Article 29: "The visiting and sightseeing tourist projects that violate the protection guidelines of nature reserves shall be prohibited."

[148] Regulations on Nature Reserves, Article 32: "In the experimental zone, no production installations that cause environmental pollution or do damage to the natural resources or landscapes shall be built. Other installations to be built in these areas must not exceed the discharges of pollutants prescribed by national or local discharge standards."

[149] The English translation of the Regulations on Nature Reserves says "trading," but Guangzhi (2010) felt that a more accurate translation would be "commercial activities."

Figure 3–17. Forest Park in Zhangjiajie, Hunan. Photo by Steve Blake

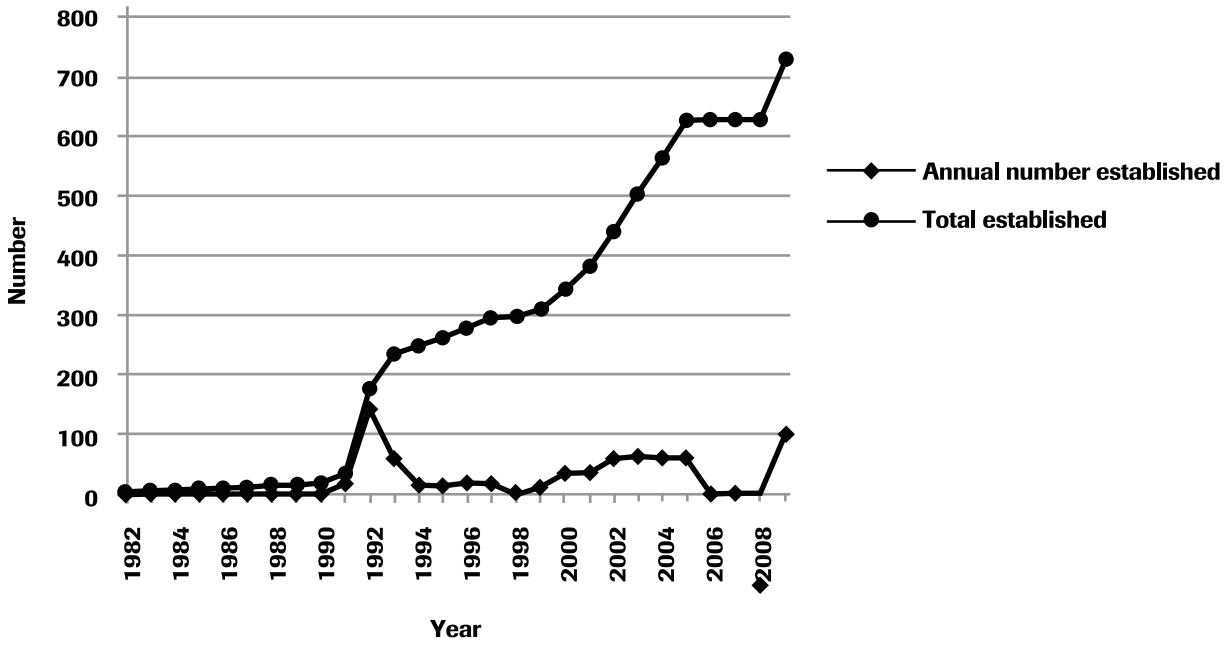
C. Forest Parks

i. Purpose, Number, Extent

Forest parks emphasize protection and appropriate development, with public access as a secondary goal. The main biological conservation targets include wild animals and plants with high aesthetic value (Figure 3–17). The Central Government created the forest park system in the early 1980s to fuel local economies through tourism and to protect important forest resources. The State Planning Commission (now the National Development and Reform Commission) established the first national forest park—Zhangjiajie Forest Park in northern Hunan Province—in September 1982. As of 2009, the government tallied 2,458 forest parks covering approximately 16 million hectares (General Office of the National Afforestation Committee, 2010). While the number of forest parks and nature reserves is roughly the same, forest parks cover far less area—1.7% of China versus 15.8%. Nonetheless, forest parks are

important to forest protection, encompassing approximately 8.5% of the forests in China. Of the forest parks,[150] 730 are national forest parks (Figure 3–19) and 1,073 are provincial forest parks; the remainder are county-level. According to a survey of nearly 1,900 forest parks, visitation reached 332 million tourists in 2009 and generated 22.6 billion RMB in revenue that year (State Forestry Administration, 2009).

Figure 3–18. Establishment of national-level forest parks, 1982–2009, recreated from (Li & Chen, 2007)



ii. Guidance

- Regulations on Forest Park Management (1994)
- Standard for Overall Design of Forest Parks (1996)
- China Forest Park Landscape Resources Grade Evaluation (State Standards) (1999)
- Local-level guidance—Provinces such as Hunan, Shaanxi, Guizhou, Shanxi, Heilongjiang, Guangdong and Gansu have developed more specific management rules for forest parks. Some cities and counties have also issued guidance, such as Qingdao City in Shandong Province.

[150] There is also one national forest tourism site which is a type of forest park.

iii. Establishment

Forest parks may be established in areas with natural forests that are large enough for exploration, entertainment, recreation, and/or the conduct of scientific, cultural, and educational activities. Such areas should be scenic and may contain cultural values. Specifically, forest parks are designed to protect special natural landscapes and maintain historical and cultural relics; and provide opportunities for entertainment and recreation and environmental education.[151] A site that possesses one or more of the qualities below is eligible for designation as a forest park, although these criteria may not always be applied in practice:

- Special forest features; ecological, historical or scientific preservation values; or educational values
- Development values for tourism
- "Large enough" acreage and canopy cover of no less than 60% (except for sites with high development value); in practice, most provinces require at least 70% cover
- Clear forest resources tenure and well-delineated boundaries [between state and collective lands, according to Guangzhi (2010)], including relevant ownership certificates
- No spatial overlap with an officially established nature reserves

As with nature reserves, forest parks can be national- or local-level depending on resource quality and size. To be a national forest park, an area must have "significant landscape, concentrated cultural landscapes and significantly high scenic, scientific and cultural values, specific geographical location, representativeness in region scale, well-equipped tourist facilities and higher popularity."[152] A county forest park, by contrast, is characterized by scenic, scientific and cultural values of more local importance.

The State Forestry Administration is the only agency that creates and manages national forest parks, but local forestry bureaus have the authority to propose and approve the creation of forest parks at their respective levels. For example, a provincial forestry bureau can designate provincial-level forest parks. The process is as follows: the local forestry bureau prepares an application, then the provincial forestry bureau reviews the application, and finally the State Forestry Administration reviews the application and makes a final decision.

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[151] Regulations on Forest Park Management Article 2

[152] Regulations on Forest Park Management Article 6

Forest parks are placed in one or more of the categories according to dominant landscape features (Table 3–7). Such designation helps the public understand the main resources of the forest park, but it does not necessarily affect allowed or prohibited activities (Guangzhi, 2010).

Table 3–7. Types of forest parks and examples (National Forest Parks of China)

Type of Forest Park	Example
Mountain	Taibaishan Forest Park, Shaanxi Province
Lake	Qiandaohu Forest Park, Zhejiang Province
Volcanic	Huoshankou Forest Park, Helongjiang Province
Glacial	Hailuogou Forest Park, Sichuan Province
Grassland	Huangganliang Forest Park, Inner Mongolia Autonomous Region
Desert	Yanguan Desert Forest Park, Gansu Province
Hot spring	Longsheng Hot Spring Forest Park, Guangxi Autonomous Region
Coastal	Qinghuandao Coastal Forest Park, Hebei Province
Sea island	Pingtanhaidao Forest Fujian Province
Cascade	Qishan Forest Park, Fujian Province
Urban	Sheshan Forest Park, Shanghai Municipality

iv. Allowable and Prohibited Uses

Regulations address master planning,[153] but unlike the nature reserve system in China, there is no recommendation to establish particular zones in forest parks, such as core, buffer, and experimental zones. Prohibited activities in forest parks include: clearing forest for farmland, quarrying, sand mining, excavating soil, and conducting other deforestation activities. In addition, except as necessary for basic safety, the construction of buildings or engineering facilities in rare, important, and scenic areas is also prohibited.[154] Some provinces create additional rules to govern allowed and prohibited uses of forest parks. For example, Fujian prohibits the following activities in forest parks: clearing forest for farms and mining; graffiti; filling natural water sources arbitrarily; hurting, harming or hunting protected wild animals without permission; collecting endangered and rare wild plants; littering; smoking, building fires, and lighting candles or fireworks.[155]

[153] Regulations on Forest Park Management Article 7

[154] Regulations on Forest Park Management Articles 11 and 12

[155] Fujian Province Forest Park Management Rules

D. Scenic Areas

i. Purpose, Number, Extent

Along with protection of beautiful places and ecological values, scenic areas typically emphasize tourism much more than nature reserves and forest parks (Figures 3-19 and 3-20). China has 906 scenic areas, including 208 national-level and 698 provincial-level scenic areas,[156] which cover approximately 1.9% of the terrestrial land area of China (Ministry of Housing and Urban Development, 2009). Twenty-two national scenic areas are also designated World Heritage sites. In the past, some scenic areas were allowed to partially or totally overlap with nature reserves. However, the Regulations on Scenic Areas no longer allow such overlap.

Figure 3–19. Gongga Mountain Scenic Area offers a cable car ride to Hailuogou Glacier. Photo by Megan Kram

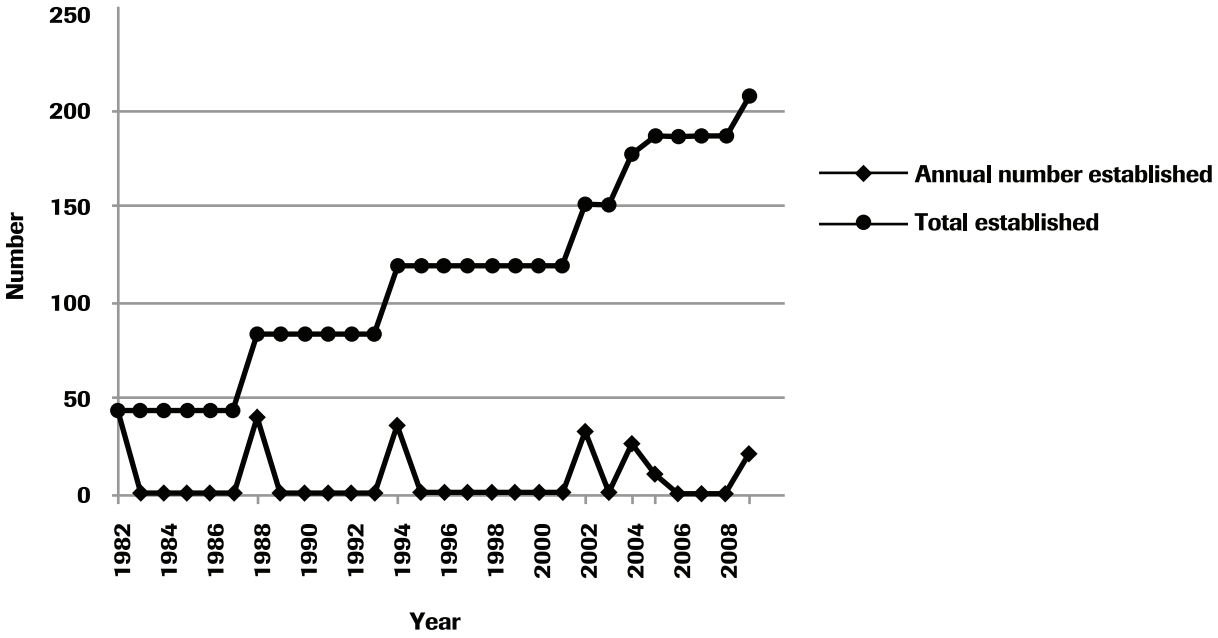
[156] In China, the direct translation of "scenic areas" in Mandarin is "national parks."

The origins of scenic areas can be traced to the 1920s. At that time, the government set aside famous scenic sites, such as Lu Mountain in Jiangxi Province and Huang Mountain in Anhui Province, as important summer resort and sightseeing districts. Those scenic sites were administrated by local government agencies. Then in the 1970s, in response to heightened economic development and pressure on natural resources, the State Construction Commission (now the Ministry of Housing and Urban-Rural Development, MOHURD) placed greater emphasis on strengthening protection of natural and cultural landscapes and natural ecosystems. The Commission led country-wide scenic sites assessment and advised relevant provincial governments to select a series of scenic sites for promotion as national scenic areas.

Figure 3–20. Scenic areas typically contain more tourism infrastructure than nature reserves and forest parks. Below are facilities at Gongga Mountain Scenic Area, Sichuan. Photo by Megan Kram

In November, 1982, the State Council announced the first 44 scenic areas with national significance. Since then, the government established another six groups of scenic areas (Figure 3–21).

Figure 3–21. Establishment of national-level scenic areas, 1982-2009 (Xinhua News Agency, 2009)



ii. Guidance

- Construction Management Regulations of Scenic Areas (1993)
- Regulations on Scenic Areas (2006)
- Local regulations

iii. Establishment

Scenic areas have been designated in some of the most picturesque places in China, for sightseeing, scientific research, or cultural activities. The government designates scenic areas for a variety of reasons, such as to protect ecology, biological diversity and environment; develop tourism; conduct scientific research and educational programs; and provide ecological and social benefits through compatible development activities. Scenic areas must possess one or more of the following traits:

- Natural or nearly natural status
- Reflect the evolution process of significant natural and historical events
- Representativeness and significance
- ·A minimum size of approximately 50 square kilometers (for a national-level scenic area)

National-level scenic areas possess both significant natural and cultural values and, like nature reserves and forest parks, are identified by type (Table 3–8).

Table 3–8. Types of scenic areas and examples

Type of Scenic Area	Example
Mountain	Tai Mountain Scenic Area, Shandong Province
Lake	Tai Lake Scenic Area, Jiangsu Province
River	Li River Scenic Area, Guangxi Autonomous Region
Cascade/waterfall	Huangguoshu Waterfalls Scenic Area, Guizhou Province
Coastal or island	Qingdao Coastal-Lao Mountain Scenic Area, Shandong Province
Cultural	Badaling Great Wall Scenic Area, Beijing Municipality

MOHURD manages all scenic areas, but a variety of agencies can propose their establishment. To establish a national scenic area, the government follows these steps: First, the people's government of a province, prefecture or municipal must submit a proposal to MOHURD; then MOHURD consults with the Ministry of Environment Protection, SFA, the State Administration of Cultural Heritage (SACH), and other relevant agencies for review and comments; and, ultimately, the State Council decides whether to approve the scenic area.

iv. Allowable and Prohibited Uses

Each scenic area is required to develop a master plan and detailed plan within two years of its establishment.[157] Usually, a master plan covers the intended use and development for 20 years and includes: a biological inventory, conservation strategies for protecting ecological resources, the location of major construction projects, zoning and major functions, areas where development is prohibited or restricted, and environmental capacity for tourism.[158]

The plans should emphasize principles of sustainable development, and should "strictly protect" significant landscapes and natural resources and not arbitrarily destroy or change them.[159] Prohibited activities include: Any activity that would destroy the landscape, vegetation, or landforms, including, but not limited to: blasting mountains and quarrying; clearing forest for farmland; constructing facilities to store explosives, flammable, radioactive, poisonous, and corrosive items; creating graffiti; and littering. Other commercial activities are allowable, with the permission of "relevant management authorities," including: Installation or posting of commercial advertisement; large-scale entertainment activities; modifying the course of streams and rivers; and other activities that impact the ecology and landscape.[160]

[157] Regulations on Scenic Areas Article 14

[158] Regulations on Scenic Areas Article 13

[159] Regulations on Scenic Areas Article 24

[160] Regulations on Scenic Areas Articles 26-29

E. International Designations

At least three types of international protected area designations have been established in China—Biosphere reserves, World Heritage Sites, and RAMSAR sites. This section addresses only the terrestrial types—biosphere reserves and World Heritage sites; RAMSAR sites are designated for wetlands. These designations typically overlap existing protected area designations, and can overlap with each other. Technically, they offer an additional layer of protection, though in practice they do little to discourage development.

There are 28 **Biosphere Reserves** in China. Biosphere Reserves are recognized under the Man and Biosphere Reserve Programme of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) (UNESCO, 2011). They are intended to serve as learning and demonstration sites for meshing conservation and sustainable development. All biosphere reserves in China currently overlap with existing nature reserves; for example, Wolong Biosphere Reserve overlaps Wolong National Nature Reserve. Typically, biosphere reserves in China have no special management requirements beyond those of nature reserves, since the nature reserve zoning requirements mirror those of biosphere reserves (core, buffer, and flexible transition area).

If a nature reserve desires Biosphere Reserve status, first the management bureau must seek approval from higher level administrative management sectors. Then, the Chinese National Commission of Man and the Biosphere Program (the Commission) decides whether the reserve is qualified to be a biosphere reserve; if so, the Commission will submit application to UNESCO for final review. The State Council created the Commission in 1978 as part of the Chinese Academy of Sciences (Chinese National Committee for Man and the Biosphere).

UNESCO also designates **World Heritage Sites** for natural and/or cultural locales that have "outstanding universal value" for at least one of ten criteria. There are 41 World Heritage Sites in China, 12 of which are designated partially or entirely for natural values, such as the Sichuan Giant Panda Sanctuaries and the Jiuzhaigou Valley Scenic and Historic Interest Area (UNESCO, 2011). Any one protected area (e.g., nature reserve) or multiple consolidated protected areas can be designated as a World Heritage Site. Qualified sites are nominated by MOHURD and/or the Ministry of Culture, which submit an application to IUCN and/or the International Council of Monuments and Sites. Once the application is approved, the local government establishes relevant management organization(s) responsible for management.

III. Case studies

This chapter provides six case studies of the land protection tools and strategies described in Chapter I. The case studies illustrate the practical application of each tool within the current land tenure regime, with the hope of sparking more such efforts (Table 3–9, Figure 3–22). While all of the case studies correspond to specific land protection opportunities, most also apply more than one land protection tool. For example, Yu Jia Shan illustrates the application of the private reserve and conservation lease tools. Each case study also provides examples of public-private partnerships and providing benefits to stakeholders, which are both factors in ensuring project success.

Table 3–9. Case studies and associated land protection tools—bold "Xs" indicate the primary tool, non-bold "Xs" indicate other tools used and described.

Case Study Sites	Improve the management of existing protected areas	Create new protected areas (i.e., National Parks)	Apply private tools: Private reserves	Apply private tools: Conservation developments	Apply private tools: Certification projects	Apply private tools: Conservation leases
Pudacuo: China's first national park	X	**X**				
Yu Jia Shan: China's first private nature reserve			**X**			X
Songshan: Evolution of a model nature reserve	**X**					
Monkey Island: Conservation development for primates, people, and profit	X			**X**		X
Great Wall Resort: The making of a model conservation development				**X**		X
Tengchong County Forest Carbon Offsets: Protecting land through a gold-level certification project					**X**	X

Table 3–22. Case studies sites

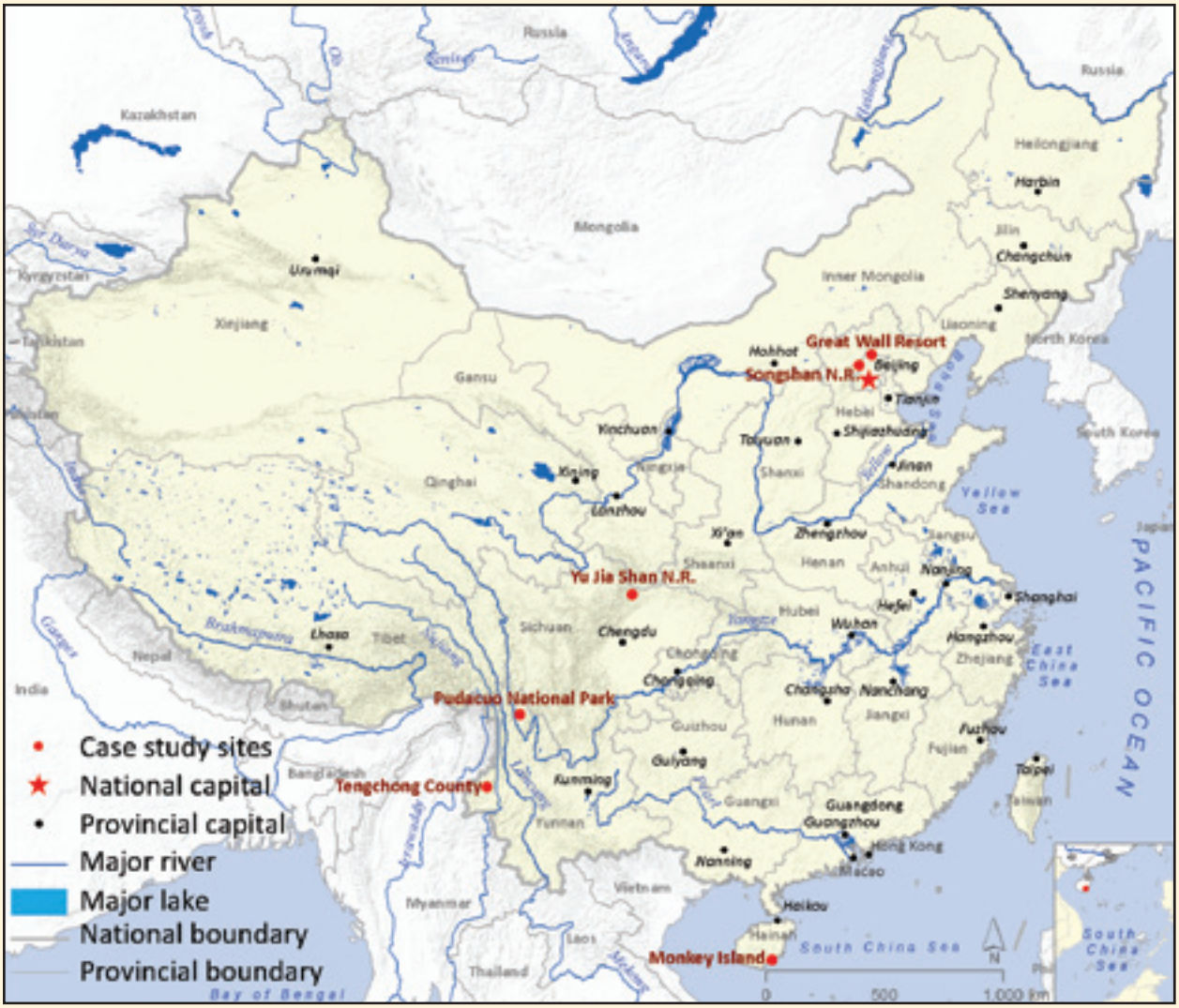


Photo by The Nature Conservancy

Pudacuo: China's First National Park

Interviewees

- ·Dr. Yang Yuming, Vice President, Southwest Forestry University and former initiator of national parks in Yunnan Province when he served as the Director of The Nature Conservancy's Yunnan Program

- Dr. Ye Wen, Dean, Ecotourism Faculty of Southwest Forestry University and creator of the Master Plan for Pudacuo National Park

- Wang Yue, Acting Director of the Yunnan Program, The Nature Conservancy

Introduction

As Chapter I, Tools and Strategies describes, China boasts more than 5,000 nature reserves, forest parks, and scenic areas, as well as many of other types of protected areas. Although all of China's existing protected area models have their strengths, none have proven particularly effective in simultaneously achieving goals of biodiversity protection and revenue generation. Thus, the Yunnan Provincial government, with encouragement from The Nature Conservancy, decided to test the national park model, in the hopes of increasing conservation while generating more income. The concept is working. Pudacuo National Park, China's first,[161] has expanded protection to an area four times the size of the original protected areas that it surrounded (Bita Lake Nature Reserve and Shuduhu Lake Scenic Area), and generated 117 million RMB in 2009 alone (up from 6 million RMB in 2005, a 20-fold increase). This case study tells the story of the park's creation.

Vision

- To pilot a new national park model in China as a way to meet dual goals of biodiversity conservation and income generation

- To create a site to protect the conservation values surrounding the existing Bita Lake Nature Reserve and Shuduhu Scenic Area

Project Area

Pudacuo National Park lies within one of the most biodiversity-rich regions of China, if not the world. The area lies within "one of the world´s least-disturbed temperate ecological areas, an epicentre of Chinese endemic species and a natural gene pool of great richness" and is believed to support over 25% of the world's animal species (UNESCO). For this reason, it is part of the Three

[161] In 2008, the Ministry of Environmental Protection and the National Tourism Administration announced the creation of Heilongjiang Tangwanghe National Park as China's first (People's Daily Online, 2008). However, in terms of timing, Pudacuo is the first national park because it was created in 2006.

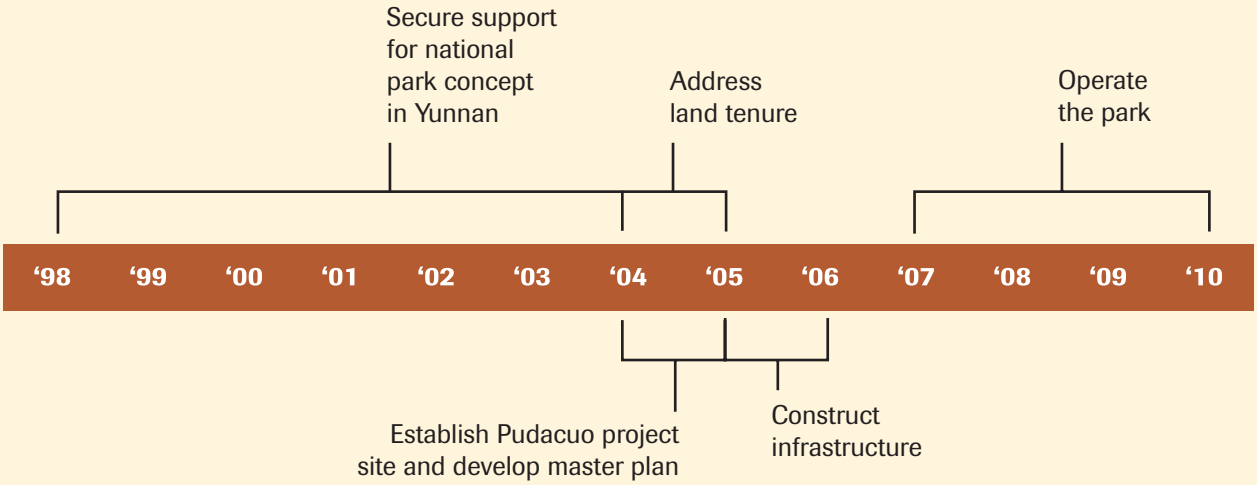
Parallel Rivers of Yunnan Protected Areas World Heritage Site. Pudacuo is home to species such as the black night crane and an endangered endemic fish, *Ptychobarbus chungtienensis chungtienensis*. The site is situated in the core zone of the Hengduan Mountains Biogeographical Region.

A 50-minute drive from the town of Shangri-La, the park covers approximately 60,000 hectares in Shangri-La County, Deqing Tibetan Autonomous Prefecture, Yunnan Province. The park encompasses and extends beyond two existing protected areas—the Bita Lake Nature Reserve (14,000 hectares) and Shuduhu Lake Scenic Area (1,500 hectares). The remaining area covers a mix of collective-and state-owned land, nearly all of which is public benefit forest and prohibits timber harvest (see Part 1, Lay of the Land). Nearly 2,000 hectares of the nature reserve are covered by the Bitahai Wetland RAMSAR site (Wetlands International, 2004). There is one village within the park, close to the gate, with approximately 200 individuals living in a relatively concentrated area.

Project Creation

Much of the work to establish Pudacuo involved garnering support for the national park concept as a whole. After 6 years of discussions between TNC and the Chinese government from local to national levels, there was enough support for the project to establish the project site, create a master plan, and start addressing land tenure issues (Figure 3–23). The park became operational in 2007, 9 years after discussions started.

Figure 3–23. Steps and timeline for the creation and management of Pudacuo National Park



1. Secure support for National Park concept—In 1998, TNC first proposed the idea of a Chinese national park system to the local governments associated with the Three Parallel Rivers World Heritage Site. Originally TNC aimed to create a "Great River National Park" for the entire site. However, the idea did not gain traction because the government did not fully understand the purpose and process for establishing national parks. Although the term "national park" was well known in China, there was no common understanding of what they were and how they differed from traditional Chinese protected areas. In fact, the direct translation of the Chinese word for *scenic area* is *national park*; the Ministry of Construction named them as such without fully appreciating the conservation purpose of typical national parks. TNC was promoting a national park model that would both protect biodiversity and generate revenue by developing small portions of park areas for tourism and recreation.

For the next 6 years, TNC communicated with government officials at all levels about national parks, slowing building support for and a common understanding of the concept. TNC organized educational visits to national parks in Australia, Canada, New Zealand, and the U.S. The organization held workshops and trainings for a wide variety of stakeholders. TNC also published two books to promote a common understanding of the concepts, which were actually published after the national park was created: *From theory to practice: Yunnan National Park* (2010) and the *Resource Book of Yunnan National Park Policies and Research* (2009). Official government support for the project started from the bottom-up, expanding from Diqing Prefecture to Yunnan Province to the Central Government. In 2008, the State Forestry Administration approved Yunnan as the pilot province for establishing national parks in China.

With government support at all levels in place, Yunnan decided to cultivate its national park program. In December 2009, the province identified a goal of creating 12 national parks from 2009-2020. The first 5 included Pudacuo, Meili Snow Mountain, Lijiang Laojun Mountain, Xishuangbanna, and Pu'er. Based on the Pudacuo experience, Yunnan developed standards and guidelines to guide the creation of these and other future parks. The guidelines describe requirements for establishment, master planning, surveys, and construction (National Park Management Office of Yunnan Province, 2009). As of this writing, Pudacuo was the only park open to the public, Meili and Lijiang Laojun Mountain were under construction, and Xishuangbanna and Pu'er were not yet under development.

2. Establish park boundary and develop a master plan—The local government selected the park boundary based on existing roads, natural mountain ranges, rivers, and the administrative boundary of the county. Diqing Prefecture hired Professor Ye from the Southwest Forestry University to develop the master plan and TNC provided technical support. The plan included an "introductory core area" which is analogous to the experimental zone of nature reserves. This zone allowed some construction in the traditional Tibetan style. The plan also allowed the local villagers to continue their farming and grazing activities in identified areas, and provided for recreation infrastructure such as wooden trails, limited paved roads, and bathroom facilities.

There were two major sources of debate during the planning process: whether to construct dams and whether to build Tibetan structures in the core area of the Bita Lake Nature Reserve. Professor Ye, an advocate for maintaining a natural landscape, persuaded the Director of Diqing Prefecture against some of the dam construction based on its potential political risk (e.g., anticipated protests by NGOs) and limited attractiveness for to tourists. Ultimately, the Director canceled the plans to create a large dam and lake, and reduced the number of waterfall-creating dams to two. He did maintain plans to reroute the river to "improve views," where construction activities had already significantly impacted the riparian system.

Pre-existing human activities in the protective core area of the Bita Lake Nature Reserve—an island in the middle of the lake—presented another challenge. Prior to the designation of the nature reserve, Tibetans had constructed a temple for religious use. Government officials wanted to build additional Tibetan structures on the island, to attract tourists—despite the fact that the Nature Reserve Regulations (1994) prohibit human activity in core zones.[162] In the end, the government built the additional facilities.

3. Address land tenure—The local government addressed two tenure issues in the process of creating Pudacuo: the allowed uses by the local people and the management of the land surrounding Bita Lake Nature Reserve.

The local people were using the land in Pudacuo primarily for widespread livestock grazing, limited farming, and tourism development around Bita Lake. The tourism infrastructure consisted mainly of shops, restaurants, and horseback riding and boating businesses. Timber harvesting was not an issue; although some of the park is forested, the government had already designated the land as public benefit forest (as opposed to commercial forest. See Part 1, Lay of the Land).

Upon the establishment of the park, the government allowed all local uses to continue except the horseback riding and boating operations. These were eroding soils and impacting the water quality of Bita Lake. Furthermore, the government saw an opportunity to implement a more profitable and coordinated tourism strategy by employing a tourism company. A state-owned tourism investment company formed an agreement with the village committee that specified allowed uses and a compensation plan. The company compensated the local people for their businesses and agreed to pay each household a total of 5,000 RMB per year.

In addition to working out the agreement with the villagers, the local government completed an intra-governmental shift of the management of the area around Bita Lake. Prior to the park's designation, the area around Bita Lake was a scenic area managed by the prefecture construction bureau. The construction bureau applied a "hands-off" approach to management. To streamline and improve operations, the prefecture government transferred the management from the construction bureau to the national park (see below).

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[162] Nature Reserve Regulations Article 18

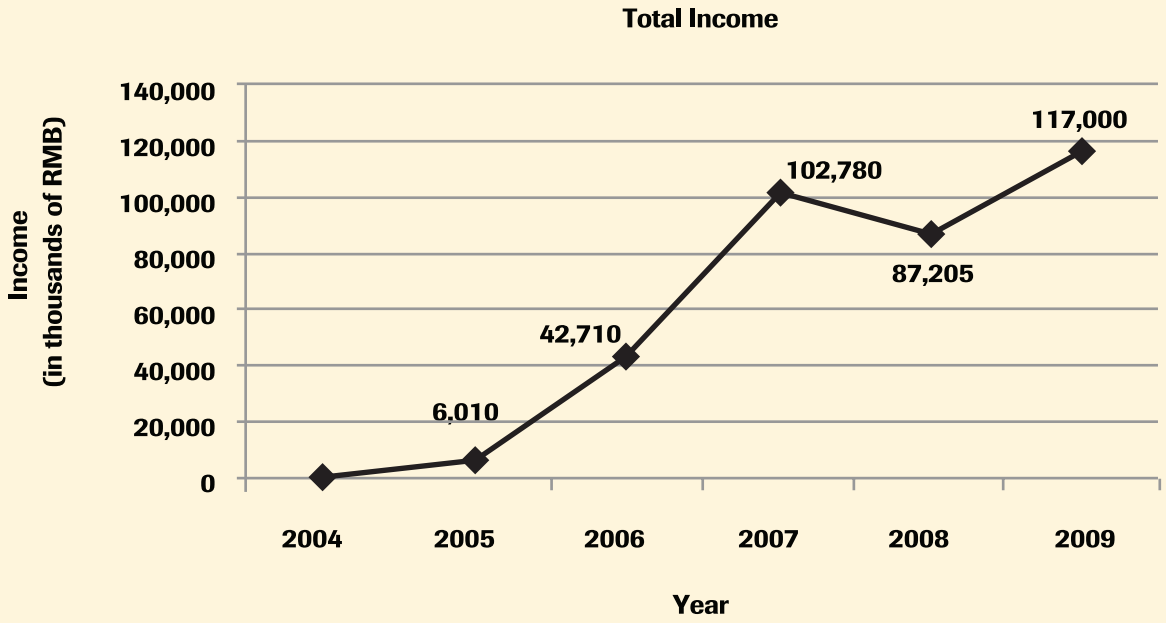
4. Construct park facilities—The state-owned tourism investment company secured the bank loans for the construction of tourism facilities. The construction cost approximately 400-500 million RMB, and included roads, walking trails, visitor centers, toilets, lookouts, signage, and other infrastructure. The park was closed to visitors for portions of 2005 and 2006 for construction.

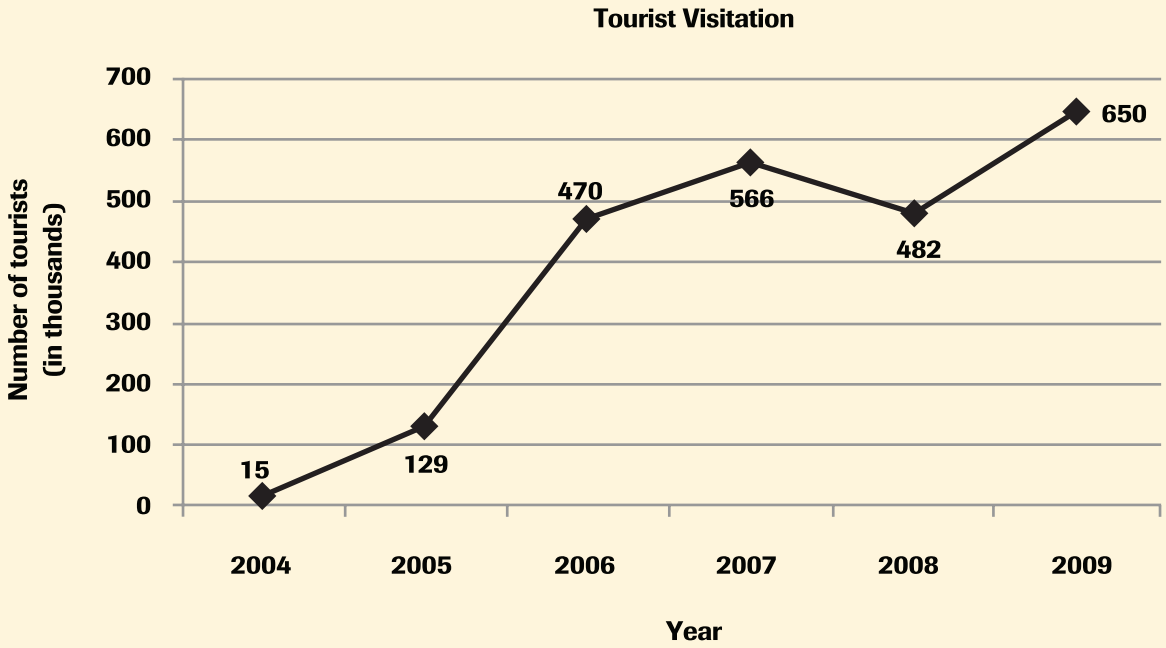
5. Operate the park—Once the park opened its doors to the public in 2006, visitation and revenues skyrocketed (Figures 3–24). From 2005 (prior to park designation) to 2009, Pudcauo enjoyed a 20-fold increase in income and a 5-fold increase in tourists. Altogether, from 2006-2009, the park generated 350 million RMB of income and hosted more than 2 million visitors. At present, the entrance fee is 180 RMB per person and the park is open 10 hours per day. As of 2009, the park employed 230 people, including 180 permanent employees and 50 temporary workers.

Tourists can enjoy walking along the wooden trails in different areas of the park and boating in the lakes. One visitor to the park described the experience as follows (www.seeyunnan.net, 2007):

> *"The park has a visitor center, two lakes, a number of interesting minority villages, lush forests and pasture views. At the visitor center you take a park bus to the first stop 8 miles away from where you can walk for a mile to several miles on a raised wooden walkway, pass by Shudu Lake 300 acres in size and then catch the bus again to your next destination . . . Bita Hai Lake is 11,482 feet above sea level and is usually the next lake you will encounter. It is surrounded by dense forests that are spectacular to see in their late October autumn colors. The bus lets you off a few feet from the wharf where you can catch a boat ride around the lake and the island in the center. Price for the boat ride is 30 Yuan. It is just over a mile from where the boat lets you off to the bus pick up point. Alternatively, some travelers walk down the 1.2-mile path from the south entrance and hike to and exit the park from the west entrance. Getting to the west entrance requires both a boat and ferry ride, depending on your stamina the entire hike can take 4-6 hours."*

Figure 3–24. Income and visitation in Pudacuo National Park, 2004-2009





All levels of government including prefectural, provincial, and central have a role in the creation and/or management of Pudacuo National Park (Figure 3–25). Key roles and responsibilities include the following:

- **Central Government:** The State Forestry Administration is supervising the establishment of Pudacuo and other parks in Yunnan through the Yunnan Forestry Bureau.

- **Yunnan provincial government:** The provincial government makes policies and regulates park establishment across the province. Within the provincial government, the Yunnan Forestry Bureau created and supervises the Yunnan Provincial National Park Management Office (YPNPMO). The YPNPMO coordinates agencies, experts, and institutions to develop relevant guidelines and standards and implement the park application and approval process.

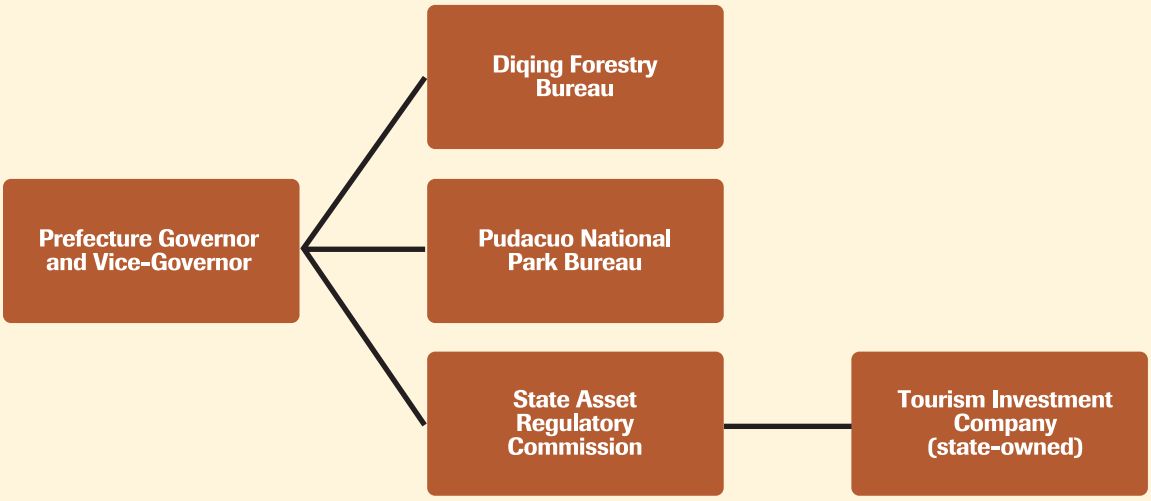
- **Diqing prefecture government:** Diqing oversees the on-the-ground management of the park and coordinates with local-level agencies. The prefecture selected and now oversees the three park offices responsible for the day-to-day operations including:

  - **Bita Lake Nature Reserve Station (within the Forestry Bureau)**—This "conservation station" was in operation prior to the establishment of the national park. It still manages the Bita Lake portion of Pudacuo on behalf of the Forestry Bureau. The station receives and allocates funding from the provincial government for research and monitoring, and from the prefectural government for staffing.

  - **State-owned tourism investment company (within the State Asset Regulatory Commission)**—With guidance from the prefecture, this company develops all aspects of tourism such as ticketing and collection of entrance fees, facility maintenance, and interpretation. The director of the Bita Lake Nature Reserve Station is the deputy officer of the tourism company, which employs 230 people in Pudacuo.

  - **Pudacuo National Park Bureau**—This bureau provides administrative management for the entire park. It employs only a few staff.

Figure 3–25 Offices of the Diqing prefecture government associated with Pudacuo National Park



NGO Role

TNC acted as a catalyst to generate support for the national park concept and the creation of Pudacuo as the first national park. The organization has served as a technical advisor for park design and management, bringing to bear its knowledge of international park management practices. The Yunnan program of TNC also engaged Dr. Yang in the development of the standards and guidelines for national parks across China. TNC has not yet fulfilled its goal to improve the interpretation system in Pudacuo so that visitors can gain a better understanding of the park's values.

Successes

National park model is up and running—It took six years of concerted effort on the part of TNC to garner support for the national park idea. Ultimately, the organization succeeded and Yunnan took a "leap of faith" to create Pudacuo National Park. Today, the park is serving as a model for how to balance conservation with limited development while generating significant income.

Skyrocketing visitation and revenues—From 2005 (prior to park designation) to 2009, Pudcauo enjoyed a 20-fold increase in income and a 5-fold increase in tourists. The park generated 117 million RMB of revenue and attracted 650,000 visitors in 2009 alone.

Improved protection for biodiversity—The creation of Pudacuo expanded size of the protected area by four times and eliminated some activities that were negatively impacting biodiversity, such as horseback riding around Bita Lake.

Challenges

Use of revenues—The Park is generating significant revenues but little is returning to conservation. Originally, the project aimed to dedicate 10-15% of its income for monitoring and other conservation activities. Drs. Yang and Ye recommend using the revenue to monitor the impacts of tourism on biodiversity, tourist behavior compared to that in other types of protected areas, and changes in the local community in terms of income, lifestyle, and attitudes toward the park.

Implementing a new model—Implementing any big new idea can be a daunting task. It took many years to secure enough support for the national park to convince the government to implement it. There were no rules and regulations to guide the effort, and the government questioned the utility of creating a new model when nature reserves, scenic areas, and other types of protected areas already existed. Now the Central Government must decide whether and how to support the creation of national parks in other parts of the country. Until then, it is unlikely that other provinces will do so.

Ensuring sustainable management—At present, there is no regulation of grazing in the park boundaries. There is no consensus about whether the amount of grazing currently in the park is sustainable.

Replicability

Based on Pudacuo's impressive visitation and revenues, it is clear that national parks can effectively generate fresh interest and income for protected areas while maintaining or expanding biodiversity protection. However, it may be challenging to create national parks in provinces other than Yunnan due to the lack of policy guidance at the State level. Yunnan is the only province with national park guidance, and, despite the "national park" title, no central-level guidance exists for these parks.

The timeline for Central Government action is uncertain. Ultimately the State Council will need to make a decision on whether and how to support the creation of national parks in China, and who will be the managing agency. The State Forestry Administration has led the Yunnan effort, but other agencies such as the Ministry of Environmental Protection and the Ministry of Construction have expressed the strong desire to lead the national effort. Creation of a new agency is highly unlikely and "would take 100 years," according to one of the interviewees. At the same time, this lack of Central Government policy also presents an opportunity for local governments to create national parks as they see fit.

Below: Yu Jia Shan is the first and only private nature reserve with panda habitat.
Photo by Megan Kram

Yu Jia Shan: China's First Private Nature Reserve

Interviewees

- Liu Yong, businessman and manager of the Yu Jia Shan Nature Reserve
- Chen Youping, Vice-Minister, Pingwu County Forestry Bureau
- He Xin, Project Manager, Shan Shui

Introduction

"I am an unlucky man," proclaimed Liu Yong only half-jokingly, "a very unlucky man." In 1997, Liu purchased the logging rights to 1,000 hectares of forested panda habitat just outside of Jinfeng Village in Sichuan Province. Just one year later in 1998, the government issued a logging ban in the area, in response to the Yangtze River flooding. Unable to harvest the timber or earn significant income from the land via other means, Liu worked with the Pingwu County Forestry Bureau to establish Yu Jia Shan as China's first private nature reserve in 2006. Liu is now the proud manager of the nature reserve and enjoys sharing the forest, water, and wildlife with others.

Yu Jia Shan is unique as China's first and only private nature reserve with panda habitat. While it is an official protected area as authorized and created by the county government, Yu Jia Shan is considered "private" for several reasons:

- It is comprised entirely of collective lands—not state-owned lands as is the case with other nature reserves;
- It receives no regular funding from the government; and
- None of the nature reserve staff are government employees. Liu is self-employed and has hired three staff himself.

The circumstances of Yu Jia Shan's creation led to this unique arrangement. However, the private protected area model—as well as the PES and conservation agreement efforts—could certainly be replicated in other places with different circumstances. In addition, this project provides an important example of a "conservation use right" in the form of the non-use (for the most part) of the timber.

This case study describes the unique aspects of this private nature reserve and the process by which it was established. It also describes the cooperative agreements that NGO Shan Shui (formerly Conservation International, CI) has helped broker between the Yu Jia Shan and the Forestry Bureau, and between Yu Jia Shan and the local community. Finally, it explains how a ground-breaking, collaboratively-managed, and county-wide funding source—the Pingwu Biodiversity and Water Fund—is financing Yu Jia Shan and other conservation priorities, in part through Payments for Ecosystem Services (PES).

Vision

- To demonstrate a new model for protected areas in China—private nature reserves
- To establish private nature reserves' potential for ecological sustainability through agreements with the local community
- To prove private reserves' potential for fiscal stability through Payments for Ecosystem Services and other funding sources

Project Area

Located five kilometers outside the Pingwu Township, the Yu Jia Shan County Nature Reserve encompasses 1,000 hectares in Pingwu County. Yu Jia Shan is a small but important component of a network of nature reserves that protect panda habitat in the Mingshan Mountains. The Mingshan Mountain region in Sichuan and Gansu Provinces is the most important of four key areas for pandas.[163] Of the total global population of 1,500 pandas, 650 (more than 40%) live in the Mingshan Mountains, within which Pingwu County is the global stronghold. More than 40% of Pingwu County is panda habitat, and the county is home to approximately 200 pandas, the largest number of pandas of any county in China or the world.

Yu Jia Shan is the smallest of four nature reserves in Pingwu County, the others being Wanglang National Nature Reserve, Xubaoding National Nature Reserve, and Xiaohegou Provincial Nature Reserve. Together, these nature reserves capture 20% of the area of the County and more than 50% of the County's panda habitat. Yu Jia Shan abuts one other protected area—Tangjiahe National Nature Reserve in the adjacent Qingchuan County.

In addition to protecting panda habitat, Yu Jia Shan is the source of Pingwu Township's drinking water. Two streams wind their way through the nature reserve and a water treatment plant lies just downstream of it. Some agricultural plots lie just upstream of the nature reserve and the heavy use of pesticides and fertilizer is affecting water quality, as are goat droppings.

Unlike most if not all other nature reserves in China, Yu Jia Shan is comprised entirely of collective lands. The managing village is a small hamlet just outside of the reserve boundary and includes 17 households and approximately 50 residents. The average household income is 3,300 RMB per hectare per year from sources such as the Grain for Green Program and the Natural Forest Protection Program, beekeeping, and construction labor. Poaching of pandas, musk deer, takin, and other bushmeat is negatively impacting the nature reserve.

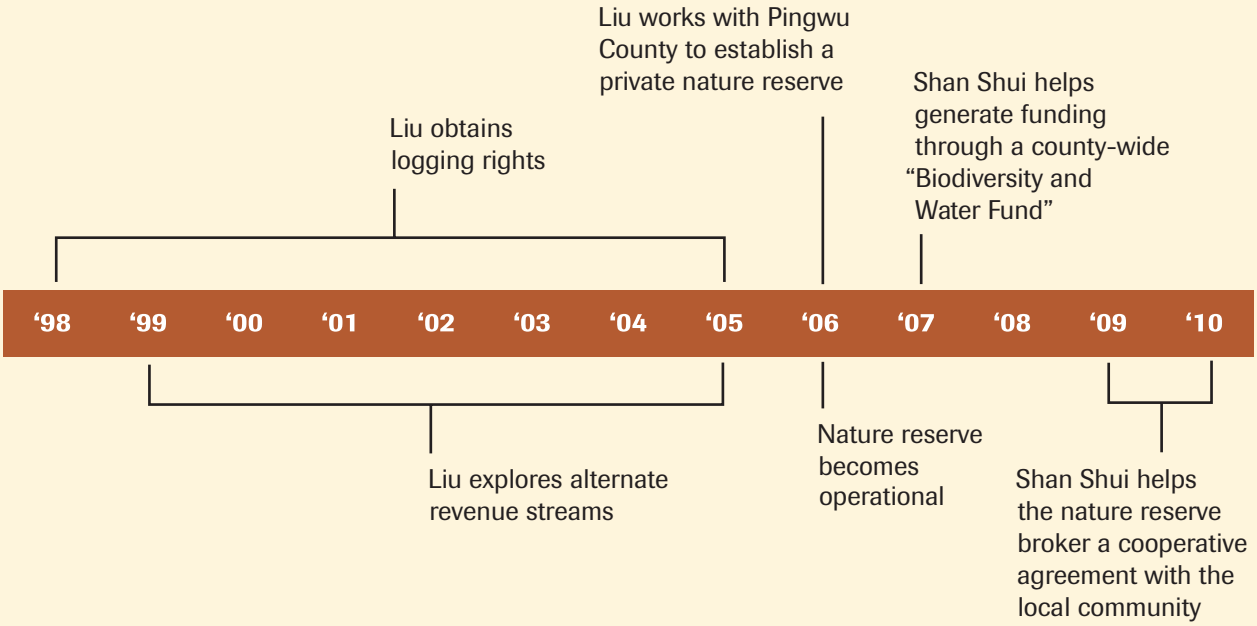
[163] The others include the Qingling Mountains in Shaanxi Province, the Qionglai Mountains and Daxiaoxiangling Mountains in Sichuan Province.

Prior to its designation as a nature reserve, the area was part of a forest farm and was logged until the timber ban in 1998. To implement the timber ban, the county government zoned a series of "public benefit" or "ecological" forests (see Part 1, Lay of the Land) which included the Yu Jia Shan area. Today, the mountainsides are recovering well and are forested with young trees.

Project Creation

This case study describes the history of the project since 1997 when Liu obtained the logging rights. The real conservation action started in 2006, with the creation of the Yu Jia Shan nature reserve (Figure 3–26).

Figure 3–26. Steps and timeline for the creation and management of Yu Jia Shan Nature Reserve



1. Liu obtains logging rights—Liu originally purchased 50-year logging rights for 320,000 RMB to harvest timber, not to establish a nature reserve. He bought them from a Chengdu businessman in 1997, who had purchased the use rights from the collective land managers in 1996. They were displeased with the original lessee and was eager to find a new lessee, especially a Pingwu County local like Liu. In purchasing the use rights, Liu assumed approximately 1 million RMB of owed benefits to the community including electricity, road construction and maintenance, satellite for television, and annual payments of 500 RMB per year for 40 years (after the first 10 years of the lease). Liu received two contracts for the use rights—one from the Chengdu businessman, and one from the village and the county.

2. Liu explores alternate revenue streams—After the Central Government banned logging in 1998, Liu considered different ways to recuperate his costs. He pursued income from the Natural Forest Protection Program (which he still receives). However, additional income sources were needed. Liu considered all of the following possibilities, none of which were viable options:

stone mining, which county regulations prohibited close to streams; ecotourism, which was financially prohibitive; harvesting frogs for medicinal purposes, but the frogs were nearly impossible to catch; and herb growing, which required 7 growing seasons prior to harvest.

Thus, stuck with logging rights that he couldn't use and resources that he couldn't access or harvest, at least not in the near term, Liu was faced with a choice: sell the logging rights at a loss, or keep the logging rights and increase the potential for revenue by turning the land into a nature reserve. He appreciated the natural beauty of the area and chose the latter scenario.

3. Liu works with Pingwu County to establish a private nature reserve—Liu approached the Pingwu County Forestry Bureau with his plan. It was an easy sell due to his relationships, the importance of the site for panda habitat, and because the land was the headwaters of the local drinking water supply. Liu knew the head of the Forestry Bureau in 2006 well because he had also, coincidentally, been the leader of the village in 1998 when Liu secured the forest use rights. (Today, that same individual is one of the vice-ministers of the county government as a whole.) Liu also consulted the village about his vision, which was eager to embrace a new revenue source because they were hurting financially from the timber ban. Prior to the ban, 70% of the county's income was from logging.

In accordance with the Regulations on Nature Reserves (1994), Liu submitted an application to the County Forestry Bureau to establish a county-level nature reserve. The Forestry Bureau reviewed the application and submitted it to the county, who then approved it. The entire process, from application to approval, took approximately six months. The approval went quickly because it was free to the county, which did not have funds to contribute. The county was already financing the three much larger reserves in the county. (The county has, however, provided funding for the private reserve on two occasions thus far).

4. Nature reserve becomes operational—As part of becoming operational, Shan Shui helped Yu Jia Shan develop a master plan and obtain funding for staff and other costs. Like the master plans for other nature reserves, Yu Jia Shan's plan identifies three zones of use—a core area (no humans allowed), an experimental zone, and a buffer zone. Yu Jia Shan's plan for the experimental zone allows herb plating and harvest, logging of cultivated trees (if and when the timber ban is lifted), and the construction of a conservation station to house local staff.

Shan Shui also helped broker a deal between Yu Jian Shan and the County Forestry Bureau for the period of 2006-2008, whereby the Forestry Bureau would pay 100,000 RMB to the nature reserve for patrolling and monitoring costs. This was the first of two "Conservation Steward Agreements" (CSAs) signed between these parties. CI and Shan Shui facilitate the creation of CSAs worldwide to establish mutual understanding between the holders of use rights and other stakeholders.

Liu pays and manages a staff of three for monitoring, patrolling, and community relations. He also hires extra help during the winter, when poaching is most common. One full-time patrol officer is especially well-qualified: he was a poacher himself. Each staff member earns approximately 1,000

RMB per month, or 50 RMB per day. That amount is half of a "good salary" in Pingwu County of 100 RMB per day, and less than the average salary of 60-80 RMB/day. Even paying lower wages, Liu found that the costs of managing the reserve were beyond his ability to finance alone.

5. Shan Shui helps generate funding through a county-wide Biodiversity and Water Fund—Shan Shui realized that the County's (then) one-time contribution to Yu Jia Shan, while extremely valuable, could not be depended upon in future years. Furthermore, it believed that the nature reserve could not be expected to generate significant income in the foreseeable future due to limitations on timber harvesting, ecotourism, and mining. To keep the nature reserve afloat and also fund other conservation priorities in Pingwu County, Shan Shui proposed the creation of a Biodiversity and Water Fund (Water Fund), to be funded in part through Payments for Ecosystem Services.

He Xin from Shan Shui (then CI) first introduced the Water Fund to the Vice-Governor of Pingwu County in 2007. Since then it is has "taken on a life of its own." The idea appealed to all the stakeholders. Most importantly, it appealed to Pingwu County because would allow the local government to collect revenue that would actually remain in the county. Often, fees collected by the county do not remain there. For example, the counties in Sichuan Province collect water use fees, but must turn them over to Provincial government for redistribution.

In 2009, Shan Shui seeded the fund with 350,000 RMB. The County and Shan Shui distributed the initial pot to the reserve (55%), to projects in the form of grants (40%), and to operations (5%). Yu Jia Shan received 50,000 RMB for monitoring and patrolling (45,000 RMB) and to incentivize the community to decrease its impacts on the nature reserve (5,000 RMB).

As of mid-2010, the fund had received more than 1.1 million RMB, of which Yu Jian Shan received another 50,000 RMB for the purpose of monitoring, patrolling, and water conservation. Sources of the Water Fund included:

- Payments for Ecosystem Services: 500,000 RMB from a large state-owned hydropower company in Pingwu County

- Donations from corporations: Funding from Dreamworks, the producers of Kung Fu Panda; 400,000 RMB from Marriott Hotels; and 200,000 RMB from Pingwu County

The County keeps the money in a separate account at the local bank. The Fund is managed by a team of nine members from Shan Shui/CI and county government. In the future, membership may be expanded to include members of the local communities. The Vice-Governor of Pingwu County has primary responsibility for securing funding and is the overall manager of the fund. According to He Xin, ideally the fund would have dedicated fundraisers.

6. Shan Shui helps the nature reserve broker a cooperative agreement with the local community—As previously mentioned, the villagers use the lands inside the nature reserve as (illegal) hunting grounds. Also, their activities upstream of the nature reserve negatively impact the streams within it, primarily through heavy pesticide and fertilizer use and contamination from goat droppings. To address these issues, Shan Shui is facilitating an agreement between the nature reserve and the villagers to establish a mutual understanding of allowed and prohibited activities and to incentivize the village to abide by the agreement.

This agreement is still in negotiations as of this writing. However, the parties have agreed that 12,000 RMB is necessary to secure the community's cooperation. The 2010 Water Fund contribution to the nature reserve allocated just 5,000 RMB for distribution to the community, while Shan Shui donated an additional 7,000 RMB. In future years, Shan Shui anticipates that the Water Fund will fully fund the effort (instead of Shan Shui needing to contribute).

Shan Shui and the nature reserve will organize a "village conference," to be attended by all the villagers, to decide how best to use and manage the money. The funding could, for example, fund the creation of alternative sources of income to the villagers such as beekeeping. It may also be used to pay villagers to not engage in certain activities such as grazing goats near streams. The distribution of the funds will probably include a combination of direct payments to households and a lump sum payment to the village. As He Xin said, "It is good for the households to actually feel the money."

In the event of a lump-sum payment to the village, Shan Shui has full confidence in the village leaders' ability to manage the money. In 2007, Shan Shui introduced World Wildlife Fund (WWF) to the Yu Jia Shan project. WWF gave a small grant of 9,000 RMB to the Yu Jia Shan community for the purpose of microcredit loans. The community has managed the grant very well, creating a community fund and lending out money to individuals based on village approval. The fund collects interest and has grown to 11,000 RMB.

Successes

Creation of a private nature reserve—The timing was right to establish a nature reserve and all the stakeholders were supportive of doing so.

Stakeholder benefits—Pingwu County and Pingwu Township are enjoying a greater degree of water protection at limited additional cost. The village is benefiting financially. Finally, the nature reserve designation has enabled Liu to generate some revenue when he otherwise could not.

Biodiversity outcomes—The biodiversity outcomes have also been positive. Based on monitoring by the nature reserve staff, more wildlife such as golden monkeys and pandas have been utilizing the area. This is due to increased forest cover, better fire prevention, and more effective control of poaching.

Creation of the Biodiversity and Water Fund—The project partners have successfully established this county-wide fund based on donations and, to a lesser degree, Payments for Ecosystem Services. Donations to the fund are increasing over time. The partners have created regulations and assembled an effective team to guide its management.

Challenges

Funding for the nature reserve—Financial support has been the biggest challenge for the reserve. The government was fully supportive of creating a nature reserve, but had no consistent stream of revenue to offer. As a result, the nature reserve is almost entirely funded by private contributions, both directly (e.g., from Liu and Shan Shui) and indirectly (from corporate donors through the Water Fund). Finding a continual, renewable source of revenue is critical to continued protection of the area.

Funding for the Biodiversity and Water Fund—Since its creation in 2007, the fund has received support primarily from Shan Shui, various corporate donors, and one hydropower company. This is a supportive but random array of contributors, who, for the most part, are making one-time donations. Ideally the fund would be supported more by companies having direct impacts on the ecosystem and would be allocated to more closely offset actual impacts by the donors.

Heavy reliance on NGO support—The project is heavily dependent on Shan Shui. Given the endless conservation opportunities in China, it can be challenging for NGOs to determine how much time to dedicate to any one effort—and when to exit.

Replicability

There are two aspects of this project that are particularly replicable: the private nature reserve and the Biodiversity and Water Fund.

Private nature reserve—The circumstances that led to the creation of the Yu Jia Shan private nature reserve were very unique and are not likely to be duplicated. That being said, it would still be possible to create a private reserve in a different locale, as TNC is attempting with its Motianling Land Trust Reserve project (see Chapter I, Tools and Strategies). First and foremost, there is nothing in Chinese law that prohibits the acquisition of forest or other use rights (aside from agriculture) for "non-use" purposes. Beyond that, success requires the support of the local government and a dependable funding stream. It is possible that local government would support the creation of a private reserve, so long as the benefits outweigh the costs. In the case of Yu Jia Shan, the county government was thrilled to have Liu protect an important source of drinking water at little additional cost to the county, and the other resources were virtually inaccessible anyway.

Biodiversity and Water Fund—As previously mentioned, Pingwu supported the Water Fund because it could keep any funding it secured rather than sending it "up the government chain" as is the case with most fees that counties collect. For this reason, other counties may be equally as enthused about establishing such a fund. Securing the funding would be the primary challenge, followed by fund management. Pingwu County is in an usually easy position to raise private funds because of its panda habitat. Other counties may have more difficulty securing funds from private sources. Payments for ecosystem services are ideal for generating funding, but it is challenging to negotiate PES with companies who have no legal requirements to buy services and do so only to show goodwill. Counties that create legal requirements or incentives for companies to offset activities with PES would be much more effective in generating funds.

Below: View of the Yanshan Mountains from a lookout tower at Songshan Nature Reserve. As part of the model reserve effort, Songshan aimed to attract more tourists through well-maintained infrastructure and world-class interpretation. Photo by Megan Kram

SONGSHAN: Evolution of a Model Nature Reserve

Interviewees

- Wu Jigui, Director of Natural Resource Management, Beijing Songshan National Nature Reserve

- Guangzhi (Lucy) Yu, The Nature Conservancy

Introduction

Rising dramatically from the vast, flat expanse where the Hebei grasslands meet the northern hills of Beijing, the Yanshan Mountain Range is an area rich in natural beauty and historical significance. The Songshan Nature Reserve lies within these storied mountains. Here, the Great Wall of China follows a lumpy ridgeline until it meets the East China Sea, ending its 5,000 mile traverse across China. The pine forests of the Yanshan Range have long been an important economic, environmental, and cultural resource for the people of northern China. During the Qing Dynasty, the Emperor Kangxi was so enchanted by the rugged, picturesque mountains that he ordered a lavish royal complex—the "Escape the Heat Palace"—to be built in the forested foothills of Yanshan.

Today, the forests are flourishing, and Songshan has become 1 of 51 model nature reserves in the country. This case study examines the establishment and evolution of Songshan Nature Reserve, with special attention paid to the implications of designation, policy, and management that arise from its unique location close to China's capital city. Songshan is a typical example of a nature reserve in China, and thus provides a lens for examining the shortcomings, successes, and lessons learned from this particular—and common—protected area approach.

Vision

- To protect one of the best examples of temperate forest ecosystems in the greater Beijing municipality as 1 of 51 model nature reserves in China

- To serve as a "conservation window" to other nature reserves in the country

Project Area

Beijing Songshan National Nature Reserve lies in the heart of the Yanshan Range, a 90-minute drive northwest of downtown Beijing on the border of Hebei Province. It is one the closest nature reserves in China to the seat of national government. Songshan is surrounded by nature reserves on two of its three sides, while the third side is bordered by community forest lands. Songshan's boundary is occasionally marked by signposts, and generally follows natural geographical features such as ridges and rivers.

In a small valley within Songshan's borders lies a small village called Dazhuangke. Today, approximately 70 people live in the area. While the rest of the reserve is state-owned, the village is in collective ownership, with the villagers responsible for land use decisions as prescribed by their rights in the collective ownership framework.

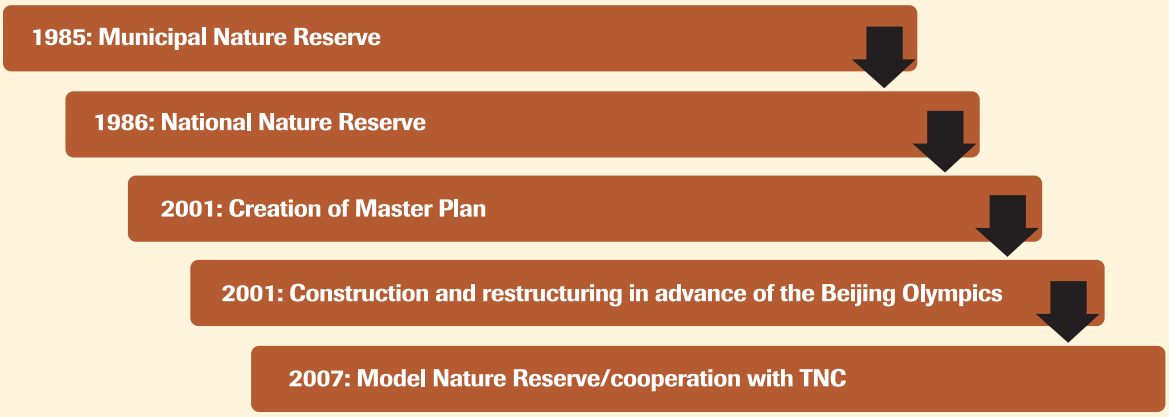
Songshan was established to protect existing regional forest ecosystems and is home to not only warm temperate deciduous broad-leaved forests, but also Chinese pine and Mongolian oak forests. With 88% forest cover, its 4,660 hectares provide refuge for a variety of native animal and plant species that are threatened by increasing development in the region.

Songshan's pine resources are a particularly important conservation target. In fact, in Chinese, Songshan means "Pine Mountains," a name that reflects the historical prevalence and social importance of the region's natural pine stands. The stands of Chinese pine at Songshan are the only natural stands in the Huabei (north-central China plain) region and are, thus, areas of both ecological and educational importance. Due to the use of the Chinese pine in everything from furniture to pharmaceuticals, centuries of logging and deforestation have left few remaining stands of old-growth Chinese pines in the country. Thus, by protecting 100 hectares of one of the few old growth forests of Chinese pine in Beijing Province, Songshan further cements its significance as a conservation project.

Project Creation

Songshan's status as a protected area has evolved over the years, from its beginnings as a municipal-level nature reserve to its promotion to a national-level nature reserve. Songshan's transition from a lower level reserve to a national reserve represents a relatively common trajectory for nature reserves in China (Figure 3–27).

Figure 3–27. Steps and timeline toward the creation of Songshan as a model nature reserve



1. Creation of a municipal nature reserve (1985)—Before its designation as a municipal nature reserve in 1985, the Songshan area was a forest farm (林场) and was subject to commercial timber production and harvesting in select zones. The region first received protected status in 1985 when the Beijing Garden and Forestry Bureau (BGFB) established it as a Beijing Municipal Nature Reserve. The reserve was notable for its rich natural resources, limited degradation, relatively sparse resident population, and its proximity to Beijing, the political heart of the nation. Local residents traditionally used the forested hills of Songshan as a source of fuelwood and other commercial or personal commodities, such as wild mushrooms. Upon transition from forest farm to nature reserve, there were few changes to the use of the collective lands within Songshan's boundaries.

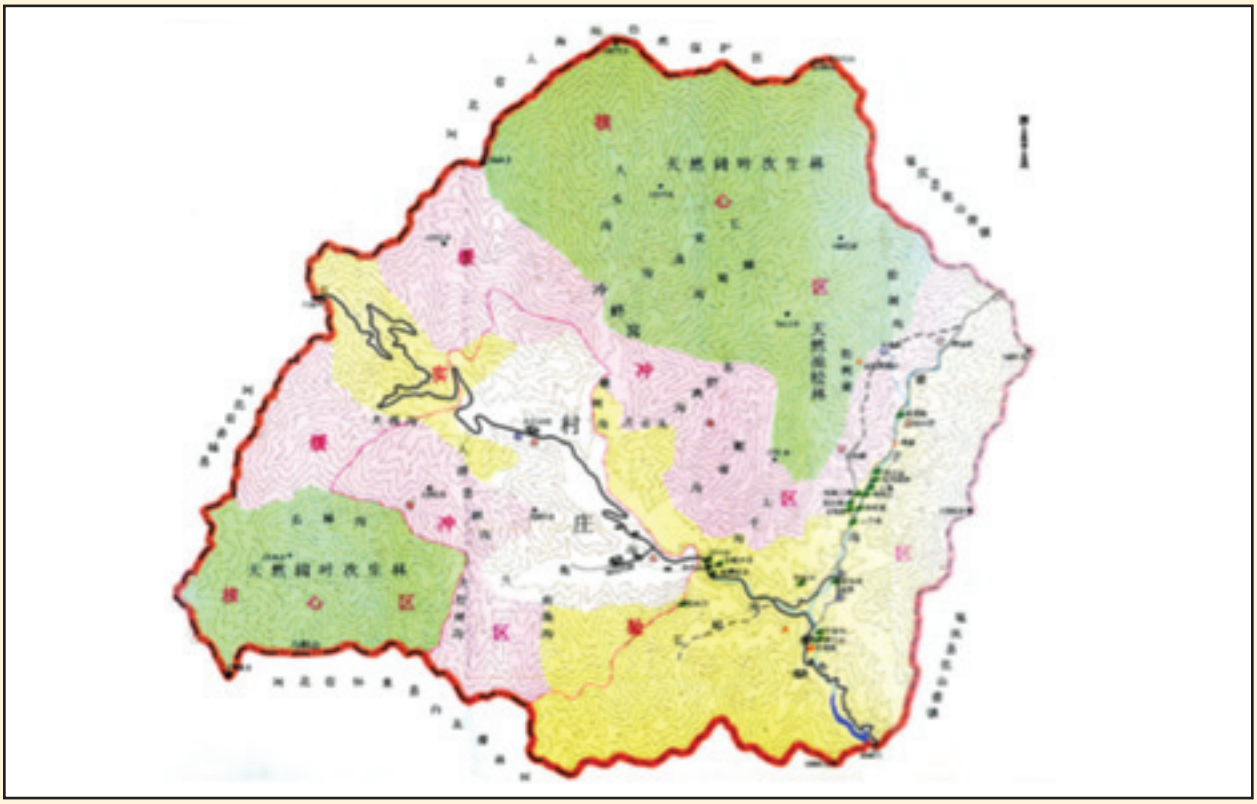
2. Promotion to a national nature reserve (1986)—Under the legal framework guiding the establishment of national-level nature reserves, only a nature reserve with municipal or provincial status can achieve national status. Because Beijing is not governed as a province, but as a special type of municipality, Songshan became a national-level protected area..

3. Creation of Master Plan (2001)—From its establishment in 1985 as a municipal nature reserve until a large influx of funding in 2005 prior to the Beijing Olympics, the majority of Songshan's forest area was closed and not subject to active forest management policies. Over this period, there were few changes to the management structure and there was no active conservation strategy or activity. Smaller steps to reform the management of the park occurred in 2001 with the development of the first official Master Plan under guidance of the SFA and the BGFB.

The *Songshan National Nature Reserve Master Plan* serves as the foundation for the development and management of the nature reserve. The plan specifies both short and long-term development goals for reserve partition, wildlife conservation, capacity building, infrastructure development, community involvement, public education, and ecotourism. As specified in the Master Plan, the first stage (2001-2006) saw the completion of the specimen exhibition hall, education building, and fire control tower as well as the renovation of restaurants, shops, and roads. A second Master Plan is currently under review, and will be implemented in 2011.

The Master Plan divides Songshan into three zones—the core protection zone which accounts for 39% of the reserve, the buffer zone covering 27% of the reserve, and the experimental zone covering 34% of the reserve (Figure 3–28). All of the reserve's infrastructure and visitor facilities are contained within the experimental zone, such as the visitor's center, lodging, and hiking trails. The objective of zoning at Songshan, as with other nature reserves, is to allocate appropriate activities to areas with respect to conservation objectives. This allows a high level of protection in one part of the protected area and controlled levels of minimal impact use in other parts.

Figure 3–28. Songshan's zoning divisions: green = core zones, pink = buffer zones, yellow = experimental zones, and white = village



To encourage conformance with the master plan, the villagers are offered compensation to discourage the illegal harvesting of timber. They are permitted to collect fuelwood, but they also are charged with the process of self-monitoring and enforcement. The Beijing municipal government provides the funding for the compensation. The agreement is broken into two parts: Villagers receive 23 RMB for every mu they control within the protected area; in addition, villagers receive the national compensation rate under the Natural Forest Protection Program. The Songshan management office employs villagers throughout the year, giving them additional income opportunities.

4. Construction and operations in anticipation of the Beijing Olympics (2001)— Construction of reserve facilities began in earnest after the creation of the first Master Plan, and in anticipation of the Olympics, and also upon creation of a second master plan in 2005. There is now a visitor center, restaurants, a walking path, a hotel, and several stations on the trail including bird watching platform, a fire outlook pagoda, and trash cans shaped like tree stumps. The entrance fee is 50 RMB. Annual visitation is averaging 70,000 per year, which is down from more than 100,000 per year in the early 1990s when the government placed an emphasis on tourism. This reduction in tourism was one of the drivers for the creation of Songshan as a model nature reserve (see next section).

The visitor center and the four-kilometer pathway are two of the park's greatest assets and tourist attractions. The center is a lovely two-room building, complete with brilliant photographs of Songshan and many of the other model nature reserves in China. The pathway, which meanders up a gentle slope and ends and the boundary of the core zone, provides a pleasant experience (even though the vegetation on either side of it was being drenched with pesticides as the authors hiked), surrounded by examples of Chinese pine and other plant and animal species. The path is laid in stone for the entire four kilometers, and features interpretation signs, benches, side trails to overlooks, and bridges across a small stream.

There is a side "tourist attraction," an illegal development, about 1.5 kilometers from the visitor center along the nature trail. It consists of rickety rope bridges that were built and run by an individual in the mid-2000s. The operator would live for six months out of the year in the experimental zone, and charged 10 RMB per person to walk across the "Indiana Jones"-style bridges. The operator also constructed a small dam to create a mini reservoir that contributed to the aesthetic of the attraction. The individual has since left and the platforms, bridges, and dams are scheduled to be torn down, presumably at the expense of Songshan.

Today, Songshan is jointly managed by the State Forestry Administration (SFA) and the Beijing Garden & Forestry Bureau (BGFB). SFA is involved in national-level administration and provides review and approval for master plans. The BGFB directly manages the structure and policies surrounding the management of Songshan. Besides providing SFA with occasional reporting and other information, the BGFB is the *de facto* government body in charge of Songshan and budget approval. Songshan itself is responsible for the day-to-day administration of the park. There are 36 employees, plus 10 or so people who are hired from village on occasion for fire prevention and monitoring.

5. Model nature reserve and TNC involvement—In 2007, the BGFB and SFA commissioned TNC to collaborate with Songshan to discuss installation of global-standard interpretation in Chinese nature reserves. As an outgrowth of this effort, SFA and TNC agreed to establish 51 model nature reserves across the country. TNC and Songshan worked together to complete the following efforts; similar efforts are being completed in other model reserves:

- Created a "Conservation Action Plan (CAP)," a TNC planning document that assesses the status of biodiversity values, prioritizes threats to these values, and identifies management strategies to abate the threats. Nature reserve staff, experts, and local community members participated in the process.

- Built the capacity of nature reserve staff for planning, GIS and nature reserve management.

- Supported Songshan's tourism planning efforts to disperse and minimize negative impacts from visitors.

- Invited fire experts to identify the role of fire in the protection and restoration of Chinese pine in the nature reserves.

- Partnered with General Motors (China) to construct a visitor center.

- Completed education and outreach activities including a handbook about Songshan's plants and birds, a short video to promote the reserve, and a summer volunteer interpreter program.

- Helped build Songshan's website in order to attract tourists and generate more revenue.

NGO Role

Currently there are no partnerships with NGOs other than TNC, described in detail above. However, Songshan seeks a bigger NGO presence following its positive experience with TNC. It desires to work further with NGOs to help establish better forest management programs and to establish connections with foreign entities.

Successes

Public-private partnership and model nature reserve—The creation of Songshan as a model nature reserve helped increase the reserve's planning, capacity, education, and outreach. According to Wu Jigui, visitors to the park increased dramatically after the initial creation of the model nature reserve; however the numbers leveled and eventually fell after a few years due to minimal funding to promote the park to tour groups and travel agencies.

Resource protection—A well-trained staff at Songshan has enacted a series of mechanisms important to the long-term protection of the reserve. According to official reports, there has been no fire, illegal logging, or poaching in the reserve for 21 years. Songshan relies on a forest patrol system and patrol team to strengthen the conservation and management of ecological resources. In 2005, a team for fire suppression was established.

Challenges

Funding—Like most nature reserves, Songshan has far less funding than it would like. The most pressing needs for additional funding are facility operation and maintenance, marketing, removal of the illegal dam and rope bridge, and, according to one park scientist, additional monitoring.

Ecosystem management— Arguably, the reserve places too much emphasis on fire suppression, with the fire suppression team, a consistently-staffed fire observation tower, and "no smoking" signs everywhere. The use of "bug zappers" and pesticides on either side of the nature trail is ecologically questionable in a nature reserve, particularly since the trail runs along a creek

Enforcement—While Songshan has been successful in preventing illegal logging and poaching, monitoring and enforcement remains a challenge. There has been an increase in locally-led tourism which is problematic because tourists are accessing, with the aid of local villagers, the core zones of the reserve by a trail leading from the village to the summit of Haitou Mountain—the highest peak in Songshan. This access is having a serious negative impact on the ecosystem along the trail. Due to the unplanned tourism, several new trails have appeared in several valleys in the reserve, and the vegetation along these trails is also damaged to some extent.

Replicability

It is expected that SFA will evaluate the success of the model nature reserves after more time has passed, and will decide at that time whether to replicate the program.

Below: Dai Guofu stands in front of a statue that reads "Darwin" at the Nanwan Monkey Islet Eco-tourist Attraction. Photo by Megan Kram

Monkey island: Conservation Development for Primates, People, and Profit

Interviewees

- Mr. Dai Guofu (above), Developer and Chair of the Hainan Nanwan Monkey Islet Eco-tourist Attraction

- Dr. Long Yongcheng, Chief Scientist, TNC's China Program

Introduction

In the middle of the Monkey Island development and surrounded by lush vegetation, a bronze statue of a monkey gazes thoughtfully at the human skull in the palm of its hand. "Darwin," the inscription reads.[164] The statue embodies businessman Dai Guofu's philosophy of development and conservation: Projects must respect nature or humans will cause their own demise.

Upon visiting Nanwan Monkey Island in the mid-1990s, cable car entrepreneur Dai saw the opportunity to profitably apply this philosophy while resolving many of the island's issues. The island, established as a nature reserve in the 1970s, was suffering from decaying tourism infrastructure and unsustainable fuelwood harvest on the part of local villagers. Annual visitation had dropped from 200,000 in 1990 to 30,000 in 1995, which reduced income for the nature reserve and the local people. Related, the local people were hunting the resident Hainan rhesus monkeys, a state protected species, for bushmeat, medicinal purposes, and even out of self-defense—the monkeys had a habit of harvesting farmers' young sweet potatoes. With just 100 monkeys remaining, the future of the primates and their habitat did not look promising.

Fortunately for the monkey population, Dai had a vision of a conservation development and the resources and savvy to execute it. Today, Monkey Island is a major tourist destination that is protecting the forest and wild monkeys, enhancing villagers' livelihoods, and generating ever-increasing profits. And, of course, the development includes a cable car—China's longest overseas cable car, in fact. This case study shows how conservation development projects can be sustainable and benefit all stakeholders involved, arguably with the exception of 100 show monkeys.

Vision

- To generate a profit by developing a tiny portion of Monkey Island for tourism and conserving the remainder of the island for the Hainan rhesus monkey

- To conserve biodiversity while benefiting local people

[164] The sculpture is modeled after Hugo Rheinhold's "Monkey with Skull."

Project Area

Nanwan Monkey Island is actually comprised of two peninsulas and a small island. Together, these landforms constitute 1,000 hectares (nearly 2,500 acres) on the south coast of Linshui County in Hainan Province. They are an hour's drive east of the town of Sanya, which boasts China's most popular beaches and an airport. The peninsulas are surrounded on three sides by the South China Sea and serve as the only tropical-type nature reserve for macaque monkeys in the world. Today, 24 tribes of approximately 1,000 monkeys inhabit the area. Four of these tribes serve as the "show monkeys" for Dai's development on one of the peninsulas, while the remaining 20 tribes roam freely outside the development area. As recently as the 1960s, the local people used significant portions of the land for agriculture. Now, however, most of Monkey Island is covered with forest and fruit trees such as lychee, coconut, and jackfruit.

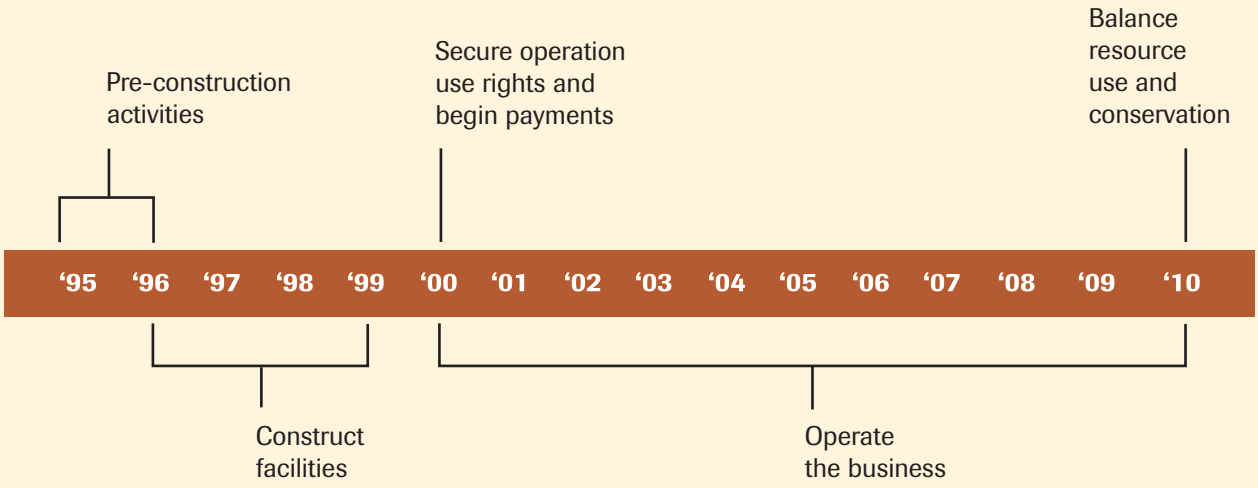
The nature reserve is a provincial-level protected area that the Hainan Provincial Forest Bureau operates through a conservation station. The nature reserve covers 90% of the peninsulas and consists of the traditional core, buffer, and experimental zones. The 10% of the island outside of the nature reserve primarily lies along the outskirts of the peninsulas, along the sea. The conservation development project covers less than 1% (80 *mu* or 5.6 hectares) of the peninsulas near its outskirts and straddles the boundary of the nature reserve. Ten *mu* of the development lie in the experimental zone of the nature reserve. The remaining 70 *mu* lie in what was previously collective unused land (wasteland) that the local government requisitioned for the project.

There is one village associated with the island consisting of approximately 400 households and 1,200-1,500 people. Most of the villagers reside in shacks that float in the channel between Monkey Island and the mainland. The villagers earn their incomes through employment with the conservation development, fishing, sales of food and gifts, and other tourism-related activities. The world's fastest cable cars fly over the village, shuttling tourists between the development project and the mainland. At 2,138 meters, the cable lines comprise the longest overseas cable car in China.

Project Creation

Establishing the project was relatively straightforward, largely due to the clear and significant benefits that the conservation development would provide to the stakeholders. Operation began in 2000, just five years after Dai first visited the site for the first time (Figure 3–29).

Figure 3–29. Steps and timeline in the creation of Monkey Island Conservation Development



1. Pre-construction activities—To prepare for the construction of the cable car and on-site tourist facilities, Dai conducted a socioeconomic survey, garnered government approval for a general strategic plan, and obtained separate approval for construction. The survey captured data such as population, age, and income of local villagers in order to learn about the potential employment base. Based on the survey, Dai created a general strategic plan to describe the project including anticipated improvements to local livelihoods, proposed locations of cable car and tourism infrastructure, profit-sharing agreements, environmental impacts, and other aspects of reserve management. Because the project would affect a provincial-level nature reserve, Dai needed approvals from provincial and county governments and their respective departments. For example, the land and resources bureaus at both levels approved the concept of issuing development use rights, the ocean bureaus approved the seashore-related construction plans, and the environmental protection bureaus verified the adequacy of the environmental impact assessment.

Once the provincial and county governments approved the strategic plan, the county granted Dai the approval to construct the cable car and tourism facilities starting in 1996, with the understanding that operational (i.e., development) use rights would commence in 2000. According to Dai, once a strategic plan is approved it is relatively simple to obtain construction approvals and operational use rights.

As part of the construction approval process, the county secured access for Dai to the 70 mu outside of the nature reserve. The county purchased the land from the village using money from Dai, converted the land from collective to state ownership in accordance with the law,[165] and sold Dai the use rights. The transaction was relatively simple because the land was classified as "wasteland" and was not being used for agricultural or other purposes. It enabled the villagers to earn money on land that was not generating any income.

[165] Land Administration Law Article 43

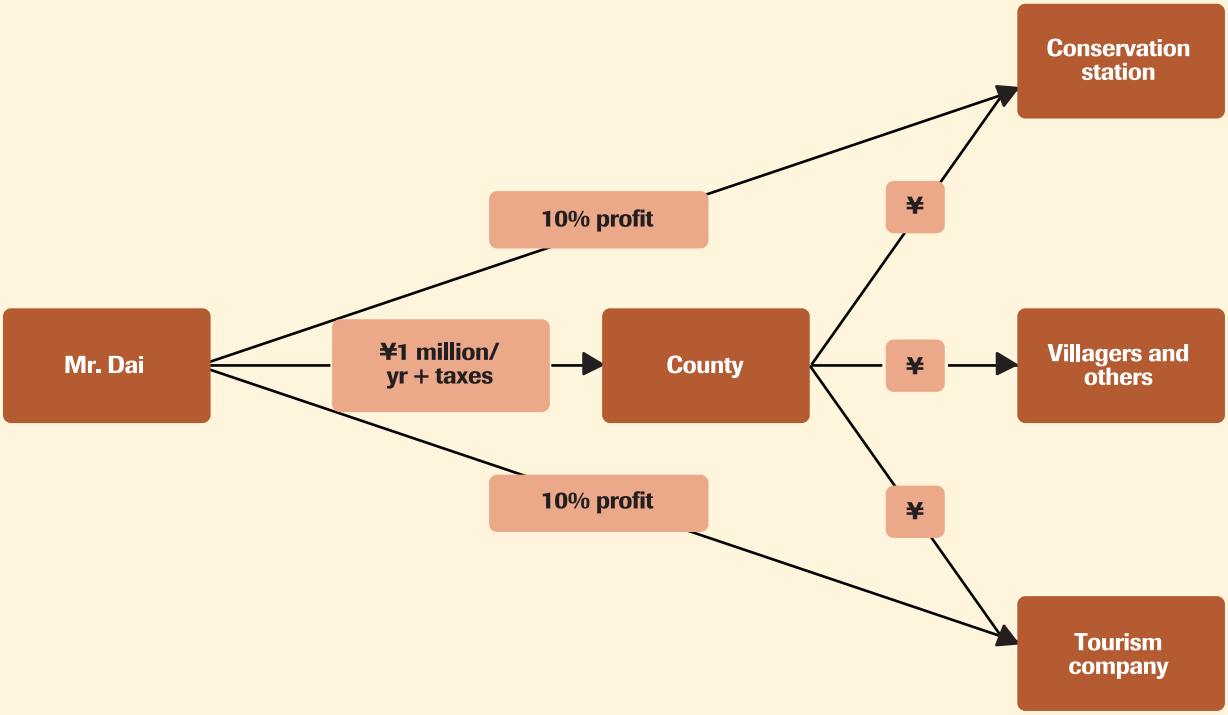
2. Construct facilities—From 1996-1999, Dai constructed the cable car and tourism infrastructure, aiming to build a "harmonized environment for the coexistence of humans and wildlife." The buildings incorporate natural materials such as coconut shells for roofs and small-diameter coconut logs for building structures, signposts, and benches.

The development project includes two large "bedrooms" and a number of smaller "guest rooms" for the monkeys. The bedrooms are the forested mountainsides that lie adjacent to the development. As Dai explains, "The monkey is the master" of the bedrooms and enjoys full respite from tourists. The "guest rooms" consist of outdoor theaters for monkey performances, a monkey swimming pool, and other facilities where tourists (the guests) can view them. Fruit trees mitigate the summer heat for both monkeys and humans. Lush native plantings both prevent the establishment of invasive species and provide a beautiful environment for guests.

3. Secure operation use rights and begin payments—In 2000, Dai signed a contract with Linshui County for 50-year operational use (i.e., development use) rights to the 80 *mu* project site. The contract specifies that Dai will pay the county 1 million RMB per year for the life of the project, regardless of profit and in addition to taxes. Dai took great care to ensure that the terms of the contract would appeal to subsequent employees and politicians so that they would not be likely to rescind or change the contract. Upon expiration of the use rights, the county will have the option of taking them back or negotiating a new contract. Dai expects the latter, since the project is benefiting all the key stakeholders.

Through a separate but related agreement, Dai formed a joint venture with the conservation station that operates the nature reserve and the county tourism company. The terms of the venture specify that Dai will pay each party 10% of net profit on an annual basis. This arrangement facilitated securing the use rights from the county. These entities also receive some portion of the 1 million RMB from the county finance department, based on an internal county allocation process. Dai retains all remaining profits and is responsible for all capital and operational expenses (Figure 3–30). Thus far, the model is working well and all parties are adhering to the terms of the contract.

Figure 3–30. Monkey Island development funding path



4. Operate the business—Since the conservation development became operational, visitation has increased 20-fold, from 50,000 in 2000 to 1 million in 2009. In 2009, international visitation totaled 150,000 people from Japan, Russia, and other countries. Profits have been skyrocketing as well. The first year of operation was the only year that ran a deficit, and Dai contributed 100,000 RMB of his own money to pay the county the 1 million RMB as promised. Just nine years later Dai earned 18 million RMB in net profit after paying the government nearly 7 million RMB in taxes. The entrance fee, including the cable car ride, currently costs 140 RMB per day.

While the cable car ride is exhilarating, the 100 show monkeys are of course the main attraction. Dai applies an operational methodology in which the monkeys are the "hosts," the tourists are the "guests," and the workers are the "servants." Dai makes a genuine and concerted effort to ensure the health and well-being of the hosts—as much as is possible given their roles as entertainers. Visitors are not allowed to touch the monkeys and are closely monitored by the many workers. At night, the monkeys retreat to the solace of the forested mountainsides.

The interactions with the monkeys can produce a wide range of emotions, from thrilled awe as monkeys greedily grab peanuts from your hand, to wonder as you see them splash and frolic in the swimming pool, to bittersweet appreciation as you see realize the unwitting sacrifice that these creatures have made to enable their wild brethren to persist. As Bedford (2009) writes, "The various stations you walk through…[bring] to mind a cross between an organ-grinder and an old time carnival—but 1 million people a year are able to have an up-close experience with a remarkable little creature."

Thanks to the working monkeys, local livelihoods are improving and the wild monkey populations are recovering. The development directly employs 200 people, 90% of whom are local, and pays them at market rates. In addition, tourists support other businesses apart from the conservation development such as restaurants, food stands, hotels, and gift shops. Because the local people have more income, hunting and fuelwood gathering within the nature reserve have decreased. Over the last 15 years, the monkey population has multiplied ten-fold.

5. Identify strategies to balance resource use with resource conservation—The development's facilities are at capacity to support its current 1 million annual visitors, and visitation is still growing. Dai estimates that another half-million visitors would require more infrastructure and six more tribes of monkey performers, which he considers "no longer conservation-friendly." As a result, Dai is considering alternative options that would keep profits growing without placing significant additional pressure on the monkeys.

One option would be to cap visitation and increase ticket prices. However, the more likely scenario in the near future is that Dai will expand tourism options to include the local village and its "seashore-style culture." He has received authorization to manage the coral reefs around Monkey Island, and aims to capitalize on the island's natural and unique values such as its beaches, seafood, and floating houses. Whether the new activities will shift attention from the monkeys is to be determined, but unlikely. In any case Dai fully recognizes the need to carefully plan for and mitigate risks to the primates, the freshwater aquifers, and the seafood populations that could result from additional development.

NGO Role

Dr. Long, one of the interviewees and a TNC employee, is the leading scientist for China's primatological community. As such, he has had an informal role in providing technical advice for the management of the monkeys in the island. Dai has also asked TNC to assist in the coral reef management.

Successes

Improved conservation of the nature reserve and wild monkeys—Fuelwood harvest and monkey hunting were the primary pressures on the nature reserve prior to Dai's involvement. Because the development project has greatly increased local peoples' employment and incomes, their dependence on the nature reserve's resources is substantially reduced. The villagers are self-policing of the nature reserve and the monkeys. As Dr. Long quips, "No one wants to cut their money tree. You kill one monkey and the other families will kill you."

Ever-growing profits and improved local livelihoods—All stakeholders are profiting financially from the development: the local people, the local government, and Dai. The villagers enjoy a much more sustainable existence than they once did due to employment by the development and other tourism-related income streams.

Government support at all levels—The government continues to support the development because it is earning millions of RMB in tax revenues every year. In addition, the project has received recognition from the Communist Party. In February 2011, a member of the CPC Central Standing Committee visited the Monkey Island and recognized its role in both promoting local economic development and being a model of best practices for wildlife and natural resource management.

Challenges

Development—Creating a conservation development "is like sailing a small ship through a sea of potential lagoons," observes Dai. There are many potential pitfalls, and strategy and foresight are required to sidestep them with grace and maintain credibility. Dai explained the challenges of running a business in a nature reserve and with local people: Operational models may be constrained by no development restrictions in buffer and core zones. Hiring local employees is critical to ensuring the support of local people and the government, but significant staff training may be required to achieve a high quality of service. Furthermore, local and external partners may have differing ideas of designs that will attract tourists, such as "fancy materials" versus natural products.

Philosophical debate—Is the sacrifice of a few worth the benefits to the many? A visit to Monkey Island inevitably begs this question. As Bedford (2009) writes, "Now, there is a strong population, good habitat protection, and a local community that relies on the health of the monkeys to survive—even though we were all embarrassed for the monkey's loss of dignity at being on stage in a 'Monkey Comedy Theatre.'" In any case, it is clear that Dai genuinely wants the monkeys to be healthy and happy. "Upon my retirement," he reflects, "all that I want is for the monkeys to say, 'This guy treated us great.'"

Balancing conservation and development—Visitation is increasing with no end in sight, especially if Dai proceeds with the seashore culture tourism expansion plans. As numbers increase, pressures on the monkeys, fisheries, and freshwater supplies will mount. Having too many visitors is perhaps an enviable problem, but one that requires careful planning and attention, as Dai fully realizes. As development progresses, time will tell the extent to which the monkey statue's message of sustainable development will persist as the Island's guiding principle.

Replicability

Few nature reserves offer the draws of Monkey Island such as its charismatic primates, beaches, and close proximity to an airport. However, Dai firmly believes that it is possible to create conservation developments in other parts of the country that are economically, socially, and environmentally sustainable, if certain criteria are met. First and foremost, he urges developers to pursue sustainability over a very long term, at least several generations. This may mean sacrificing some short-term profit for long term natural resource conservation. For developments in nature reserves, he strongly recommends keeping them within the experimental

zone and out of core and buffer areas, in order to sustain conservation values. He recommends showcasing the values for which the nature reserve exists—wildlife or other—and respecting these values as the "hosts." "Any development must respect and appreciate the local host," he emphasizes. He strongly cautions that developing in nature reserves with endangered species such as pandas may only add to their demise and again—that long term costs and benefits to species and profits must be considered, as they are inextricably linked.

Site of the future Great Wall Resort. The developer will concentrate buildings and sustainable agriculture in the valley, while protecting surrounding hillsides as a model nature reserve. Photo by Great Wall Resort Ltd.

Great wall resort: The Making of a Model Conservation Development

Interviewees

- Robert Devine and Zhao Shan, business partners, Great Wall Resort

Introduction

"I missed the nature in the U.S.," explained Zhao Shan, one of the three partners of the Great Wall Resort project, regarding his motivation for creating the Great Wall Resort. To clear his head from studying economics in the U.S., he hiked in National Parks such as Yellowstone and the Grand Tetons. And when he returned to China in 1994, he sought out new trekking destinations—including the future site of the Great Wall Resort (GWR). Then lying 2.5 hours north of Beijing and bordered by a rare stretch of un-restored Great Wall, the pastoral site was an easy, peaceful getaway for this native Beijinger.

Now 15 years later, Zhao Shan and his partners are creating a nature preserve and luxury resort on this special land. They are lucky—a conservation development was not always the plan for the GWR site. In the 1990s, the State Council granted development permissions to the Beijing Cultural Relics Bureau and the local government to create a "Badaling"-type destination at what is now the GWR site. Badaling is the Disneyland of the Great Wall; an awe-inspiring but overwhelmingly developed site complete with a cable car, expansive visitor facilities, and a highway to transport millions of tourists per year.

Horrified by this notion, Zhao Shan and his partners jumped on an unexpected opportunity to create a vastly different vision of a development that would provide an authentic visitor experience while protecting natural values. In 2000, a hiker fell off the Wall at the GWR site and broke her arm. The incident received press coverage because a foreign ambassador happened to be among the group. Concerned about potential liability, the government halted its mass development plans and began to consider Zhao Shan's idea.

This case study explains how the GWR partners—with their passion for conservation, business savvy, and dogged persistence—are bringing their vision to life. The tale sheds light on how to navigate the development process through a dizzying array of government agencies and villagers, and provides insights about how it may be possible to establish permanent protection for nature outside of an existing protected area in China.

Vision

- To build an environmentally sustainable resort that will showcase model conservation development practices such as green building principles and sustainable farming

- To restore and protect the natural environment and preserve a section of the Great Wall

- To provide a comprehensive framework of livelihood improvement for the local community including housing, services, job opportunities, retirement and medical security, plus an option for significant cash payouts to finance urban relocation for those who choose that path

- To implement an economic model that is robust enough to support the above priorities

Project Area

The GWR site lies 65 kilometers north of Beijing's Central Business District, within Yanxi Township, in the Huairou District of Beijing Municipality. It is two kilometers west of the Mutianyu Great Wall, on the north side of the Wall. This section was built around the year 1600 during the Ming Dynasty and is famous among local hikers for its beauty.

Bordered on two-thirds of its perimeter by 20 kilometers of original Great Wall, the site is roughly triangle-shaped and covers 15 square kilometers (1,500 hectares). Still in pre-development, it is primarily covered by 1,400 hectares of shrubland and forested hillsides rising up to the Wall (thanks to the reforestation efforts of the GWR partners), with some village lands and agricultural plots in the valley below. The site is under collective ownership, and is managed by one administrative village comprised of seven natural villages. The villages are scattered throughout the valley and include approximately 180 households and 400 villagers. The villagers reside on 21 hectares of rural residential lands and farm 65 hectares of agricultural lands (1% and 4% of the land area, respectively). Different use rights pertain to each of the three types of land: hillside, agricultural, and rural residential.

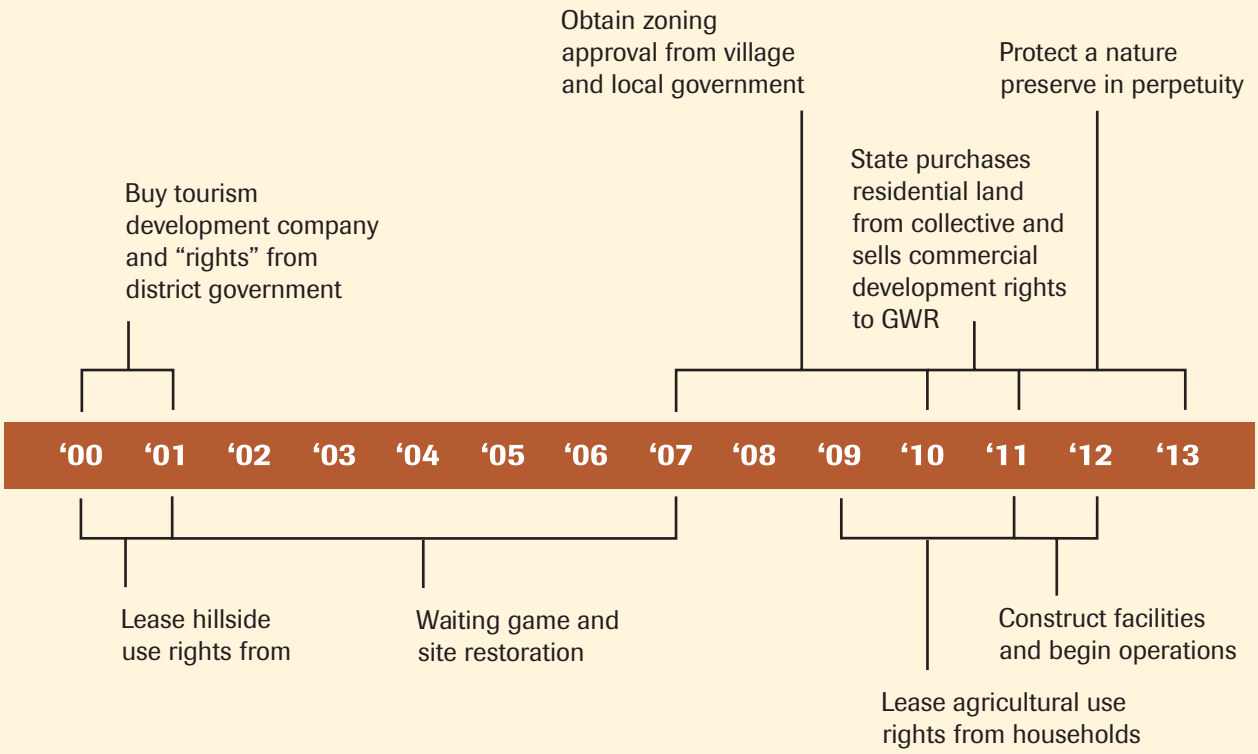
The site, though scenic, was in dire straits environmentally when Zhao Shan and partners first became involved. The land had been nearly completely deforested and wildlife was practically nonexistent. The local agriculture practices were unsustainable and depleting the soil. Farmers used significant amounts of pesticides and herbicides on the farmland (as is common throughout China) and poisoned pheasants and other birds so they would not eat the corn. "We never even saw a bird for the first few years," explained one of the partners.

Villagers earn approximately US$700-800 per year from agriculture and tourism. Net per capita agriculture income, primarily from corn, is approximately US$300 per year. Net per capita tourism income is US$400-500 per year and is generated primarily from Beijingers coming to climb the wall (although technically the Wall is closed to the public), paying for (unsanctioned) tickets, buying food and drink, and perhaps staying overnight. There are two problems with the tourism. First, damage to the Wall from unregulated access is becoming increasingly apparent. Second, income is distributed unequally—two private restaurants account for nearly half the income. Without the GWR project, the government would have either had to restrict access (unlikely because it would crush the villager's tourism income), or completely rebuild the Wall along the Badaling/Disney model, paid for by developing the valley for mass tourism.

Project Creation

The project started in 2000 and should be operational by 2013, with the infusion of approximately US$200 million (Figure 3–31). Once fully developed, the project will consist of an eco-luxury spa, resort, a new village, and other resort-related buildings on 1% of the site; agricultural plots in the valley on 5% of the site; and the remainder of the valley and surrounding hillsides protected as a nature preserve.

Figure 3-31. Steps toward the creation of the Great Wall Resort



1. Buy tourism development company and associated "rights" from the district government—The State owns the Great Wall. Prior to the involvement of the GWR partners, the State Council had granted permission to the Beijing Cultural Relics Bureau for tourism development of the Wall bordering the GWR site. The district government had set up a "Development Center"—a quasi-private company—responsible for acquiring the collective lands, relocating its residents, and planning and constructing the mass development.

GWR spoke with government officials at all levels, from the village to Central Government bureaucracies like the State Administration of Cultural Heritage, to garner support for its vision and acquire control of the project. GWR negotiated the purchase of the development center

from the district government for a couple million RMB and, in doing so, acquired the "tourism rights" for an indefinite period of time. In 2001, the transaction was completed and the Development Center was transformed into a private company owned by GWR.

2. Lease hillside use rights from collective land managers—With the private corporation in place, GWR negotiated a 70-year lease for 1,400 hectares of collectively-owned hillside land (Figure 3–32). The negotiations were relatively easy, because the land was economically productive for the peasants only insofar as it provided fuelwood, wild crops such as mushrooms, and limited wild game. The company received all use rights and lease payments were contingent upon controls on continued deforestation. The collective leadership, prior to signing, sought and obtained approval from the township and district governments.

3. Waiting game & site restoration—In 2001, China was focused on rapid development and there was little recognition of, or market demand for, conservation projects. Additionally, with travel time from central Beijing to the GWR site then nearly three hours by car, the project could not economically support a conservation model. So, with the hillside lease and development rights in place, GWR proceeded to wait for infrastructure and the market to catch up to the project concept, while immediately commencing restoration activities. For the next six years, GWR paid lease fees to the collective, implemented a reforestation program, and prepared the ground for development by engaging with all levels of government on education and outreach. The hillsides are now covered by young forests of species such as wild apricots, pines, mountain poplars, and cherry.

4. Obtain zoning approvals from the village and the local government—In 2006, the waiting game ended as the government constructed the JingCheng Expressway, cutting transport time from central Beijing to 1.5 hours. (Additional roads and tunnels have also been planned, which will further reduce travel time to one hour by 2012.) Interest in "green" experiences had also become more widely spread in China. In response, GWR began working within the District Government's regional planning process to start a "master" zoning designation for the tourism development land within the valley of the site. Although the government had already approved tourism development for the Wall, GWR still needed approval for the "detailed" zoning for locations for buildings, densities and heights, and road and infrastructure layouts.

Figure 3–32. Sample provisions of the hillside lease between GWR and the collective

- States goals of protecting the Great Wall and other cultural and natural resources in the valley, restoring the forest, developing tourism infrastructure including site and economic planning, and improving villagers' livelihoods
- Defines "hillside" as mountains, forests, scrubland, riverside (i.e., riparian areas)
- Transfers the use of the hillside resources including trees and other natural resources to the company for 70 years
- Explains that is the "mutual responsibility" of GWR and the collective to undertake the "aggressive protection" of cultural and natural resources, including stabilization of the wall
- Prohibits GWR or anyone else from felling trees or otherwise harming existing forests, trees, and fruit trees without proper approvals (e.g., from the State Forestry Administration)
- Prohibits the conversion of scrubland into development or agricultural land, and any projects that will cause soil erosion
- Obligates GWR to increase forest cover by 75% over the life of the lease, protect water resources, protect public water irrigation infrastructure, and prevent soil erosion
- Allows the withdrawal of land from the contract if the government changes the zoning and/or intends to acquire the land
- Gives GWR exclusive rights to the use of the assets, investment return, and cooperation with third parties
- Gives GWR the right to determine the extent and nature of tourism development, including the structure such as direct investment, cooperative investment, and selling or leasing the project

Ordinarily, planning and zoning is internal government work. For the GWR project, however, the partners undertook zoning on behalf of the government, committing to both funding the planning work and working the bureaucracy to obtain approvals. This unusual arrangement cost GWR 2.5 years and more than US$1 million, but allowed them to create a plan aligned with their vision. GWR retained two U.S.-based firms—Hart Howerton as the Master Planner and Sherwood Design Engineers as the civil and environmental engineers—to formulate the plan and then began the long and arduous task obtaining government approvals from the village, township, district, public (through a 30-day public comment period), and municipal government. Village approval was based largely on the compensation plan (Figure 3–33).

Figure 3–33. Compensation package that GWR is providing the villagers in exchange for their use rights and opportunity to develop the GWR site

For villagers choosing to remain on-site

- Ongoing income from hillside and agricultural leases.
- One-time cash payment for agricultural land averaging approximately US$25,000-30,000 per household and based on the total number of mu acquired (one mu is equal to 1/6th of an acre).
- Compensation for housing and other above-ground structures averaging approximately US$80,000 per household and consisting of either new housing with utilities such as running water, gas for cooking and heating, and telecommunications. The houses will be owned by the recipients and they will not pay any rent.
- Indefinite employment for whoever desires it, including entrée into a social security system (retirement, pension, etc).
- Potential income for the rental of any "extra" residential units in the new village that are not inhabited by the villagers. GWR will manage the new village jointly with the collective and since the new village will accommodate up to 200 households (more than the number of villagers who are expected to want to stay on-site) the additional space will be rented to the resort for back-of-house and staff dormitories, or for local retail operations and the like.

For villagers choosing to move away

- One-time cash payment of approximately US$80,000-100,000 for the agricultural land, housing, and other above-ground structures. This compensation is higher than for those choosing to stay, because they are foregoing all the other benefits such as new housing and employment. As part of its calculation, GWR estimated that unskilled labor moving to Beijing will earn at least 60 RMB per day or approximately 20,000 RMB per year.

5. Lease agricultural use rights from households—In 2009, GWR initiated the painstaking process of leasing agricultural land from the villagers, household by household. The partners worked out an agreement with the land managers whereby GWR could acquire the use rights for all of the agricultural plots within three years if at least 75% of the households agreed to the transfer—an all-or-nothing arrangement. Unlike the hillside land, which was under the direct control of the collective land managers, they had contracted out the agricultural land to individual households in a "crazy patchwork." The result was 700 different leaseholds across the valley, each of which is being negotiated and then transferred to GWR. It is like putting together a jigsaw puzzle and has already involved stacks of leases "a meter high."

As of 2010, GWR had acquired more than half of the agricultural use rights, each for the remainder of the household's contract (average of 25 years), and GWR had planned to lease more land at the end of the growing season. For the most part, the households have been amenable to leasing their use rights because of the compensation. The biggest challenges have been the households who were using the land for illegal but lucrative non-agricultural purposes, such as parking lots at which they charged entry fees to hikers, and speculators from outside who leased some of the land and attempted to flip the leases to GWR at inflated prices. With much of the agricultural land under control, GWR has started reducing the sites' toxicity by prohibiting the use of chemicals and poisons. As a result, wildlife such as pheasants and wild pigs are returning.

6. State purchases the rural residential land from the collective and sells development right to GWR—GWR must also obtain the rights to construct the commercial infrastructure on the rural residential land. This area will include all the rural residential land except that which the new village will occupy, which will remain in collective ownership. The state will sell the development rights to GWR via tender, which will require GWR to create an Environmental Impact Statement. Once the transaction is complete, GWR will own the land use rights to the state-owned portion of the valley (15 hectares) of rural residential land for a period of 40 years. The use rights are renewable upon expiration. How this renewal will work is to be determined—perhaps through another payment.

7. Construct facilities and begin operations—The resort facilities will include a central spa and hotel, a club house, hotel reception and facilities, an integrated organic farm, organic cuisine restaurants, small-scale meeting and banquet facilities, and other outbuildings. The new construction will reuse as many materials as possible from the existing buildings. It is not desirable to simply renovate the existing buildings because of they are highly energy inefficient and have limited historical value.

The site will be a model of sustainability, and will include an interpretive learning center to describe each of the sustainability elements below:

- **Environmental sustainability**—GWR is restoring the local biodiversity on most of the site and nearly the entire site will be protected as a nature preserve. GWR is partnering with TNC on these efforts.

- **Resource sustainability**—GWR will design the resort to LEED standards and is aiming for net zero impacts on energy, carbon, and water. All the energy will be renewables (geothermal, biomass, and solar) so the resort will be "off-grid." New buildings will be constructed with local materials using green building design, the biomass will be harvested locally, rainwater will be harvested, and maximum onsite recycling and treatment will be used.

- **Agricultural sustainability**—GWR will aim for 90% food self-sufficiency for grains, meats, produce, and herbs for its restaurant on-site. It will export any extra local fruits, nuts, and mushrooms to nearby Beijing. The farm will be organic and chemical-free.

- **Cultural sustainability**—The site will be a model of non-profit, limited tourism that strives for in-place preservation (i.e., no reconstruction of the Wall). The Wall will be open to the public and not just limited to hotel guests, but GWR will cap the number of visitors.**8. Protect the hillsides as a nature preserve in perpetuity**—Although GWR will hold all the use rights to the site, there is no guarantee of long-term protection for the future nature preserve which will cover the vast majority of the hillside/forest area (Figure __). This uncertainty is due to China's patterns of tenure insecurity and limited enforcement. GWR and TNC considered having the government establish a protected area, but are leaning instead toward private protection and management, with government support. The solution must address issues such as future ownership of use rights by a party other than GWR who may not want to retain the nature preserve; activities that would harm biodiversity values, such as incompatible timber harvest; rezoning and legal development; and illegal development. Along with the Motianling Land Trust Reserve Project (see Chapter I, Tools and Strategies), TNC and GWR hope that this project can help start a 10-20 year conversation with the government about developing a trust and easement regime in China.

NGO role

The Nature Conservancy (TNC) is helping GWR figure out how to establish permanent protection for the nature preserve area. TNC will also help design and manage the preserve as a model protected area in China and will provide input to the interpretive center. TNC or other entities may be able to offer trainings for park rangers or other types of conservation professionals from the center.

Successes

Stakeholder support—"Nothing has gone terribly wrong," quips Devine. Sarcasm aside, this highly complex project is on its way to successful completion because the GWR partners have "played their cards" wisely. GWR has saved the site from being "chopped into pieces" and has maintained functional control. The partners developed a feasible business model with the right partners and financing to support the project. And thanks to good timing and strong relationships with the government, they have received approval for "an excellent zoning plan," for both conservation and development purposes. Slowly but surely, they have had success in obtaining buy-in from the government.

Figure 3–34. The proposed nature preserve (green/shaded areas) covers the vast majority of the GWR site and includes all of the hillsides

Challenges

Resource requirements—GWR has learned some important lessons along the way. While GWR believes that getting into the zoning was really the only way to create a truly successful project, it has cost more time, patience, and money than they envisioned. Also, they did not anticipate the challenges in arranging for funding – the business model needs to be very solid very early on in the project in order to obtain the necessary funds. Finally, Devine wishes they had worked more closely and earlier with the government bureaus on the site design and zoning, rather than investing significant time and money in a design that the township initially rejected.

Replicability

Devine shares the following recommendations for others interested in creating conservation developments:

- **Develop a sound business model.** The developer needs to know from the outset that the project is financeable, including the extra costs and foregone revenue from land conservation. GWR carefully developed its model, which was challenging because so little of the land area is being developed (i.e., there is less land on which to generate revenue) and the price of acquiring development rights is very high, particularly in the Beijing area. A golf course, for example, may be an "easier sell" for financing but was not compatible with GWR's vision.

- **Be prepared to solicit approvals from the full array of village and government stakeholders.** Developers will spend significant time and money in soliciting approvals from villages for use rights, and from the government for zoning approval and development use rights. Although the GWR case was more complicated than the average deal due to the importance of the site, the same or similar process of working through the different bureaus at different levels of government (e.g., township, county, province) would be utilized in other areas of the country. Obtaining buy-in at higher-levels of government (e.g., district vs. township) will ease the approval process. As Devine states, "If the higher-ups believe in a project, the lower ones will at least pretend to."

- **Get involved in zoning.** Even if conservation development were the government's focus, its plans would have undoubtedly differed greatly from GWR's. For example, the government probably would not have hired the same caliber of site planners and would have created a much more simple design, such as a block of land for development in the middle of the valley. Such decisions directly affect the final product, including its conservation and revenue-generation potential.

- **Carefully plan land protection.** There is no "silver bullet" for protection—there are both pros and cons with creating either traditional protected areas or private protected areas. To be effective, any solution must be sanctioned by the government and address key threats such as future ownership by a party with different values, activities that would harm biodiversity values, illegal development, and the potential for rezoning and legal development. The solution must also, naturally, provide ample incentives for local villagers to abide by any use restrictions, ideally by improving their livelihoods.

The project will reforest abandoned agricultural lands. Photo by Steve Blake

Tenchong county forest carbon offsets: Protecting Land with a Gold-level Certification Project

Interviewee

- Ma Jian, Project Manager, The Nature Conservancy

Introduction

As Part 1 (Lay of the Land) describes, China's forests have suffered several periods of intense deforestation over the last 50 years. The upside or "silver lining" of this situation is that China is now ideally poised to be an important player in the market for forest carbon offsets. This case study describes one such effort—the Tengchong County Forest Carbon Offset Project, also known as Tengchong County Small-Scale Reforestation for Landscape Restoration. This project is the second forest carbon offset site in China, the first being in Guanxi Province, and will protect part of the buffer of the Gaoligongshan Nature Reserve. It is also certified as the world's first Climate, Community and Biodiversity (CCB) "gold-standard" project (explained below). In 2004, TNC and Conservation International (CI) initiated this project in Yunnan Province, plus another, larger project which covers portions of a five-county area in Sichuan Province. TNC is managing the former; CI is managing the latter. At the time of this writing, the Tengchong County project was further along and was thus selected as the case study site.

Vision

- To reforest and protect a buffer to the Galigongshan Nature Reserve by restoring ecological condition by planting trees and removing invasive species.

- To improve local livelihoods through jobs and compensation for use rights, financed through the sale of carbon credits; and

- To meet two sets of internationally-recognized carbon offset certification standards:

    - Clean Development Mechanism under the Kyoto Protocol—The project follows the criteria defined by the Clean Development Mechanism (CDM), which is the primary driver of carbon offset projects worldwide.

    - Climate, Community, and Biodiversity standards (CCB)—The project was certified as the world first CCB "gold-standard" project. A group of international NGOs and research institutions created the CCB standards (2008) as a complement to the CDM. The CCB standards support standardized verification of a project's environmental and social benefits.

Project Area

The project site covers 467 hectares in Tengchong County, in western Yunnan Province and adjacent to the Gaoligongshan National Nature Reserve. The nature reserve covers more than 400,000 hectares. It is a UNESCO Biosphere Reserve and a biodiversity hotspot, as recognized by Conservation International, World Wildlife Fund, and TNC. The mountainous terrain of the region hosts a wealth of vegetation types such as savanna, coniferous forest (Pinus yunnanensis), monsoon evergreen broad-leaf forest, and cold temperate bamboo forest.

The project site lies along approximately 20% of the southwestern border of the nature reserve. Most of the land lies along two major tributaries of the Irrawaddy and the Salween Rivers. The site is comprised of 13 non-contiguous patches that range in size from 6 hectares to 86.2 hectares, and average 36 hectares. Twenty percent of the project's lands are adjacent to the nature reserve; the other 80% lie within 30 kilometers of the nature reserve. The site spans portions of three different townships including Qushi, Jietou, and Houqiao.

The land tenure of the site is complex. Approximately 25% of the site is a state-owned forest farm and the remaining 75% is collective- or household-owned. The collective/household lands are managed by 5 administrative villages, which in turn manage 18 natural villages (i.e., collectives). Of the collective/household lands, the collectives hold 280 hectares while households "own" the remaining 75 hectares. More than 450 households including nearly 2,300 individuals hold use rights to agricultural and unused lands, which they have since contributed to the carbon project.

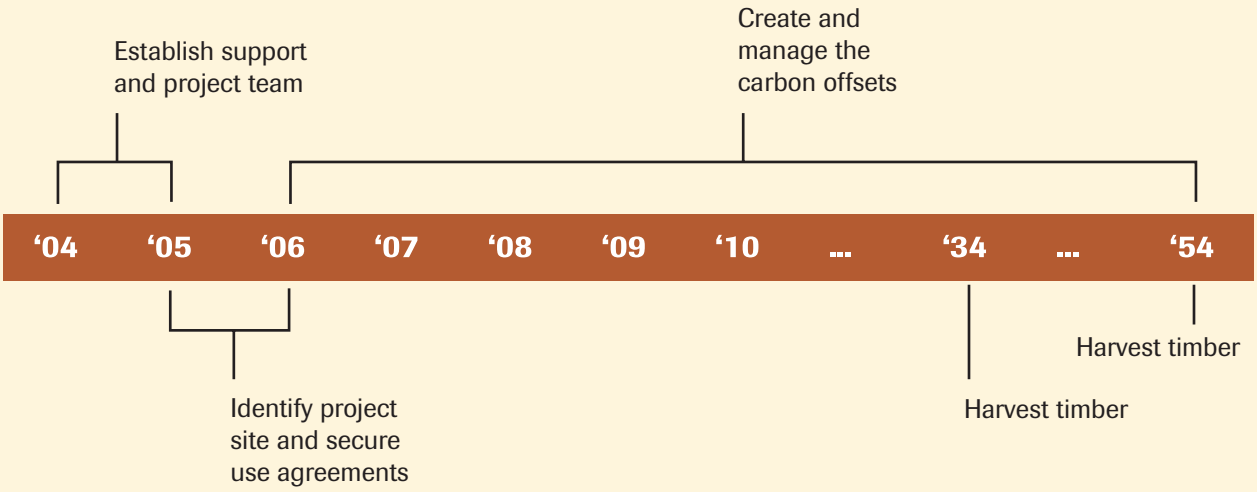
The county has re-zoned the agricultural lands in the project site to commercial and ecological forest. For the most part, the local people supported this alternative land use because the lands were relatively undesirable for agricultural purposes. Eupatorium, an invasive species, flourished in the abandoned lands, and was so dense that regeneration of native species was impossible. The carbon project is providing income for the households that they would not have otherwise earned.

Today, as a result of the carbon project, the invasives have been controlled and all of the lands in the project area have been converted to young forest. The site is covered by native trees such as flous taiwania (*Taiwania flousiana Gaussen*), shiny-bark birch (*Betula luminifera H.Winsl*), Yunnan pine (*Pinus yunnanensis*), and Nepal alder (*Alnus nepalensis*). The shade from the growing trees is preventing the reestablishment of the invasives and native understory is returning.

Project Creation

It took just a few years to get the project up-and-running. The first timber harvest will occur more than 20 years from now (Figure 3–35).

Figure 3-35. Steps in creating and managing the Tengchong County Forest Carbon Offsets project



1. Establish support and project team—To build support for the project, TNC and CI conducted workshops for the government at all levels to explain the project and the forest carbon market. The training targeted the State Forest Administration at all levels of the government including national, provincial, county, and township. In 2004, the 3M Foundation granted TNC and CI $300,000 for the project.

With funding secured, TNC created a project team comprised of TNC, the Tengchong Forestry Bureau, the Sujiang Forestry Farm (a state forest farm managed by the Tengchong Forestry Bureau), the nature reserve, Yunnan Forestry College, the Yunnan Forestry Department, and Yunnan Forestry Inventory and Planning Institute. TNC provides technical support, developed the project's standard operating procedures associated with the CDM and CCB requirements of the field surveys, and developed the Project Design Document (see below). The state forest farm is designated as the "Local Operating Entity" (LOE) for the project. The LOE manages the on-the-ground implementation of the project such as acquiring and planting seedlings, patrolling, preventing fire and insects, and preparing the contracts with households. The Tengchong Forestry Bureau monitors the project and ensures quality control for all processes such as field surveys and planting. The nature reserve, with its many years of positive interactions with the local communities, is assisting with project communications.

2. Identify project site and secure use agreements—TNC and CI solicited input from the Yunnan Forestry Bureau to select a site. Tengchong County was an excellent candidate given its location in a biodiversity hotspot, its favorable conditions for forest establishment, and its relatively low community income. Furthermore, the project area met the requirement of the Clean Development Mechanism including no forest reforestation since 1989 and no afforestation for least 50 years. Local nature reserve staff mapped the initial project site, which included 900 hectares of deforested land.

The team next secured household participation. They identified the villages and households involved in the initial 900-hectare project area by interviewing local communities. They surveyed the villages to identify collective and household lands. Although the households' use right boundaries were not mapped, the village leaders were able to identify the percentages owned by individual households.

To entice households to participate, a group comprised of TNC, CI, the Yunnan Forestry Bureau, the Tengchong County Forest Bureau, the State-owned forest farm, and local people developed a compensation package (Figure 3–36). This package was based on data collected locally by the Yunnan Forestry College. The mean annual gross per capita income ranged from US$75 to US$372. The compensation package was appealing to the participating households because of the low potential crop yield of the site, and the fact that many individuals were not earning any income from the farm plots they had abandoned. Furthermore, compensation of 210 RMB per year totals nearly 15% of average annual household income.

Figure 3–36. Compensation package associated with the carbon offset project

- **State-owned forest farm:** 90% of the revenue from the sale of carbon credits, estimated at 40 RMB/mu/year and 100% of the timber revenue on state-owned lands.
- **Households:** would technically still hold their land use rights, but would allow the LOE to implement the forest carbon project in exchange for the following:
  - » 10% of the revenue from the sale of carbon credits on collective lands, estimated at 10 RMB/*mu*/year. Households will receive this income once every five years.
  - » 100% of the revenue from the sale of the timber on collectively-owned lands, estimated at 6,000 RMB/*mu* over the first 30-years of the project, or 200 RMB/*mu*/year. There will be two selective tendings, in year 16 and year 23. In year 30, the harvest will total 40% of the standing volume. Households will receive this income after each tending and the 30-year harvest.

Ultimately, 433 households with land covering 467 hectares (approximately 50% of the original project site) agreed to participate. The LOE prepared the legal agreement and visited each eligible collective land manager and household to solicit the signatures of willing participants. The household negotiations were time-consuming given the large number of households involved. Not surprisingly, households that were not actively cultivating their lands generally contributed their land to the project without hesitation, while those who were actively farming were much more reluctant to do so.

The use agreements effectively transferred the use rights from the households and collective land managers to the forest carbon project. However, unlike typical lease transfers, these agreements do not include annual payments. Instead, payments are deferred until the timber is actually sold in order to allow the project to focus its available cash on the land, and to incentivize the local people to protect the timber resources.

3. Create and manage the carbon offsets—The project team developed the forest carbon offsets in accordance with CDM standards. The team created a "Project Design Document" to describe the project, monitoring methodologies, environmental and socioeconomic impacts, and stakeholder comments. The team also completed a baseline survey to calculate the amount of carbon on the site pre-reforestation. TNC and CI, in partnership with the Provincial and County Forestry Bureaus, hired and provided technical training to local villagers to collect the survey data, which TNC then analyzed. Furthermore, in accordance with both CDM requirements and the Chinese government, the project team identified two validation entities—one for third-party independent valuation and one for national agency valuation.

The team also completed activities on the ground to prepare for the sale of carbon credits. Using local labor, tree-planting began and was completed in 2007. The LOE also hired 10 guards, or approximately 1 guard for each 1,000 *mu* (67 hectares), at a cost of 800 RMB per month each. The guards patrol the project site to prevent illegal activities such as timber harvest and livestock grazing. The latter is particularly important in the first several years after initial plantation because the young trees are particularly susceptible to damage. If the guards catch offenders, they can turn them over to Tengchong County for punishment. The county has relatively strong enforcement procedures because most of it is zoned as commercial forest and nearly 10% of the county's revenues come from forestry.

Presently, CI and TNC are finding buyers for the carbon credits. The project will create 150,000 tons of carbon credits over 30 years. At the time of writing, the project had sold 20,000 credits to one company and one individual, both from voluntary carbon markets in the U.S. There are two types of markets for carbon credits—the Kyoto (CDM) market and non-Kyoto markets including those in the U.S. and Australia. Typical buyers of carbon credits include brokers, investment banks (e.g., World Bank), individual companies, and individual people.

In several decades, the timber will be harvested and the profits shared with the local people in accordance with the compensation package. The timing of the timber harvest depends on the type of forest zone, commercial versus ecological. For example, the Yunnan pine in the commercial forest will be harvested in 30 years from when the project started (in approximately 2034), whereas it will be harvested in 50 years in the ecological forest (in the year 2054). The staggered timing of harvest will help maintain ecological function.

Successes

Nature reserve buffer protection—The project is effectively protecting the nature reserve buffer area by improving its ecological condition and reducing invasive species. Local people are incentivized to ensure the protection of the forest, since they will receive the bulk of their payments after the timber is harvested in 30 years. The project is maximizing benefits to the environment and communities because it is applying the CCB standards.

Model for afforestation efforts—Unlike most of the country's afforestation projects, the Tengchong County project is using diverse native species. If carbon value were the sole consideration, the project would have planted faster-growing species. The plantation of diverse species provides a wider array of benefits such as wildlife habitat, biodiversity, and scenic values. To encourage the plantation of diverse species, the carbon market recognizes the high environment value carbon credits in high price.

Sound business model—The project team created a workable financing scheme. The team's up-front research on household income enabled them to craft a compensation package that would balance affordability with attractiveness to the community. They also succeeded in effectively acquiring use rights without having to pay the typical annual fees to collectives and households. This arrangement enables the project team to spend more money on the ground on an ongoing basis.

Local experts—Finally, the project has created a team of local experts who understand and can implement Clean Development Mechanism projects and CCB standards. They have the ability to replicate this project in other places.

Challenges

No guarantee of long-term protection—Although the project will effectively protect the nature reserve buffer for at least the next 30-50 years, there is no guarantee of long-term protection beyond that timeframe. Any variety of factors could terminate protection such as a reduction or elimination of the market for carbon credits, a change in zoning, or illegal timber harvest.

Securing local support—Garnering the support of the local people was one of the most challenging aspects of the project. It was difficult to convey the carbon offset idea to the local people, and to persuade some to contribute their land.

Selling carbon credits—Forest carbon represents a very small part of the international carbon market. More common markets include energy (bioenergy, hydropower, windpower, and methane generation through garbage), electricity, and public transportation.

Replicability

Certified forest carbon offset projects can provide a cost-effective way to protect and restore land. The sale of carbon credits can fund the compensation to local people or other relevant stakeholders so secure their participation. The tool is promising and forest carbon projects should become easier to implement as Chinese government officials become increasingly familiar with the concept and the international forest carbon market gains strength. The project manager believes that once stakeholders are supportive of a project, "a project is not that difficult and local people can replicate this same idea in other places." Smaller-scale projects that involve fewer players would be easier to implement than those with more complex stakeholder interactions.

Creating a workable financial model is critical to project success. It is possible for projects to be profitable on their own through the sale of the carbon credits and (eventually) timber, but significant up-front capital is needed for initial planting and other start-up costs. Ultimately, for this tool to be successful at scale, the sale of forest carbon credits will need to become easier in the future, as the market grows.

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CHINA OVERVIEW MAP

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