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**CONSERVATION
AND SOCIAL DEVELOPMENT**

**A STUDY BASED ON AN ASSESSMENT
OF WOLONG AND OTHER PANDA
RESERVES IN CHINA**

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UNRISD Discussion Papers are preliminary documents circulated in a limited number of copies to stimulate discussion and critical comment.

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UNRISD PREFACE

Under its programme on Environment, Sustainable Development and Social Change, the Institute is currently focusing on the social dimensions of policies and initiatives for environmental protection. The purpose of the research is to analyse the implications for livelihood and conditions of life, especially of the low income groups, of a wide variety of projects to rehabilitate degraded resources and protect wild animals and plant species in national parks and reserves. This paper, based on original research in Wolong nature reserve in the Sichuan province of China, analyses the social impacts of the creation of reserves to protect giant pandas and their habitat. It forms part of the work being carried out under this research project.

The prevailing conservation ideology seeks to maintain “ecological wilderness” and tends to prohibit resource utilization by local communities. Prospects for attracting foreign assistance and promoting the tourism industry have also played an important part in the decisions taken by many countries to accord priority to the expansion of protected areas. The impact of the establishment of parks and reserves on the lives of local populations has until recently received scant attention. In line with many other countries, there has been a rapid expansion of parks, reserves and other types of protected areas in China: they covered 0.07 per cent of national territory in 1965 and over 6 per cent in 1991. China’s panda reserves in particular are a source of pride and have attracted the most attention and resources from abroad.

The paper argues that panda reserves provide a particularly auspicious setting for integrating the objectives of conservation with social development. The parks are thinly populated: their total population amounts to less than 5,000 people, mostly of Tibetan origin. In Wolong reserve, as in other protected areas which host panda populations, the pandas live and roam at elevations different from those utilized by human inhabitants for agriculture and livestock. There is therefore little or no competition for resources between pandas and people. However, people continue to be regarded as a threat to the viability of pandas. In some areas, people have been removed and forcibly resettled elsewhere. In Wolong, a resettlement plan was elaborated — but it met with such resistance from local populations that the apartment buildings constructed for them remain empty. The establishment of the reserve has led to restrictions on livestock-grazing, collection of forest products and hunting. The construction of roads and installation of electric power have benefited local people, but few resources have been devoted to improving housing, health care and sanitation for them. Nor have they benefited from employment opportunities which have arisen as a result of infrastructural development and steadily growing tourism.

The paper argues that there are enormous opportunities for enhancing the livelihood security and living standards of the local inhabitants while preserving and improving the natural habitat. These objectives can be achieved with a small proportion of the resources allocated to panda reserves. These opportunities lie in yak farming, pig breeding, collection of medicinal plants, trading, catering and lodging tourists, handicrafts production and processing of minor forest produce. The paper suggests the need for a more flexible approach to conservation and resource use, with the dual objective of improving people’s living conditions at the local level and conserving forests and wildlife through their sustainable use and management. In other words, social development objectives must receive as much priority as the preservation of pandas.

The author of this paper, Krishna Ghimire, is a researcher at UNRISD and has been co-ordinating several of the Institute’s research projects on environment and social change, including The Social and Environmental Impact of National Parks and Protected Areas.

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WWF PREFACE

ABBREVIATIONS, LAND MEASUREMENT AND CURRENCY EQUIVALENT

Abbreviations

CES	Chinese Environmental Science Press
CCP	Chinese Communist Party
IUCN	The World Conservation Union
FAO	Food and Agriculture Organization of the United Nations
FRI	Forestry Research Institute
MAB	Man and Biosphere programme
NEPA	National Environmental Protection Agency
NGO	Non-Governmental Organization
RDI	Rural Development Institute
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WFP	World Food Programme
WWF	World Wide Fund For Nature

Land measurement

15 mu = 1 hectare

Currency equivalent

5.7 RMB (yuan) = US\$ 1 in October 1993

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I. INTRODUCTION

A. Broader Issues and Concepts

Many of the processes of environmental degradation occurring in developing countries — such as soil erosion, landslides, sedimentation, water depletion and contamination, overuse of mangrove and coastal areas, deforestation, desertification, drought, flooding, etc. — have become a vital concern both at international and national levels. In an attempt to halt these processes, or rehabilitate and improve environmental conditions, many conservation measures have been undertaken — soil preservation, afforestation, and protection of forests, grasslands, wetlands and freshwater resources, to name a few. Lately, much emphasis has been placed on protecting biodiversity.

The way or the extent to which a given conservation initiative can influence the social development parameters in a particular area varies. But where conservation programmes are limited to narrow protective functions, potential for social development can be frustrated. Besides the issue of “how it is done”, social development through nature conservation programmes is also intimately tied to the question of “who does it”. Where there is local enthusiasm for a programme, and people are free to design projects which respond to their household and community needs, the ensuing social benefits are likely to be greater than where such possibilities do not prevail.

Drawing on the preliminary results generated from a larger research programme on the social and environmental impact of protected areas in developing countries, as well as the author’s previous work on the topic, this paper seeks to explore the hypothesis that the social development component may very often be totally overlooked in planning and implementation of protected areas. This is tested by examining the panda protection initiatives in China. The discussion of panda reserves is important not only because they are well-known, but also because pandas are considered as both “unique” and a “flagship species” by leading conservation scholars and organizations. However, while there has been enormous scientific interest in the species since the end of the last century, the socio-economic impacts of the panda protection initiatives have not been carefully studied. This paper is a preliminary attempt to fill that gap by focusing primarily on the socio-economic and political aspects of such conservation schemes. Before looking at the panda reserves, however, it is appropriate to review briefly the broader issues and concepts associated with the establishment of protected areas in developing countries, as well as our understanding of what social development is about.

Why are national parks and reserves an issue? Parks and reserves are being established in increasing numbers in developing countries. They cover significant tracts of national land and water resources, and conservationists seek to bring many remaining forest and aquatic resources under such protective régimes. Even gazetted forests, watershed areas and village woodlots are frequently turned into rigorously protected parks and reserves guarded frequently by national armies or special armed forces. Access to these protected areas is often limited to purposes of education,

research and recreation. The fact that national parks and reserves are relatively better protected against unauthorized uses has led to an increasing official emphasis on these forms of protection (as compared to other forms).

National parks and reserves can greatly help to preserve biodiversity, maintain watershed areas and generate income from tourism. There also exist many forest or aquatic products within protected areas which are important to local consumption and income. Some studies tend to over-emphasize the benefits from establishing protected areas (e.g. Dixon and Shermann, 1991). In fact, their establishment also has many undesirable consequences, especially at the local level. While the benefits are difficult to quantify, or take a long time to materialize, or are disproportionately distributed amongst different sections of the population, the costs are often immediate, enduring and onerous, in particular for poorer households in and near the protected areas.

When national parks are established, local people are frequently removed from their settlements and provided with few or no alternative sources of employment or income. Where resettlement provisions are made, they are generally insufficient or inappropriate. For example, people are often transferred to entirely different socio-economic or climatic zones, or are given land which is inadequate or unsuitable for the type of agriculture or other production activities that they have customarily practised. Even where people are not displaced from their settlements, they are usually forbidden to use park resources. Grazing, hunting and fishing, and gathering of food, wood and other useful biomass products are prohibited in parks. Social groups which traditionally rely heavily upon these activities, such as pastoral, tribal or landless people, are subjected not only to economic hardships, but also to difficult social and cultural adjustment processes.

In most park management activities, emphasis is on the management of natural resources found within the designated area and little or no care is given to areas outside the reserve. Ironically, the establishment of parks and reserves has often tended to lead to an increased level of deforestation, since households losing land in and around the parks must move to new locations and clear forests for settlement. Those who are unable to migrate to new destinations are often obliged to over-exploit forest and land resources which remain relatively accessible (e.g. forests outside of the park, village commons). How or to what extent people's subsistence activities are based on the use of local biomass is rarely evaluated. For instance, restrictions on grazing in parks and reserves can lead to the concentration of cattle in smaller areas outside the park or reserve, resulting in the degradation of rangeland and erosion and compaction of soil. Moreover, there is no incentive for local communities to manage protected areas because they simply view them as "lost village resources". Consequently, nearby areas much larger than the park or reserve can become degraded.

The establishment of national parks and reserves and accompanying restrictions on the utilization of resources also sometimes produces open social conflicts. Although sporadic in nature, organized protests and rallies, attacks on park guards, poisoning of animals and deliberate burning of forests are becoming common events in many developing countries. Management of the park becomes expensive and ineffective when the area has to be protected from an unco-operative and hostile

local population. Any success of a protected areas scheme in the long run requires the active support of local communities.

What is meant by social development? In the context of this paper, “social development” basically means the recognition of the human factor in conservation. The central question is whether protected areas are able to promote economic, social and cultural improvements along with conservation. This issue has received little attention from natural scientists, as well as economists and other social scientists. By the very nature of their vocation, the first group of scholars has remained biased in favour of protection of flora and fauna, unless this mandate is directly threatened by public opposition. But social scientists too have failed to look systematically at the interactions between human beings and the natural environment in protected areas. This is because the prevailing justification and ideology of nature conservation assert that far too much environmental destruction is occurring and that the integrity of the environment is therefore not negotiable.

Natural scientists and conservation organizations imply that conservation initiatives, by definition, are social because they are designed to protect natural ecosystems and biodiversity, which are essential to human life-support systems and activities. In theory this is quite logical. Much however depends upon how such initiatives are carried out. Artificial nature conservation measures (i.e. human intervention in natural processes and management) can bring about — along with the positive changes in ecosystems and biodiversity — important destabilization in evolutionary processes due to natural and human impacts. For example, wetlands can be transformed in a matter of a few decades through replenishing, if leaves and grasses are left to decompose and trees are allowed to grow by curtailing their human use. Certain types of species can increase much faster than others when hunting or extraction processes are modified, thereby affecting the existing relative equilibrium in habitat structure, food availability and predator-prey relations (e.g. Gomez-Pompa and Kaus, 1992; Hobbs and Huenneke, 1992).

As hinted earlier, there are also direct human costs when protected areas are established; people living in these areas are removed or human use is restricted. Certain external actors such as tourist interests usually profit at the expense of the local inhabitants.

Social development depends upon a conservation programme placing high priority on the well-being of local people. In other words, a conservation initiative should, to the extent possible, not become an end in itself, but should be a means for promoting socially equitable and environmentally sustainable socio-economic development in the surrounding areas. It is essential for local residents to be considered as both actors and beneficiaries of conservation efforts.

A whole array of areas and issues is involved in any serious consideration of the human factor in conservation. It requires an assessment of the way protected areas are established and managed and their probable impact on the basic needs of local social groups. It also necessitates an evaluation of the possibilities for these measures to enhance existing livelihood opportunities and alleviate poverty and other aspects of

human deprivation. Have they encouraged self-reliance? Or, have they led to resource alienation, marginalization and increased local resentment?

For analytical purposes, these different human development components can be divided into three broad categories: basic social provisioning, economic security and improvements, and social integration and popular participation. Under the theme of basic social provisioning, the effects of a conservation programme on existing poverty conditions will be examined. In particular, the possibility of the conservation programme contributing to improvements in housing, clothing, health, access to safe drinking water, sanitation, food, nutrition, etc., will be explored. The second category, economic security and improvements, considers the prospects for employment, income and social mobility resulting from the establishment of protected areas. Finally, social integration and popular participation concern processes of internal differentiation, conflict management, strengthening of local institutions, grassroots actions, cultural protection, promotion of the interests of disadvantaged groups such as indigenous peoples, ethnic minorities, women and the landless, and the direct involvement of local communities in formulating, planning and managing protected areas. Using case study material, these points are examined more systematically in section II. Further scrutiny of the relationship between social development and conservation is provided in the concluding section.

B. Conservation Ideology and Practice in China

National initiatives to establish protected areas. China has a wide network of strictly protected areas, which is growing rapidly. In 1965, parks and reserves covered only 0.07 per cent of the national territory. But by 1991, nearly 6 per cent of the territory, or 560,000 square kilometres, was included in parks and reserves (see table 1). In terms of the total area involved, it is equal to the total surface of Austria, Belgium, Britain, Denmark, Ireland, Luxembourg and Switzerland combined, or slightly larger than France. In the early 1980s, the Chinese government proposed the creation of an additional 500 protected areas by the end of the century (Liang, 1990). The rapid expansion of protected areas which has taken place over the last few years is the direct outcome of this policy (see table 1). Recent official information suggests that the government intends to establish as many as 1,000 nature reserves by the year 2000 (**China Daily**, 13 July 1993).

Table 1
The growth of protected areas in China

Year	Number	Area (1,000 hectares)	% of national territory
1965	19	648.8	0.07
1978	34	1,265.0	0.13
1982	119	4,081.9	0.43
1987	481	23,749.5	2.47
1989	573	24,763.0	2.58
1991	708	56,000.0	5.83

Source: NEPA, 1992.

Most of the existing protected areas are located in the eastern and southern parts of the country, where population densities are high and economic activities are expanding rapidly. Recently, more parks and reserves have been established in the

north-west, which is arid or semi-arid but contains vast land resources. It also has one of the lowest population densities in the country, although production activities such as cattle ranching, involving transhumance systems, require extensive use of land resources. Future expansion of protected areas is expected to occur in this region, as well as in wetland and coastal areas.

It should be noted though that many parks and reserves established prior to the early 1980s were generally “paper parks”. Much of the official emphasis was on showing the outside world that increasing areas of national territory were being brought under strictly protected régimes — although few such areas were actually well-managed. As we shall see, panda reserves were among the exceptions. Indeed, the concept of strict protection was essentially contradictory to the existing government policy of land reclamation, agricultural extensification, natural resources extraction and rural industrialization. In recent years, there has been a marked shift from the past lukewarm attitude to conservation to more rigorous protection, in large part to attract external financial resources.

The nature and scale of panda protection measures. Panda reserves are China’s premier protected areas, well known both nationally and internationally. These reserves have been established essentially for the protection of pandas, although reserve management plans emphasize that they have also contributed to the protection of several other endangered species (e.g. MacKinnon et al., 1989:9). The creation of strictly protected areas to preserve specific species is not characteristic of China alone. In Africa, various countries have set up parks to protect gorillas, unique species such as lemurs, black rhinos, elephants, etc. In Asia, India’s “Project Tiger” is well-known. But it is China’s panda reserves that draw the most attention.

Why have the panda reserves become so acclaimed? Part of the answer is that pandas’ physical structure and origin have puzzled scientists. Some suggest that the panda belongs to the racoon or leopard family, while others believe it to come from the bear group (see Sheldon, 1975; MacKinnon et al., 1989; Schaller, 1993). Like cats or leopards, pandas are theoretically carnivores, and many of their habits differ from those of the bear.

The so-called “giant” pandas are found in south-western China, although a few other species have been observed as far south as the southern slopes of the Himalayas. “Giant” pandas weigh an average of 100 kilograms. They are actually quite small compared to bears so the term “giant” in many ways is misleading. Bamboo stems form the bulk part of their diet, although they eat other plants as well as meat when it is available (Schaller et al., 1990:69). They are essentially mountain beasts, and have few natural predators. Their main predators are wild dogs found in the region, but they too are not numerous. Unlike alpine bears, pandas do not hibernate. According to Schaller, this is due to their inability to store food inside their stomach and an ineffective digestive system (Schaller, 1993:103). Previously, natural scientists thought that pandas were highly solitary and territorial, each adult needing several kilometres to roam and seek food (MacKinnon et al., 1989:14). But recent research suggests that numerous pandas can live together without evidence of territorialism (Schaller et al., 1990:91).

Map 1: Panda reserves in China

Table 2
Panda reserves in China

Name	Date of establishment	Province	County	Area (square kilometres)
Baihe	1963	Sichuan	Nanping	200
Baishuijiang	1963	Gansu	Wen	953
Labahe	1963	Sichuan	Tianquan	120
Wanglang	1963	Sichuan	Pingwu	277
Wolong	1963	Sichuan	Wenchuan	2,000
Xiaozhaizigou	1975	Sichuan	Beichuan	167
Dafengding Mabian	1978	Sichuan	Mabian	300
Dafengding Meigu	1978	Sichuan	Meigu	160
Fengtongzhai	1978	Sichuan	Baoxing	400
Foping	1978	Shaanxi	Foping	350
Juizhaigou	1978	Sichuan	Nanping	600
Tanjehai	1978	Sichuan	Qingshuan	300
Huanglong	1983	Sichuan	Songpan	400
Total				6,287

Source: MacKinnon et al., 1989.

Pandas have been a species of special interest to Western explorers, mammalogists, zoologists, biologists and animal collectors since the late nineteenth century. The first descriptions of pandas provoked a great deal of scientific interest when they were brought to Europe by a French missionary explorer, Père David, in the 1860s. Many expedition teams from the United States, Britain and Germany subsequently visited panda habitats. Live pandas were sought by many zoos and scientists, but given the long travel involved and the animals' difficult feeding habits most explorers tended to shoot pandas and bring home their skins. A live panda was not taken to the West until 1936, but it died soon thereafter (Sheldon, 1975:XVII-XIX). Furthermore, the establishment of the People's Republic of China dominated by the Communist Party in 1949 was followed by the nearly total breakdown of contacts with the West in the 1950s and 1960s. This only served to further public curiosity about pandas. For many, pandas are alluring, tender, furry and huggable animals (Schaller, 1993:42). Few zoos around the world are equipped to keep pandas. Their rareness together with the limited possibility for viewing them have thus contributed to the public's interest in them.

Panda reserves are located in three of China's western provinces: Sichuan, Gansu and Shaanxi. Three reserves (Labahe, Wanglang and Wolong) were established in 1963, followed by a lull until the mid-1970s, and a rapid increase in the establishment of reserves in the late 1970s. There are currently 13 panda reserves: nine in Sichuan and two each in Gansu and Shaanxi. By the end of the 1980s, these reserves covered a total area of 6,287 square kilometres (see map 1 and table 2).

Many early efforts aimed at the formulation of comprehensive legislation for the protection of pandas. Scores of laws and acts have been implemented since then, including the national constitution, presidential order, forestry law, and provincial and county legislation, along with regulations for specific reserves. In recent years, laws have been tightened further. People convicted of poaching pandas can now receive sentences ranging from short-term to life imprisonment and capital punishment, depending upon the severity of the case.

Early reserve management activities included fixing of boundaries, construction of headquarters facilities, check-points, roads, trails and basic visitor facilities. The removal of people from reserves was another important priority. Initial efforts also involved a major faunal survey. In addition, in some reserves, scientific research on pandas was encouraged. Rescue operations were organized in many reserves to save pandas affected by mass flowering of bamboo (bamboo dies after flowering, thus depriving pandas of their principal source of food). In Wolong, attempts are now being made to breed pandas in captivity, with the main purpose of increasing the panda population.

Attempts have also been made where feasible to expand the existing panda reserves, incorporating surrounding forest and sometimes settled areas, because the government and leading associated conservation agencies believe that the existing reserves are too small and isolated to accommodate increased panda populations (MacKinnon et al., 1989). This argument has resulted in a comprehensive plan to enlarge many existing reserves, as well as create new corridors and 14 additional reserves. This planned future expansion, as well as some of its social and environmental implications, will be discussed later, especially in the concluding section.

Justifications for panda protection. Many justifications are presented in the reserve management plans to save pandas. As indicated earlier, the rare and exotic aspects of pandas have aroused wide interest in the species, especially in the West where nature conservation has emerged as an important issue — and where funds are generated. The protection of pandas is often regarded as a “symbol of pure challenges to conservationists” (MacKinnon et al., 1989:9). It is also justified on moral grounds. As some conservationists write:

“The Giant panda is a harmless, much-loved animal whose existence enriches the lives of millions of interested human beings. We strive to save the panda not so much because we need this species but because we want the panda and all he stands for — a symbol of Chinese and of world conservation, one of our more notable and enjoyable fellow species with which we have the privilege of sharing one planet” (ibid.).

It is difficult to estimate with any accuracy how many pandas remain in the wild. A survey carried out between 1974 and 1977 by Chinese authorities, for which as many as 3,000 people were mobilized, estimated the country’s panda population to be in the range of 1,000 to 1,100. Another survey carried out in 1985 and 1988 by China and WWF gave even more wide-ranging estimate of 880 to 1,360 pandas (ibid.:12-14). Conservationists and government officials frequently have a tendency to quote the lowest number of pandas thus amplifying their declining trend — as well as justifying tougher legislation, an increased network of reserves and additional funding.

After many years of work, several zoos in China, as well as in a few other countries, have successfully bred pandas. The fact that pandas are difficult — though

not impossible — to breed in captivity has provided conservationists with another reason why they should be protected in their natural habitat.

Conservationists, habitat protection and politics. The impetus to “save” pandas by establishing strictly protected areas emanated from the evolving conservation ideology in the West, as well as from internal political changes in China. The protection of nice looking birds and spectacular mammals in Africa, Asia and Latin America during the colonial heyday was an issue of some concern amongst biologists, botanists, mammalogists, foresters, geographers, as well as hunters and animal traders, and was taken up on a more organized fashion by environmental movements in the West after the Second World War; IUCN was established in 1948, WWF was founded in 1961. This momentum continued with the creation of UNEP in 1972, as well as many new environmental NGOs. These movements have generally been highly preservationist. In concrete terms this has implied the protection of wildlife that was considered endangered. Only more recently has the maintenance of whole ecosystems become an area of interest among dominant conservation institutions.

WWF has attached a great deal of importance to the protection of pandas and their habitat. It has used the panda as its logo since its inception; in recent years, it has devoted considerable resources to the management and expansion of panda reserves. Although, at the headquarters level, the agency has recently sought to broaden its vision as suggested by its change of name — from World Wildlife Fund to World Wide Fund For Nature — and by its recognition that restricted habitat protection initiatives will fail if social issues are not understood and effectively dealt with, many of its activities in the field still seem mainly concerned with the preservation of specific species (WWF, 1993). This narrow, species-centred focus of some of WWF’s activities is well illustrated by its activities in the case of the panda reserves.

Why WWF chose the panda as its symbol — and not, for example, a tree, another animal, or a panda with a Chinese peasant — is a titillating question. Official publications tend to suggest that, as the panda is a “nice looking”, “rare” and “endangered” animal, its adoption as the organization’s logo was most appropriate (e.g. MacKinnon et al, 1989:9). Since there were very few reliable baseline studies carried out prior to 1961 on the number and distribution of pandas, the validity of the claim that pandas were “endangered” seems to have been based as much on speculation as on scientific evidence. An important fact seems to have been that the panda’s “tender” and “quasi-baby” look conferred extraordinary marketing appeal on an organization which was essentially a fund raising body in the 1960s and 1970s.

This author suspects that the maintenance of the panda as WWF’s symbol might also have been influenced by political motives in the West. For some Westerners, the logo may have suggested that the Chinese, in their pursuit of rapid industrialization and agricultural expansion, were recklessly using the environment, thereby threatening species such as the panda. A logo featuring a panda with a Chinese peasant would have been scarcely plausible because conservationists at the time were very concerned about the growing number of people and their encroachment on the environment. The idea of “popular participation” in

environmental schemes was not yet common and habitat protection was still the primary goal amongst conservationists in the 1960s.

Within China, attempts to capitalize on the growing Western interest in pandas began in the early 1960s; Pandas became a prized gift in various countries, for example. They were also captured for exhibition in zoos, and the government allocated some resources for research on care and breeding of pandas in captivity. After WWF was founded and the panda selected as its symbol, the Chinese government established three panda reserves in the early 1960s. This was an attempt to elevate the richness of the country's natural heritage as well as a response to emerging external scientific, political and economic interests. Following China's economic liberalization and open-door policies in the late 1970s, WWF was the first foreign conservation organization to be invited to support research and project activities for the preservation of panda habitat, although detailed negotiations were apparently not smooth (Schaller, 1993). By this time, a group of powerful, often widely travelled and well read Chinese natural scientists had become influential in the bureaucracy. Appreciating the financial and other advantages of foreign aid, they pressed for more investment in the environmental sector, as well as for closer contacts with agencies such as WWF.

II. THE LOCAL CONTEXT

A. Human Interaction with Pandas and Their Habitat

We now turn to examining more closely the social and environmental impact of panda reserves at the local level, highlighting the interactions between human beings and pandas. For this, it is crucial to understand both the physical and social components of the local ecosystem. Demographic structure and trends, settlement patterns and production activities, as well as the nature of reserve management are all important factors. The physical setting — climatic conditions, topography, resource types and endowment — limits the availability of wildlife habitat, as well as local people's ability to relate to the local environment. Population structure, settlement patterns and livelihood security have implications for the use and protection of natural resources. Finally, the way a given reserve is managed has ramifications for both the long-term survival of wildlife and people's access to the reserve's resources. Wildlife protection initiatives by outsiders frequently trigger local indifference.

Physical setting of Wolong reserve. The 2,000-square kilometre Wolong reserve is situated in north-west Sichuan. The area, an extension of the eastern Himalayas, is mainly mountainous. The elevation inside the reserve begins at about 1,200 metres and rises up to 6,250 metres. Wo-Long is the name of one of the peaks, which means “sleeping dragon”.

Wolong lies in the Qionglai mountain range and forms part of the Min river system — one of numerous water sources for irrigation and agricultural development downstream. Since the construction of a dam on the fast-flowing Min river and a vast network of irrigation canals in the third century, the Sichuan basin has remained one

of the most important grain producing areas in China. It is also the country's most populous region.

The reserve spreads over several climatic zones due to varying altitudes: a sub-tropical zone below 2000 metres, a temperate zone from 2000 to 3500 metres, a cold zone from 3500 to 5000 metres, and a zone of perpetual ice and snow above 5000 metres. Temperatures vary greatly between these specific zones, with long cold and rainy/wet periods. At the reserve headquarters, situated at around 1800 metres, snow falls from November to March, but at higher elevations the snow comes earlier and may last until May. Major monsoon rains reach the area in June, and persist until early September. Indeed, the wet period usually does not end until October. Precipitation is therefore high; the area gets 1500 to 1800 millimetres of rain annually (Li and Zhao, 1989:85).

Soil types vary, depending largely upon topography. Alluvial soils are found on the banks of the Pitiao river and lower ridges of the mountains. Alpine meadow and tundra soils are concentrated above 3500 metres (Zhou, 1992:355)

The diversity of topography, hydrology, climate, rain-fall and soil formations has given rise to many distinctive species of flora and fauna. About 97 per cent of the reserve is believed to contain forests, grasslands and rocks and rivers. Of these, forests and grasslands cover 45 and 38 per cent respectively and rocks and rivers occupy the remaining 14 per cent of the reserve (Li et al., 1992:319). There are four important vegetation zones beginning from subtropical evergreen and deciduous broadleaf forests, mixed coniferous and deciduous broadleaf forests, sub-alpine coniferous forests and alpine grasslands. Over 3,000 species of plants are believed to exist in the reserve (Li and Zhao, 1989:84), which are very important for horticultural and medicinal use.

The reserve harbours many types of wildlife. Some 46 species of mammals, 225 of birds and 17 of reptiles have been identified (Li and Zhao, 1989:83). Along with the giant panda, the golden monkey, the takin, the red panda, the white-lipped deer, Temminck's tragopan and the snow leopard have been given official protection.

The giant panda has been the prime protection target since the inception of the reserve. A first, relatively systematic, survey carried out in Wolong in 1974 found 145 pandas — nearly 15 per cent of all pandas in the wild. The abundance of bamboo has been cited as the main reason for this high density, but the reserve is vast, and is capable of accommodating a panda population many times this size. Scientific observation suggests that a typical habitat range for a panda in the reserve is between 3.9 and 6.4 square kilometres, but the ranges of several individuals can overlap (MacKinnon et al., 1988:4).

According to reserve authorities, about 100 pandas existed in the wild in late 1993, concentrated mainly in the Zheng and Zhong-xi drainage areas in the northern and eastern areas of the reserve (see map 2). However, there were 19 pandas in the research centre; and it is unclear how many of the pandas that were given away as gifts, lent or kept in different zoos in China had been removed from Wolong. Schaller

estimates that the total number of pandas removed from all panda reserves for the above purposes had reached 111 by 1992 (Schaller, 1993).

Box
Notes on research methodology

The selection of particular reserves for fieldwork was not a straightforward process. It began with a review of available publications, mainly in English, on all existing panda reserves, as well as consultations with a number of panda experts in Hong Kong, China and Europe. This exercise indicated that the Tanjehai and Wolong reserves were the most suitable for in-depth case studies. Attempts were then made to collect detailed information on these reserves, including the “grey” literature. Logistics did not permit fieldwork in Tanjehai reserve, and it was subsequently replaced by Jiuzhaigou Nature Reserve.

Jiuzhaigou, with a land area of 200 square kilometres., is one of China’s best known natural reserves. It is not renowned so much for rare animals as for its scenic beauty. Since the mid-1980s, the alpine landscape, pine forests, clear lakes and waterfalls have attracted as many as 300,000 tourists every year, mainly Chinese (personal communication with Reserve administration). The reserve hosts mainly the common wildlife species found in the region, but it does have a small population of pandas. The reserve has been included in the national conservation management plan for pandas, which proposes removal of the three villages that are currently inside the boundary of the reserve and its connection with neighbouring reserves through the establishment of corridors (MacKinnon et al., 1989:48). This is likely to affect livelihood provisioning in significant ways. Tourism is another aspect which has come into direct conflict with wildlife management goals. Tourist accommodation centres inside the reserve have rapidly expanded in recent years, demanding vacant land as well as a large quantity of wood for construction. To attract more tourists, the authorities are widening roads and plan to construct an airport. This is something also aspired to by the region’s population, as it will allow them to break out of their long isolation from the wider world. Many of these dilemmas and contradictions are not unique to Jiuzhaigou. In fact, they are common in most panda reserves.

Most of the fieldwork was carried out in Wolong reserve. A reconnaissance visit and consultations with reserve authorities in Jiuzhaigou indicated that many of the processes observed there could be found in Wolong as well. But Wolong had many additional features — it is China’s oldest and largest panda reserve; it has the highest density of pandas and other wildlife; an international panda research centre has been set up in Wolong with financial assistance from the WWF; it has remained a centre for many eminent scientific studies on pandas and has been included in UNESCO’s Man and Biosphere (MAB) network. Unlike most reserves, which are generally administered by provincial authorities, it is under the direct control of the central government and is administered by the Ministry of Forestry. Finally, as in Jiuzhaigou, many groups of people reside in the reserve, and the tourism potential is high because of its proximity to Chengdu (the capital of Sichuan). For a thorough investigation of panda reserves, Wolong appeared to be the most illuminating case.

This report deals mainly with the socio-economic and environmental aspects of Wolong. Jiuzhaigou and other reserves are referred to where relevant — especially towards the end of the paper. Discussions with the reserve officials and, more importantly, interviews with local people (see figure 1) were the principal research techniques. The observations made in this paper are based primarily on the information collected through the above methods, except where otherwise noted. Personal impressions have also been important. The author was assisted in the field by two prominent Chinese scholars from the Rural Development Institute and Institute of Forest Conservation in Beijing. Also, his previous exposure in Nepal to Tibetan culture and language was helpful. Since the actual visit to the reserve lasted for approximately one month, however, several aspects lack detail. Time series data on production, income and out-migration, for example, would have been enlightening. The descriptions of social and environmental relations do not reveal a seasonal dimension. There is also little systematic evidence on the socially differentiated nature of resource use. Finally, a more detailed account of natural resource use in relation to other income-generating or self-provisioning activities would have been useful.

Figure 1

	Township	Age	Gender	Ethnic group	Main occupation	Remarks
1	Wolong	27	male	Tibetan	yak herder	
2	“	23	female	“	“	
3	“	25	“	“	“	
4	“	55	“	“	farmer/housewife	CCP member
5	“	80	male	“	farmer	knowledgeable about settlement history
6	“	85	“	Han	“	“
7	“	51	“	Tibetan	“	head of village
8	“	45	“	“	“	
9	“	47	“	“	“	
10	“	27	female	“	housewife/farmer	
11	“	43	“	“	“	
12	“	30	male	“	farmer	
13	“	22	“	“	“	
14	“	20	“	“	“	
15	“	46	“	“	“	
16	“	24	“	“	“	
17	“	65	“	“	“	
18	“	68	“	“	farmer/yak herder	
19	“	32	female	“	housewife/farmer	
20	“	63	“	“	“	
21	“	37	male	“	farmer	
22	“	34	“	“	“	
23	Gengda	60	female	“	housewife/farmer	
24	“	48	male	“	farmer	CCP member
25	“	53	“	“	farmer/clerk	
26	“	50	“	“	farmer	previously wood worker
27	“	46	“	Han	“	
28	“	47	“	Tibetan	“	
29	“	66	“	Han	“	
30	“	30	“	“	small shopkeeper	
31	“	73	female	Tibetan	housewife	knowledgeable about settlement history
32	“	70	“	Tibetan	“	“

Source: Author's fieldwork in Gengda and Wolong Townships, 1993.

Pandas have a low rate of reproduction: generally one surviving cub once every two years. Any reduction in the number of pandas in the reserve — whether due to a massive die-off of bamboo, as some claim, or habitat encroachment and poaching by villagers, as others assert — naturally causes concern amongst conservationists and reserve officials (Schaller, 1993; MacKinnon et al., 1989; Li et al., 1992).

Among the local people, the older generation seems to have little interest in pandas. Indeed, according to one elderly women in Xingfu village, any sight of pandas was considered a “sign of bad luck” and thus local people tended to keep away from the animals. The attention drawn to pandas' uniqueness, their nice-looking features, as well as their declining numbers in recent years by the media, government officials and international conservation agencies has led some youngsters, politicians and others paint a more positive picture of the animals. However, during serious

conversations, most local people give the impression that they have simply nothing to do with pandas.

Settlement patterns, population and livelihood activities. There are two townships (known previously as communes) within the reserve, Gengda and Wolong, each with three main villages. Many of these villages are comprised of several hamlets (see map 2). Most of the human settlement is concentrated in a narrow strip along the Pitiao river. Even villages located off this river — such as Xingfu, upper Gengda and Zhuan Jin Luo — are generally situated on the sides of a tributary or on small patches of land in the upper valley. One source indicates that human settlements cover about 3 per cent of the reserve (Li et al., 1992), but information provided by the township authorities suggests that they occupy 5,879 mu or 392 hectares — less than 2 per cent of the reserve's 20,000 hectares. In recent years, more and more peasants' land has been incorporated within the reserve for official reforestation. This aspect will be dealt with in some detail later.

Documented evidence and personal conversations with knowledgeable elderly people suggest that all the villages in the townships were established a long time ago — in any event, much earlier than the reserve. Some people had moved to the area from the Tibetan plateau during the second half of the seventeenth century when the Chinese Qing dynasty sought to colonize the area with Tibetan people (Ma, 1989:202). The motive behind this was to increase royal revenue and to receive political support from the Tibetan chiefs, who were then made administrators of the area and were allowed to keep a certain portion of the revenue generated. The newly-arrived “settlers” too were given incentives in the initial period of settlement in the form of reduced taxation. Since the lowland Han people were unwilling to move to an altitude as high as Wolong, it was logical to attempt to attract the highlanders. Also, as most Tibetans specialized in mountain livestock-raising combined with a limited degree of upland agriculture, Wolong and its surroundings represented for them a highly suitable settlement area. Unlike most parts of Tibet, the area had more favourable rainfall and soil conditions for pasture regeneration and crop production. At lower elevations, there was plenty of wildlife to hunt, which supplemented food supplies.

The majority of these people settled in the south-western part of Wolong, but later arrivals sought to move further north where copious uncontested natural resources were available. The highland pastoral people seem to have remained at higher altitudes until the introduction of maize, probably during the early eighteenth century. Because maize could only be grown at lower elevations, which also had more productive land, people found it advantageous to move lower down the slopes. This was further encouraged by the introduction of potatoes and cabbages of European varieties at the lower altitudes, possibly brought in by Western missionaries (see Schaller, 1993:133). Lower elevations meant warmer temperatures, greater ease in constructing canals for irrigation and faster ripening of crops.

This led to the emergence of more compact settlement units, as well as larger, more permanent agricultural fields. It also allowed raising of lowland animals such as pigs. Another advantage was that crops and livestock could be better protected from

wildlife as settlements became compact. These developments apparently led to an improved standard of living for the settlers.

Map 2
Wolong nature reserve

From the beginning of the twentieth century, a limited upward movement of Hans took place, especially in the Gengda area (the main entry point from the Sichuan basin). These migrants, originally collectors of medicinal plants, generally followed the river course. That immigration from this side of the reserve was never very significant is reflected in the fact that people of Tibetan origin still constitute the majority of the population, even in the Gengda area. Table 3 shows that in 1993, 60 per cent of the population in Gengda consisted of people of Tibetan origin. In Wolong Township they represented nearly 80 per cent of the population whilst in the reserve as a whole the Tibetan people represented 70 per cent of the population. Han and Qiang formed 26 and 3 per cent of the reserve's population respectively.

In 1992, a total of 4,229 people lived inside the reserve. Of these, 2,248 lived in Gengda Township and 1,981 in Wolong Township. An improvement in general health care in the 1950s and 1960s led to significant population growth in the area, but growth has stagnated in recent years. For example, in the decade from 1982 to 1992 population increased by only 583 persons; and the total population declined from 4,277 in 1990 to 4,229 in 1992 (see table 3). The reasons for this change will be discussed later.

Table 3
Population characteristics and
ethnic composition in Wolong reserve

Population characteristics	1982	1987	1990	1992
Gengda	2,046	2,147	2,234	2,248
Wolong	1,600	1,990	2,043	1,981
Total population	3,646	4,137	4,277	4,229
Number of households	—	—	—	—
Gengda	—	—	—	479
Wolong	—	—	—	360
Total	—	—	—	839
Average household size	—	—	—	—
Gengda	—	—	—	4.6 persons
Wolong	—	—	—	5.5 persons
Average for the reserve	—	—	—	5.0 persons
Ethnic composition				
% of population, 1992	Tibetan	Han	Qiang	Other
Gengda	60	36	3	1
Wolong	80	15	3	2
Average for the reserve	70	26	3	1

— signifies "not available".

Source: Author's fieldwork in Gengda and Wolong Townships, 1993.

The origin, ethnic composition and size of the local population, as well as prevailing natural conditions have important implications for the way people live and provide for their subsistence needs. Han people introduced pigs into the area, as well as cows from the plains. Pork soon became a major component of the local diet and

nutrition, and in recent years, pigs have become one of the principal sources of cash income. Cross-breeding between lowland cows and yaks has resulted in a breed that yields more meat, gives more milk and has more draught power. The Han people also brought many new types of crops, and introduced rice as the staple grain in the local diet. Tibetan people steadily shifted from traditional staples such as barley or maize to rice, but as rice could not be grown in the area, it tended to be more expensive than other crops.

Another important aspect of local livelihood provisioning was the use of forests. Tibetans were familiar with the different types of local plants and their uses, as well as being skilful hunters. They were ingenious in raising yaks at high altitudes. Besides, many aspects of their housing and living practices were better adapted to cold and high elevations.

Many traditional practices have continued but with constant adjustments by both communities. Crop production is now the main subsistence activity. Even the Tibetan households, which traditionally relied more on livestock-raising, have begun to depend heavily on agriculture. Maize, potatoes, wheat, green vegetables and fruits are grown using mainly hand implements, natural manure and oxen. Livestock-raising is the second most important source of livelihood. Yaks are raised in significant numbers, but there are also cows, goats and sheep. Nearly all households keep pigs and poultry.

Forests are important not only for grazing yaks, cows, goats and sheep, but also for collecting medicinal plants. As will be discussed in the next section, income from medicinal plants is crucial for most households. Wood, bamboo, fodder and many edible items are collected in different seasons. We will shortly see that recent official restraints on the use of forest resources have had a profound effect on local livelihood security. But first, a few illustrative details are useful concerning the history of the reserve and the manner in which it has been managed.

Reserve management style and goals. Wolong reserve was established in 1963, covering an area of 200 square kilometres. It was initially established as a forest reserve with the goal of protecting the panda habitat; it soon acquired the reputation of being the country's leading panda reserve. As the first national panda survey in 1974 showed that Wolong had the highest density of pandas among all the panda reserves, and in view of the rising international interest in pandas, the government decided to enlarge the reserve to 2,000 square kilometres. Much of the new area involved isolated high mountains where there was little or no human impact. However, expansion also meant incorporating the Gengda and Wolong communes, as well as the areas used for logging along the Pitiao valley. Logging operations, in which the government had made substantial investments, had to be stopped. The main office complex of the logging operations was transformed into the reserve's headquarters. The Gengda and Wolong communes were allowed to remain inside the reserve but, as will be shown later, the official policy towards these settlements has changed over the years.

There have been five principal reserve management goals and activities. The first one is a classic park or reserve management task involving efforts to improve the

existing physical infrastructure such as roads and trails, check posts, office buildings, staff quarters, research centre, shops and visitor accommodations. Some office buildings and roads existed prior to the establishment of the reserve, but many required improvements; many new facilities had to be constructed as well. A sustained budget from the government and occasional financial contributions from abroad have allowed reserve authorities to install most basic facilities. However, maintenance is generally poor. The central problem is that the reserve has no source of income of its own, and the government and outside funding agencies have tended to provide assistance for construction only. This, for example, is the case with the WWF-assisted panda research centre. WWF provided funding solely for the construction and initial equipping of the centre. No provisions were made for its maintenance, which was understood to be the responsibility of the Chinese side. The centre is currently severely handicapped in its functioning, in large part as a result of natural wear and tear and the breakdown of many ultra-modern instruments which are imported and expensive to replace.

The organization and facilitation of research has been another important management activity. Wolong has long been a centre for academic and scientific research by Chinese students and scholars. For example, the panda research centre was established in the early 1980s to breed pandas in captivity through artificial insemination. This was backed by studies by Western naturalists on panda behaviour and the regeneration of bamboo. Researchers and scientists also carried out the enumeration of the flora and fauna of the region, which was completed by the end of the 1980s (MacKinnon et al., 1988:8).

A third management activity is the protection of wildlife. Access to the reserve by outside people was curtailed by establishing a checkpoint at a narrow gorge at the boundary of the reserve, and imposing an entry pass on visitors. Dates for the annual collection of medicinal plants have been regulated for some time, and people both from inside and outside the reserve must obtain a permit. A permit — which is time-consuming to apply for and is rarely granted — is also necessary to cut wood for construction. Extraction of bamboo and firewood, by villagers as well as grazing of their livestock is tolerated at best. Crop production and hunting inside the reserve are severely punishable. Surveillance has been made more effective by increases in the number of reserve guards per square kilometre and improvement in their training. The national law on panda protection gives sweeping powers to these guards and upper-level reserve authorities to deal with offenders.

Fourth, rehabilitation of degraded areas through tree planting has remained a key management goal since the early 1980s. Reforestation is a major effort throughout China, often accompanied by various incentive schemes. Many “degraded” areas inside the reserve include lands previously used by peasants for crop production or grazing. As table 4 shows, by 1992 a total area of 132,677.5 mu (8,845 hectares) was afforested through rehabilitation programmes — which included both reforestation as well as enrichment planting activities. Peasants were given minimal compensation for the loss of their land, as well as for looking after the trees planted during the initial years. In the 1980s, the World Food Programme (WFP) subsidized many of these activities. Until 1982, most afforestation was carried out in isolated or peripheral fields where peasants had trouble protecting their crops from

wildlife. Hence, there was no strong opposition from the peasants. But their attitude changed, as trees were increasingly planted on prime agricultural land.

Table 4
Afforestation in Wolong reserve (in mu)

	1965-1982	1983-1992
Agricultural land	—	1726.0
Agricultural and non-agricultural land combined	85,314.5	45,637.3

Source: Author's fieldwork (Wolong reserve headquarters), 1993.

Finally, the removal of human settlements from the reserve has remained an explicit management objective. Ever since the establishment of the reserve, the existence of the settlements has been considered incompatible with conservation goals (i.e., the protection of panda habitat), but it has taken a while for concrete policies to emerge. The first such policy, in the early 1980s, sought the division of the reserve into three principal zones: a core area was proposed at the centre of the reserve, surrounded by a scientific research zone and a management (human settlement) zone (Li et al., 1992:353 and MacKinnon et al., 1988:16-18). This zoning put the Wolong Township in the core area. An attempt was subsequently made to remove the people from the Township and resettle them in the Gengda area, located in what was considered the buffer zone. As a first step, people settled closest to the panda habitat in the core zone were to be removed. WFP provided financial assistance to construct a Western-style apartment complex to house some 100 families. This resettlement scheme made no provision of land for agriculture, and off-farm employment was virtually non-existent. In addition, the Wolong people were accustomed to living in wooden houses with extended kitchen gardens and pig-yards, which the new apartment buildings did not offer.



Photo: Ghimire

Empty apartment buildings

Understandably, people refused to move to the new location. People were also unwilling to move because they knew the proposed site was more windy and warmer due to the lower altitude. Some opposition to the resettlement was also shown by the receiving population, as they would have been obliged to compete with the newcomers for existing jobs and grazing and firewood collection sites. In the end, no one moved out of their village, and the apartment building has stayed empty, deteriorating rapidly.

A second policy was designed in 1989. The national conservation management plan for the giant panda, prepared by the Ministry of Forestry and WWF, proposed that the people of Wolong Township be removed from the reserve. The plan also proposed the removal of people from Gengda Township to make the reserve entirely free from human settlements. If this was not feasible, the plan recommended excluding the 200 square kilometres of settlement and forest area covered by the Gengda Township from the reserve boundaries (MacKinnon et al., 1989:48). But the removal of people from the reserve seems to have been the option chosen, as funds had already been appropriated for this purpose. In fact, the resettlement item constitutes over 65 per cent of the reserve's budget for the next five years (ibid.:134).

Where is the conflict? Figure 2 shows the settlement and forest structure in Wolong Township. This is similar in Gengda, but the base-altitude begins slightly lower. The most striking aspect of this figure is the existence of mutually non-conflicting activities at different elevations. Most human settlement is situated on the valley floor, with small isolated hamlets and agricultural plots found up to 2000 metres. People collect firewood and graze cows and goats up to 2500 metres where mixed deciduous evergreen forest exists. Beyond this point and up to 3500 metres lies the typical panda habitat. Villagers interact very little with this tract, except for the occasional annual collection of a few bundles of bamboo sticks by some households. Above the panda habitat lies alpine grassland where yaks are grazed, medicinal plants are collected, and most hunting was previously carried out. Neither the activities related to crop production and livestock-raising below, nor the yak grazing and medicinal plant collection above, come into direct conflict with the pandas and their habitat; indeed, most villagers have not seen a panda in their entire lifetime. This is in part because pandas are elusive animals and live in a belt that is not frequented by villagers, and pandas seldom descend to the settlement areas. They do come into some contact with yaks during the peak winter season when herds are brought down to the lower altitudes, but as yaks prefer to remain in the grassland they are not a threat in terms of destroying the panda habitat which consists of woody and bamboo vegetation. They are near the panda belt for at most a couple of weeks each year before moving up the mountain. Several villagers said that this occasionally allows pandas to catch small calves to eat during the bitterly cold months when their preferred food — bamboo stem — is in short supply. This suggests that conflict between human activities and the panda habitat is virtually negligible.

Figure 2
Typical settlement and forest structure in Wolong Township

However, the reserve management plan described above implies that present human activities are causing the reduction and degradation of forest areas available for pandas. It should be recalled that the reserve represents an area of 2,000 square kilometres, and that human activities are concentrated in areas outside of the panda habitat. Part of the perceived conflict seems to have arisen as a result of a problem with the zoning of the reserve. The concept of establishing specific and separate zones for strict conservation and human activities, developed by the MAB programme of UNESCO, indicates that the core area should consist of “minimally disturbed ecosystems” (Batisse, 1986). Under this criterion, the area where the pandas currently live (i.e., the northern and southern flanks of the reserve) should have been the principal “core” zone (see map 2). Instead, the plan considers the central area — where human settlements have long existed — as the “core” of the reserve.

Another argument explicit in the management plan is that the villagers are engaged in excessive use of the reserve’s resources. This deserves some clarification. Despite people’s critical reliance on certain forest products, the actual level of local resource use in the reserve has remained low. As discussed above, the use of the reserve for agricultural expansion has totally ceased. In fact, there has been a continuous decline in the area adjacent to villages that is under agriculture and pasture. There has been a drastic reduction in local hunting, in part as a result of vigorous surveillance and tough anti-hunting laws. In any event, pandas were never a target for hunting by local people. The collection of medicinal plants is allowed for just over a month annually. Timber from the forest is sought mainly for house construction and repair — which generally involves a small quantity and is extracted, where possible, once every few years. The management plan singles out the collection of firewood by local people, which is estimated to be 1,817 cubic metres per year (MacKinnon et al., 1988:12). This figure does not take into account the fact that many households regularly supplement firewood with agricultural residues such as maize cobs, straw and farmland trees. Also, a few households use electricity for heating. Furthermore, a significant number of households living near the Pitiao river collect wood that is brought by the annual floods during June and July. This is especially true in Wolong township, where the river bed is flat and most villages are situated close to the river.

The main issue of concern among reserve authorities and conservationists has been the size and growth trends of the local population. The national panda management plan sees population growth as the “greatest threat” to pandas (MacKinnon et al., 1989:37). Schaller, a reputed natural scientist, emphasizes the “inexorable population growth” that is threatening the future of pandas and other wildlife (Schaller, 1993:208). The Wolong reserve management plan is even more explicit. It states:

“Undoubtedly the biggest constraint on the reserve management is the problem of handling the very large population of human residents in the reserve. These residents cause most of the damage that threatens the well-being of the ecosystem, slows down efforts to restore the ecosystem and place a huge workload on the administrative offices of the reserve staff” (MacKinnon et al., 1988:8).

Three specific points are worth noting here. First, the population density in north-west Sichuan, where pandas are found, is much lower than in the Sichuan plain or other parts of China. The ratio between population density and resources available is quite favourable. Indeed, much of Wolong reserve, and most other panda reserves, are still relatively inaccessible and largely uninhabited. But project documents tend to give the impression that a similar population density exists in the reserve, as elsewhere. Second, as has been noted earlier, the human population in Wolong is quite small vis-à-vis the surface of the reserve. Just over 4,000 people live in small, confined areas of the reserve and there is no in-migration. They are also heavily constrained by wildlife laws and reserve guards in their ability to extract forest products. Finally, recent population dynamics hardly suggest a trend of “inexorable population growth”. As mentioned earlier, the total population in the reserve has actually declined in recent years due to out-migration that has resulted from the official relaxation on people’s movements. Some seem to have moved to urban centres attracted by higher wages and better education and living conditions, while others have moved to neighbouring areas to join family members. The offer of compensation, which ranged between 3,000 and 5,000 yuan per household, must also have encouraged people to leave the reserve, especially when their future in Wolong seemed so uncertain. Even though most people in the area, particularly those of Tibetan origin, are not required to follow the official one child policy, the majority seem to have already chosen to do so. The common practice of intermarriage between Han and Tibetan people especially has facilitated the adoption of the one child policy. The Chinese national culture and educational system now promote population control and have also had a considerable influence. The perceived conflicts between man and pandas are in many ways dubious.

B. Social Development through Conservation

Certain aspects of social development referred to in the preceding section will be further discussed here. As outlined in section I, the concept of social development can be divided into three sets of issues: basic social provisioning, economic security and improvements, and social integration and popular participation. These are very broad categories which frequently overlap. For instance, basic social provisioning could easily include many aspects of livelihood security and social integration, or vice versa. But for present purposes, it will suffice to shed some light on key parameters of social development, organized primarily around these three categories. The central question for discussion is: has the establishment of the Wolong reserve contributed to meeting basic needs, improving standards of living and promoting cultural development in the area, together with its conservation objective?

Basic social provisioning. The people of Wolong aspire to improved housing, health care, education and food security, as do people in other parts of rural China and, indeed, the world. They also desire better roads and access to electricity. Individual households and communities, for their part, have made numerous efforts to achieve these “primary needs”. How are these endeavours supported by the reserve management?

Let us begin with the issue of housing. Although the general housing conditions in Wolong seem to have improved over the past decades, they are far from adequate. Most houses still tend to be small, dark and damp. Despite a prolonged winter season, walls and roofs are badly insulated. People traditionally lived in wooden houses, with roofs of stone slates, which were considered warm and relatively easy to construct. In recent years, in part as a result of restrictions on extracting wood and stone from the reserve, people have been more inclined to use concrete-blocks and bricks, and tiles and zinc sheets for roofing, as well as glass for windows. Modern houses are also seen as a status symbol, offering more living space and bigger verandas and courtyards than the traditional houses. The construction of modern houses can be financially burdensome for most households: there is no official assistance or compensation for house construction. The abandonment of the commune system and influence of modernization have also meant a steady decline in the previous reciprocity system of helping one another with house-building.

The reserve has done little to improve health care and sanitation. Even though Wolong has seen some improvement in health in general, critical problems persist including insufficient health facilities, poor sanitary conditions and practices, and the prevalence of contagious diseases. Three small dispensaries, which were established in the reserve after the 1949 revolution, have provided limited health care facilities ever since. Salaries and equipment costs are covered by the provincial authorities. Health care costs were previously subsidized by the respective commune office, but now individuals seeking medical care are required to pay for examination and medicine themselves. For treatment of serious disorders, people must make the costly trip to Chengdu. Unhygienic sanitation and housing conditions are a root cause of many diseases. People generally eat with chopsticks, but dishes, cutlery and kitchen utensils are not properly washed. Although water at the source is pure, storage practices are unhygienic. Those households farther away from the river tend to economize water to avoid undertaking the long distances necessary to fetch it. The exigency to save water and wood and the inability to buy soap means that clothes are seldom properly cleaned. Children and the elderly, in particular, appear dirty. Furthermore, living quarters generally tend to be located very close to animal stalls and excreta.

There were no schools in Wolong prior to 1949. During 1950s basic educational facilities were provided with the opening of one primary and one middle school. Over the following decades, three pre-primary schools, two additional primary schools and one high school were established. The majority of the people in the reserve are literate and primary school attendance is high. Schooling is obligatory for children, but parents need to pay for books and make various contributions to the local school. The provincial government pays teachers' salaries, but as the pay is lower than in the Sichuan basin, it is difficult to attract enough good teachers. Furthermore, schools lack many teaching instruments. Clearly, much needs to be done to enhance the educational standard in the area.

The establishment of the reserve has played a positive role in two specific areas: the main road has been improved and a few hydroelectric plants have been constructed. The road which joins the Pitiao valley to the Sichuan plain was initially constructed in 1961 to enable timber extraction from the area. Since the establishment

of the reserve, it has been much improved and has been extended westward to the neighbouring county of Xiajin to provide, amongst other things, a marketing outlet for apples grown in the area. As it is a principal road leading to the Aba autonomous region, the government has provided considerable sums of money for its periodic improvement (MacKinnon et al., 1988:12). However, much of this has been spent on maintenance of the stretch between the plain and reserve headquarters in order to facilitate mobility of reserve staff and visitors. Work to surface this section of the road and replace wooden bridges with concrete ones was completed very recently. The construction of this road has allowed the peasants to transport their produce to larger commercial centres and acquire higher prices than could be obtained locally. They are also able to purchase necessary household items, which are generally cheaper in these centres. Although the main road has helped to connect the area to the wider world, most roads leading to different villages and trails within villages still remain in poor condition.

There are at present five hydroelectric plants in the reserve, with a total capacity of 1695 kilowatts. The first two were constructed to provide electricity primarily to the reserve staff, and to a limited extent to Shawan and Gengda villages. In the 1980s, three more hydro-plants were set up, with the specific aim of reducing the demand for firewood by villagers. Earlier plants were constructed by the Chinese government, but newer ones are funded by foreign agencies. Regular maintenance and staffing of these hydro-plants is supervised by the reserve's management. Nearly 99 per cent of the households now have access to electricity (Li et al., 1992:324), although much of it is used for lighting only. Most households pay about 20 to 30 yuan (US\$ 3-5) annually for lighting, but this rises substantially if electricity is used for cooking as well. A few of the more prosperous households use electricity for a limited amount of heat during the winter months and to heat water for showers, but none of them use it for cooking.

Food and nutrition is an important area of social provisioning. Due to the limited access to land resources, mountainous terrain, long cold season and primitive agrarian technology, food remains the primary preoccupation of the majority of households. The government's drive to intensify agriculture during the 1950s, 1960s and 1970s (see e.g. Perkins, 1969; Rawski, 1979; Croll, 1982) had some impact in Wolong as well. In particular, the widespread use of hybrid varieties of potatoes and maize led to a significant increase in production of these crops. The government also introduced the use of plastic sheets to cover maize seeds during cold periods, thereby permitting the ripening of maize before the arrival of winter. These plastic sheets are still subsidized by the government. Several types of new beans and green vegetables have also made their way into the area. Despite all these efforts, as we shall see below, food availability is lower than the regional and national levels. There is also a significant seasonal variation in food availability. Furthermore, people's preference for rice as a main diet staple leads them to exchange maize and potatoes for rice despite the higher price of the latter. Each household receives a subsidy for 500 kilograms of rice annually from the government. But the rate of the subsidy has remained the same for many years, even though the price of rice has increased many-fold. In recent years, the loss of agricultural land to the reserve (i.e., a 23 per cent reduction in area previously tilled), on the one hand, and the increasing destruction of crops by wildlife as a result of the rapid growth in their numbers, on the other, have

had a negative effect on the production of such crops as potatoes and maize. Indeed, the total annual quantity of food available per person stagnated or declined between 1985 and 1991 from 104 kilograms to 93.6 kilograms (see table 5). By way of comparison, average agricultural production elsewhere in China increased during this period, due in part to market incentives and the use of improved agricultural inputs (**China Agricultural Yearbook**, 1993:283). In 1991, local per capita grain production in the area was approximately one-third of the national or provincial figure.

Table 5
Agriculture and food production in Wolong reserve

	1980	1985	1992
Area under agriculture (in mu)			
Gengda	3,920.0	—	3,571
Wolong	3,685.5	—	2,308
Total	7,605	—	5,879
Average land holding per household (in mu)			
Gengda	—	—	7.3
Wolong	—	—	6.4
Average for the reserve	—	—	7.0
Grain production per person/annum (in kg)			
Reserve	90.0	104.0	93.6*
Sichuan province	—	—	400.4*
China	326.7	360.7	378.0*
Grain consumption per person/annum (in kg)			
Reserve	—	—	—
Sichuan province	—	—	253.4*
China	257.0	257.0	257.0*

— signifies “not available”; * signifies 1991 figure.

Sources: Author’s fieldwork in Gengda and Wolong Townships, 1993; **China Agricultural Yearbook**, 1992; State Statistical Bureau, 1992.

The level of food availability, as well as the type of food that is eaten, has many implications for nutritional standards. We have no precise information on the local per capita supply of calories, proteins and other nutrients, but the fact that the per capita grain production in Wolong was even less than half of the national per capita grain consumption (see table 5) suggests a clear shortfall in food consumption and thus nutritional level for an average household. Furthermore, the local diet is heavily dependent on cereals, with little consumption of meat, eggs and fish. Pigs and poultry, which form the main local sources of meat, are now raised increasingly for the market. It is difficult to determine whether the prohibitions on hunting wild game and restrictions on collecting medicinal plants have also had an impact on people’s nutrition. Beans, various kinds of green vegetables and fruits are commonly eaten, but in much smaller quantities than rice. Moreover, they are available only seasonally. There is a local taboo against catching fish. This indicates that local diets may be deficient both in calories and proteins.

Economic security and improvements. We have examined the significance of the reserve in terms of housing, health care, education, food and physical

infrastructure for the people in Wolong. Economic protection and amelioration is another critical, and related, issue. Here we will consider whether the reserve has played any role in reducing poverty through employment creation and income generation, or provided conditions for greater social mobility.

Employment. Making a decent living, a major challenge for most households in Wolong, has become even more difficult since the establishment of the reserve. Crop production and livestock-raising are the dominant sources of employment. Yet agricultural activities have been severely restricted since the reserve was established. As noted earlier, the area under agriculture has steadily declined, and the average land holding per household is less than half a hectare (see table 5). This extremely small farm size means that even with maximum labour intensification little additional employment can be generated. Obviously, this also hinders the creation of wage employment in agriculture.

The livestock sector too has failed to generate further employment. Constant official harassment for grazing their livestock within the reserve boundary has led peasants to reassess their livestock-raising practices. As table 6 shows, between 1982 and 1992, the number of grazing yaks remained about the same, but there was a sharp drop in sheep and goats. Table 6 also reveals the significant increase in the number of cows raised in the area following the “householdization” of the production system in the late 1970s and early 1980s. Cows are now increasingly stall-fed. It is probable that restrictions on grazing have also led to increased pig-raising, although the grass for making “pig-beds” still has to be collected from the nearby forest.

Table 6
Livestock-raising in Wolong reserve

	1982	1990	1992
Gengda			
Yak	105	120	119
Cow	318	682	910
Sheep/Goat	549	120	154
Pig	1,238	1,344	1,365
Wolong			
Yak	1,128	—	1,100
Cow	208	—	200
Sheep/Goat	630	—	350
Pig	900	—	1,500
Total for the reserve			
Yak	1,233	—	1,219
Cow	526	—	1,110
Sheep/Goat	1,179	—	504
Pig	2,138	—	2,865

— signifies “not available”.

Source: Author’s fieldwork in Gengda and Wolong Townships, 1993.

The use of forest resources is a vital component of households’ employment strategy. The collection of medicinal plants, wild fruits, nuts, mushrooms, wood and bamboo, as well as hunting of game, where possible, requires a significant amount of labour, and these are activities which congenially supplement household subsistence

needs: extraction activities tend to be carried out when labour demand in agriculture is low. Hence, households have an excellent means of lessening seasonal unemployment. However, these opportunities have been continuously eroded by restrictive laws and regulations intended to protect the reserve.

The issue of employment has been entirely neglected in the management of the reserve. By the end of 1993, the reserve had a total of 375 staff members, very few of whom came from the area. There was no policy to employ local people, even though many functions relating to protection and infrastructure maintenance could have been carried out by them. Villagers are only occasionally hired for construction works (e.g. construction of hydro plants, office buildings and road repair), especially when bringing in outside labour is not advantageous.

Underemployment is becoming a serious problem, and the reserve has done little to alter the situation. Households have to devise their own strategies, depending upon their economic status and contacts. A few households with some savings have established small shops and stalls in village centres, or become engaged in itinerant trading. Most households, however, must seek seasonal work in construction and road building sites outside the reserve. Even though the current dynamism of the national economy, especially in urban areas, provides promising prospects for wage employment, due to the physical isolation of the area and the need to travel a relatively long distance, people from Wolong are generally disfavoured. Also, as they are specialized in traditional highland agriculture and livestock-raising, their production skills are scarcely relevant to the requirements of people and activities in the plains or urban areas.

Income generation. Income generation opportunities are closely related to the nature and extent of available employment. Hence, where employment is restrained, income levels remain correspondingly low. At the same time, with the increased insertion into the market system and rising demands for consumer goods, cash requirements are becoming more pressing. Peasants are frequently required to sell their meagre produce in the market.

Meanwhile, many traditional or prevailing sources of income have terminated or are becoming seriously threatened, in large part as a result of the restrictions imposed on resource use within the reserve. To offset this, peasants are more inclined to use hybrid varieties of potatoes and maize, even if it implies buying seeds and plastic sheets each year, and to use their small plots much more intensively. For example, four season beans are cultivated on the plot boundaries, and green vegetables (e.g. radish, turnip) are planted immediately after the harvest of potatoes, while maize still occupies the field. Yellow beans are grown between the maize plants on the same row. To increase yields, nearby water sources are neatly canalized, fresh pig-manure is diluted with water and spread in the field together with goat/sheep pellets and cow dung. Potatoes, maize and green vegetables are some of the main sources of cash income when sold and are usually exchanged for rice. But available information suggests that only about one-third of the peasant households are actually able to market grain and vegetables in moderate quantities (see table 7).

Many households used to receive significant income from yaks and goats. Both these sources have now shrunk — especially the income from goats — because of the increasing restrictions in grazing in the reserve. There has been an increase in pig-raising as there is a ready market for pork in the plains. Overall, the income from livestock has declined. In 1992, only 50 per cent of the households were able to generate cash income from livestock sale (see table 7).

In the past, peasants earned some cash through the collection and sale of such forest products as mushrooms, fruits and nuts. Baskets made out of bamboo were also traded. However, the collection of medicinal plants was, and still is, the most important source of income from the forest. Despite a reduction in the price of medicinal plants — largely due to widespread availability of modern medicine — 43 per cent of the sampled households earned on average 699 yuan in 1992 from collecting and selling medicinal herbs, which was more than the income from livestock and about half that of crop sales (see table 7). The income from medicinal plants is therefore crucial for many households. But this activity too is considerably confined and is likely to be stopped altogether before long.

Petty trading and wage labouring are clearly emerging as the most dominant sources of income in Wolong. In 1992, as many as 90 per cent of the households were found engaged in these activities and earned on average 1,912 yuan (see table 7). Although the above figures must be interpreted cautiously — as it was the surfacing of the road (which is not a regular employment) in the reserve which provided a great deal of wage employment in 1992 — as we saw earlier, there is a clear tendency to become increasingly engaged in off-farm daily labouring activities as cash needs grow.

Table 7
Selected sources of cash income in Wolong reserve in 1992*

	% of households with income from:	Average income (in yuan) among households with income:
Grains	33	1,008
Vegetables	26	410
Livestock	50	651
Medicinal plants	43	699
Subsidies	100	158
Trading/labouring	90	1,912

*Sample size = 42 households
Source: RDI/HRI, 1993.

Average income per person/annum for the reserve**	
Gross	700 yuan
Net	538 yuan

Average rural household net income in 1991***	
Sichuan	590.21 yuan
China	708.55 yuan

** Source: Author's fieldwork in Gengda and Wolong Townships

*** Source: State Statistical Bureau, 1992

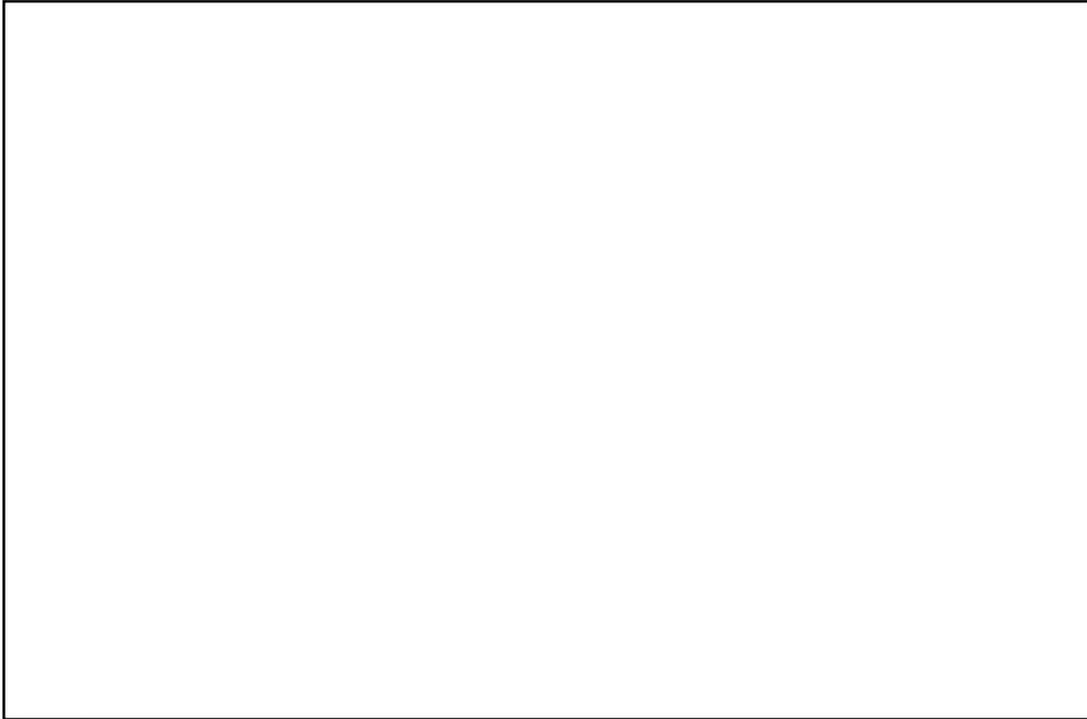


Photo: Ghimire

Yak herders: the young man claims that the prohibition of yak grazing will invite famine



Photo: Ghimire

A woman peasant

Social mobility. The old generation finds that living conditions have improved considerably since 1949, and the present generation works as hard as the old one. Notwithstanding this, the possibilities for improving household material conditions and child education in Wolong are very limited, as are those for upward social mobility. For example, during the field study, only five individuals out of the entire reserve population were found to hold stable jobs. Individual enterprise and family support have played a more important role in allowing these people to achieve limited occupational advancement than has formal social provisioning by the government or the reserve's management.

Social mobility was, to some extent, frustrated in the past by official restrictions on migration, which limited access to urban employment, higher wages and better educational facilities. In recent years, control of migration has been more relaxed. Nonetheless, for people who are generally unskilled and hardly speak Mandarin Chinese, securing housing and employment in urban centres is far from easy. They are frequently teased by the "lowlanders" for their eating habits, traditional costumes and uncleanness.

Sociologists, generally in the context of industrial societies, have shown a close link, in particular, between the level of education attained and employment enhancement, which enables upward social mobility (e.g. Barber, 1957; Coxon and Jones, 1975; and Lipset, 1981), — although this is likely to vary in different contexts depending upon the level of employment that is actually available. In Wolong, both the facilities available for and the standard of education are poor. Even though opportunities for basic education exist, minimum school education can often lead nowhere. Evidence suggests that as many as 98 per cent of the children attend primary school, but only 65 per cent of them go on to middle school (Li et al., 1992:325). The percentage of students actually completing high school is even smaller.

Students have to be exceptionally bright to secure a scholarship to attend university. Sending children to university privately is hardly conceivable, as households cannot afford the costs of food, clothing, books and, in certain cases, accommodation. This has become even more difficult under the new reforms to make universities economically self-reliant, which require students and their parents to pay even more.

Likewise, the family and local social environment are scarcely conducive to higher education and occupational mobility. There is little motivation for education. Children have to learn the skills of using sickles, hoes and axes even before they go to school; and frequently they are obliged to spend more time in the field than at school. Moreover, as children usually get married early, they tend to separate from the main family at a relatively young age. Family responsibilities, including the need to look after old parents, often make it impossible to leave the farm even for a few days. Most children thus simply end up working on their families' small farms.

Table 8
Use of three selected consumer items
in Wolong reserve, 1992

	Colour TV	Black & White TV	Water heater
Wolong (360 households in Township)			
Number of item purchased	8	100	3
% of households possessing item	2.2	28.0	0.8
Gengda (479 households in Township)			
Number of item purchased	20	380	20
% of households possessing item	4.2	79.3	4.2
Total for reserve (839 households)			
Number of item purchased	28	480	23
% of households possessing item	3.3	57.2	2.7

Social integration and participation. Social integration, in a normative sense, is used to express “the specific goal of promoting harmonious interaction and solidarity” amongst different groups of people (UNRISD, 1994). Despite the growing influence of market forces and an increasing operation of production activities at household level, people in Wolong still strongly identify themselves as “us”, and any other persons, including those from the plains, as “others”. Tibetan and Han cultures have interacted in the area for a long time, resulting in the emergence of a unique and highly tolerant “sub-culture”. In particular, the practice of intermarriage between the two communities has helped to create a harmonious community bond and distinct identity. As we saw earlier, both cultures made specific contributions to crop production, livestock-raising and foraging practices. Initially, the Tibetan culture was dominant and the Han people had to make many adjustments in living and production practices. In recent decades, the influence of the Han culture in the area has grown through the schooling system and political thinking, as well as through general state intervention. But even this more recent outside influence has so far not led to the emergence of any clear cultural contradictions between the two communities.

It is certain that economic differentiation will increase in the future. Because of declining income from crop production, livestock-raising and the collection of forest products, especially medicinal plants, on the one hand, and the growing influence of consumerism, on the other, many households are likely to find themselves in poorer situations. Televisions, radios, wrist watches, water heaters and modern clothes are now highly sought-after items (see table 8), and the social position of a household is often associated with the possession of these goods. People may cut down on subsistence expenditures or divert savings from agriculture in order to purchase such consumer items. When an off-farm income is available, it is normally used for buying consumer goods. Borrowing is also prevalent, but it generally involves small amounts and loans are given for one agricultural season only. As the state is still the owner of land, households cannot sell or buy it, which has prevented the emergence of classes of landless and rich farmers (see McKinley, 1993). Households which are able to run shops and businesses, in addition to carrying out agricultural tasks, are usually better off. Most of these households invest their savings outside of agriculture, although a few in the area were found buying more yaks. An

important point here is that there is no sign of one ethnic group becoming rich at the cost of others. There are only certain individuals who have become more “successful” in business and other new income generating activities, and they are drawn from both communities.

For a vast majority of the people, regardless of their ethnic origin, making a living is the most arduous task, and they have little say in the opportunities for livelihood improvement through formal planning or the reserve management. People are expected merely to abide by conservation regulations. The extended impact of the notion of “democratic centralism” and the rite of technocratic efficiency is that people are discouraged from taking part in conservation activities, unless they are specifically asked to do so. The concept and relevance of people’s participation in natural resource management has yet to develop in the panda reserves.

Summary. If peasants’ living conditions in Wolong were previously hard, the establishment of the reserve has not made them easier. The reserve’s impact on employment and income generation activities has been negative. Few opportunities for upward social mobility have been created by the protected areas management scheme. The present reserve management style does not foster popular participation in protection and sustainable use of reserve resources. In addition, there have been negative effects on basic needs provisioning, namely housing and food security. Two areas in which the establishment of the reserve seems to have had positive effects include construction of a road and hydro-plants for electricity. But if the level of provisioning in these two sectors is compared with other panda reserves, especially Jiuzhaigou, the single positive aspect unique to Wolong reserve is possibly the widespread distribution of electricity.

The reserve has created much uncertainty for local livelihoods. The existing level of social development, which is not high by any means if compared with the regional or national levels, is threatened as a result of measures to restrict peasants’ production activities. More significantly, peasants are vulnerable to official removal from their settlements. In this scenario, peasants would not only lose their dwellings and long-established farmland, but also the possibility of continuing resource extraction within the reserve, which is an indispensable part of subsistence for many households. Any alternative arrangements for housing, land and other provisioning by the government are likely to be limited and *ad hoc*. Prospects for these people to migrate to urban areas are slim for reasons already noted. Any improvement in their living conditions must therefore rely on the opportunities for wage employment in agriculture and rural industries which will be increasingly contested in the future.

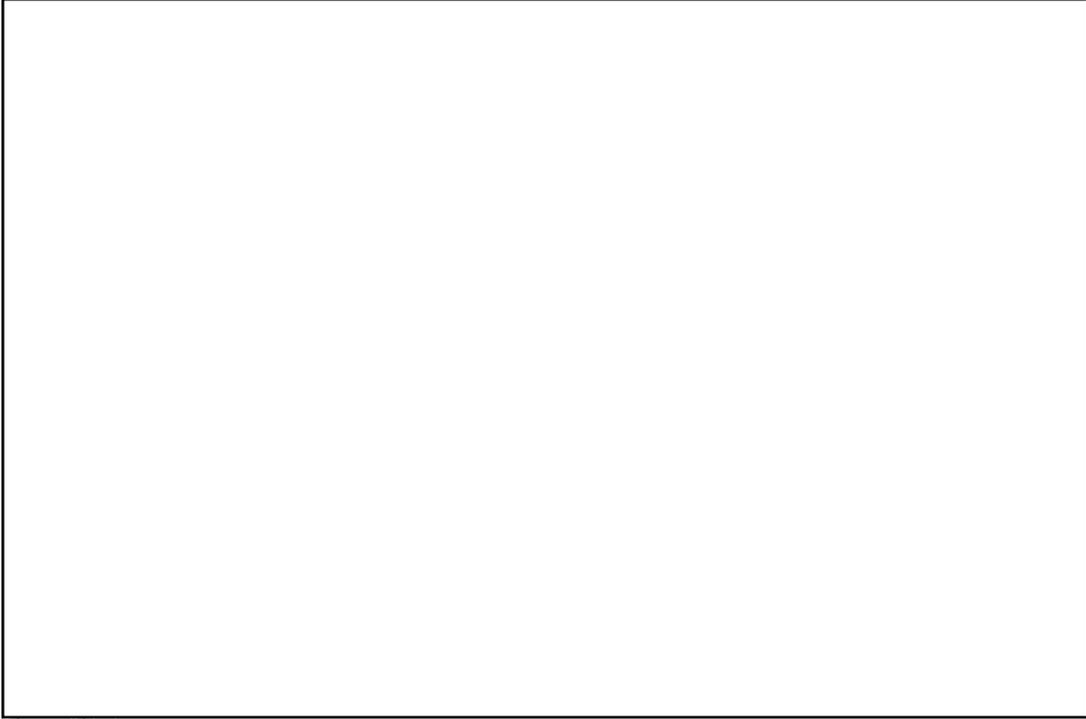


Photo: Ghimire

**Many compromises are possible
between people and pandas**



Photo: Ghimire

III. CONCLUSIONS AND REFLECTIONS

The above description and analysis suggest that the style and criteria of reserve management in Wolong are marked by a lack of attention to the survival needs and aspirations of the local people. This phenomenon is common in other panda reserves as well. The whole management exercise is generally geared towards “saving” pandas through the creation of extended habitat zones free from human interference. For this purpose, people settled inside the reserves are either removed or severely restricted in their customary resource extraction activities. There is little doubt that some wildlife requires special protection. But conservation can become counter-productive when its goal is reduced exclusively to species preservation, and local populations receive few if any social benefits.

What was said above about the few people residing in small pockets in Wolong is true of other panda reserves as well. In fact, most panda reserves contain no human settlements. Tangjiahe initially had some 300 people, but they were relocated a few years ago to the neighbouring communes. There are approximately 800 people inside the Jiuzhaigou reserve; some 100 villagers reside within the Foping reserve (MacKinnon et al., 1989:34-48). In all, the human population currently inside the panda reserves is just over 5,000. However, panda reserves spread over an area of 6,287 square kilometres. This low ratio of human beings to land suggests that there is actually no need to remove these people from their settlements rendering their very survival precarious. The geographical isolation and generally low population in surrounding areas means that most panda reserves also risk little pressure from populations attempting to settle in the reserves.

It is all the more important to stress that the potential for improving livelihoods is immense because of the abundant resource endowment and distinct spatial nature of most panda reserves. The majority of the subsistence activities carried out by local populations need not necessarily degrade the panda habitat. Firstly, panda reserves contain many renewable resources which are vital to local subsistence requirements such as nuts, fruits, plant shoots, mushrooms, honey, dried wood, bamboo, and medicinal plants. Prohibition of hunting following the establishment of the Wolong reserve has led to a great increase in populations of wild pig, deer, bear and pheasants. Permission to hunt excess numbers of this wildlife could provide not only meat and, at times, income to local people, but would also enable help them to protect their food crops. The national conservation management plan for the giant panda notes that some pandas have been killed accidentally in snares laid for other animals and urges tougher measures against poaching by local people (MacKinnon et al., 1989:17). An alternative to an outright ban on hunting could be the improvement of local snares so that pandas are not trapped in them.

Secondly, the vertical distribution of resources at different altitudes and the relatively harmonious relationship amongst resource users, including pandas and people, offer unique opportunities to strengthen social benefits. We noted above how the establishment of dwellings, agricultural activities, collection of firewood and grazing of cows and goats were carried out below the panda-habitat range, and how

medicinal plants were gathered and yaks were grazed above it. Both people and livestock have little need to interact either with pandas or their habitat.

In this respect, the situation in Wolong, and in most other panda reserves in China, differs in several respects from many national parks and reserves in other developing countries. In the latter, wildlife and human beings are frequently required to compete for the same resources involving the same space and elevation, although there can exist many complementarities. The prospects for compromise between the protection of pandas and other wildlife and people, both in Wolong and other panda reserves, are thus substantial, but they have been neglected.

The agencies and individuals involved in initiatives to protect pandas have typically tended to see local people as the greatest threat to the sustainable management of designated protected areas. The existence of human settlements inside the reserve and the use of reserve resources by local people are considered wholly irreconcilable with the conservation mandate, even though their actual negative impact might be insignificant and could even prove to be positive as we observed in the case of Wolong. This overwhelmingly negative attitude towards the local population has resulted in few attempts, if any, to combine human welfare with conservation. When the minimizing of social costs is not even considered, it is obvious that maximizing social benefits does not become an issue.

In China today, there is little debate as to whether or not local people must be removed when protected areas are established. Previously, some forces within the bureaucracy asserted "...two requirements which must be met for moving inhabitants away from protected areas: one was that the inhabitants were willing to move away, while the other was that it must be guaranteed that the productive and living conditions of inhabitants would not decrease" (Zhang, 1984, quoted in Chi and Liang, 1993:34). Another source also expressed that the individuals involved in the work of protected areas "should not regard the masses as a burden, and should understand that the masses are the fundamental forces of the work for protected areas" (Dong, 1987, quoted in Chi and Liang, 1993:35). But such voices are becoming increasingly isolated.

In recent years, hard line conservationists have had the greatest say within the bureaucracy. They have been effective in calling for increased official budgets for conservation activities, and also in creating alliances with international conservation and development agencies that control substantial financial resources and technical expertise. In situations where sufficient resources cannot be mobilized through these sources for the management of protected areas, it has recently been considered desirable to lease parks and reserves on a long-term basis to individuals and companies associated with large commercial interests, e.g. tourist agencies, pharmaceutical companies, zoos and biological foundations, etc. (Chi and Liang, 1993:10-13).

One consequence of this process is an increasing appropriation of natural resources either by the bureaucracy or powerful conservation and commercial agents. The local communities can only anticipate more resource alienation and the loss of many traditional sources of livelihood. This will be further aggravated as there are no

effective institutional mechanisms for dialogue with the affected populations which would allow them to have a say in the establishment and management of protected areas.

Another related point which should be noted here is the government's plan to increase the number of protected areas in the country and its probable local and wider effects. As was mentioned earlier, some 14 new panda reserves involving an area of 4,244 square kilometres are to be established (MacKinnon et al., 1989:4), bringing the total land area under panda reserves 10,531 square kilometres. Obviously, the official target to achieve 1,000 protected areas by the turn of the century implies a significantly greater proportion of national territory under strictly protected régimes. This would have three major repercussions. First, it would affect an increasing number of people. Second, official policy is likely to be harsh towards people settled in protected areas, especially if the population is not an ethnic minority and thus not considered by the government to be "politically sensitive". Third, besides affecting local provisioning, the expansion of protected areas is likely to deter regional economic activities such as the extraction of petroleum, gas, timber, medicinal plants, resin and tannin, as well as meat and wool production, as these practices will not be allowed within the protected areas. Evidence suggests that this has already prompted a reduction in the workforce for foraging, logging and transport of timber in certain regions including panda reserves (State Statistical Bureau, 1992:366), although this could in part be due to the decline in forest resources as well. Such processes can have undesirable social and economic impacts at several levels. For example, at local level, some people may lose employment or experience additional financial burden as many forest products previously obtained free of charge will have to be purchased. At the national level, the government may have to rely increasingly on imports of these goods, thereby raising the trade deficit. There has been little recognition of these wider impacts of protected areas. Nor is there much discussion as to how many protected areas are actually needed, and under what criteria.

Conservation initiatives such as the establishment of strictly protected areas have the potential for both negative and positive effects on social development — mainly depending upon how they are planned and carried out. Nonetheless, the positive component can substantially be increased if it is well integrated with local survival imperatives and if local people are allowed to participate actively. From the preceding assessment of the Wolong and other panda reserves, it is apparent that these aspects have both been ignored.

Why should this be so? Part of the explanation can be found in the conservation ideology followed in establishing the panda reserves, which tended to constrain many prospects for social development. The thinking has been inspired by the Western or American concept of "wilderness", which views the presence of people in protected areas as thoroughly undesirable, except for scientific and tourism purposes. As such, any resource use within the protected areas by local communities has been systematically discouraged. Indeed, a critical observer is frequently struck by the absence of Chinese thinking or influence on both the intent and content of protected areas management in that country.

Clearly, if the goal is to increase social benefits for local communities as well as preserve nature and natural resources, current conservation wisdom and practices must be altered. The dominant conservation thinking amongst international agencies and in China is still largely oriented towards “pure” conservation. Indeed, the terminologies such as “protect”, “conserve” or “preserve” all imply that natural resources will have to be protected or conserved from some perceived threats. The issue is how to improve the quality of local ecosystem in which animals, micro-organisms and vegetation, collectively referred to as biodiversity, as well as human beings can live together. Too often, the management systems of established protected areas such as the panda reserves have sought to separate human beings from their interactions with the local ecology.

Prolonged local antagonisms and protests against the state control of common property natural resources, as well as the failure to achieve even the stated conservation goals have obliged major conservation agencies such as IUCN recently to propose a slightly less rigid categorization and management of protected areas. Two distinct features of this modification include permitting indigenous people to live in “wilderness areas”, known as Category Ib, and allowing sustainable use of natural resources by local communities in “managed resources protected areas”, i.e., Category VI, (IUCN, 1994). However, if examined carefully, one will find these provisions to be merely *à la mode*. They are too narrow to permit integrated resource management combining realistic policies and institutions to harmonize the protection of unique species and ecosystems with the regeneration of real social development that improves the livelihoods of local populations.

First, local resource use is prohibited in all the other categories which make up the bulk of the protected areas. Second, these new provisions are meant for future parks and reserves and will not generally be applied to existing ones. Third, making recommendations does not ensure their actual implementation. The new changes will be confronted by inflexible national legislation regarding protected areas systems as well as by professional conservatism. Implementation of these new concepts is likely to be frustrated unless there is strong popular mobilization at the grassroots level in favour of greater access to resources within protected areas. Fourth, even in the case of “wilderness areas”, indigenous people will be permitted to remain “at low density and in balance with the available resources to maintain their lifestyles” (ibid.:21). It is not clear what happens if population density rises or when people seek to apply modern technologies to increase production (e.g., use of motor-boats for fishing, firearms to hunt and machinery for crop or livestock production and processing) and choose to adopt modern lifestyles (e.g. construction of concrete buildings, possession of cars, etc.). It is only natural that people aspire to an improved standard of living regardless of their demographic patterns, the state of their dwellings and their economic conditions. Conservationists in general have failed to tackle this question even in developed countries where professional expertise and financial resources are more readily available (e.g. Morrison, 1993; Birckhead et al., 1992). Similarly, in the case of “managed resources protected areas”, these will be located outside of the main and existing protected areas and will have to be “large” “predominantly unmodified natural systems”. The future scope for sustainable management in this category can easily be questioned. Furthermore, as it proposes to keep two-thirds of

the areas involved in a “natural condition”, little space will be left for multiple livelihood purposes (ibid.:31).

Indeed, if management of protected areas is to be made more consistent with human needs, all categories of protected areas would have to consider allowing local extraction of natural resources that are renewable and could be exploited without degrading the ecosystem. Likewise, present zoning systems need to be carefully reviewed, as designated “human exploitative zones” have tended to be very small compared to “protective zones”. Most zones could be made more open to permit resource extraction by local communities in an organized manner.

As far as the panda reserves are concerned, IUCN’s revised protected areas categories are hardly relevant. There would be no change in their protective status, even though they present exceptional opportunities for integrating human, panda and wider ecological exigencies.

Conservationists should view the presence of local people in a more positive light and include them as an integral part of the planning process. Most people have lived in the area for a long time, certainly before these areas were protected. They have their homes, families, fields and animals there. If it is decided that, for better or for worse, people are to stay where they are, a whole range of new options emerges. For example, forced removals and resettlements, which are frequently politically and economically costly and disrupt people’s livelihoods and culture, would not be necessary. The World Bank, for example, has recently acknowledged that “the potential for reducing or eliminating resettlement exists in many project proposals submitted for Bank financing” (World Bank, 1994:X). If this had been realized earlier, many removals in Bank-funded environmental and development projects could have been avoided.

The resettlement of people living in the Wolong reserve is not necessary socially, environmentally or economically. If it had been decided from the start that people would remain in their villages, the costs of constructing the (empty) modern apartment complex and planned resettlement, amounting to several million yuan, would have been avoided. The money could have been used for improving agricultural or production support services in the area for many decades. Alternatively, it could have been used for conservation purposes — for instance, maintaining the panda research centre which is now dilapidated due to lack of funds. A further disadvantage of the attempt to remove people from their settlements is that it has probably discouraged local people from making any significant investment in land, livestock and other productive activities because of the insecurity of their tenure.

The Chinese authorities, with an interest in peasants’ welfare and economic improvements, were generally opposed to moving people against their will. This is clearly reflected in the absence of the use of official coercive means to remove people or house them in the new apartment buildings. The point is that concerned international agencies such as WWF have missed an opportunity provided by political conditions that actually favoured letting people remain in their villages. This was basically due to their pursuit of a conservation ideology that saw the existence of people in the reserves as inherently contradictory to the protection of pandas.

Moreover, in recent years, official conservation thinking in China has been much influenced by Western dogmas, in part due to expectations of increased foreign aid and investments in the environmental sector. The opportunity that was missed may thus not present itself again.

When the dominant concept of conservation remains rigid and opposed to taking account of people's aspirations and needs, it is understandable that in practice a singular emphasis will be placed on pure protection of flora and fauna and on research. In the case of panda reserves, project documents fail to consider social development, even though elsewhere it is now becoming fashionable to talk of people's participation in support of conservation (e.g., Wells and Brandon, 1992; IUCN, 1993). Social development is important in its own right. People deserve to have access to the resources required to meet their basic needs, economic security and, where possible, realize upward mobility. Moreover, a socially stable and conscious population will be capable of taking better care of its environment. In fact, in the case of the Wolong reserve, social development could occur even in the absence of official conservation, as people would be freer to bring more land under crop production, improve livestock-raising and undertake sustainable forest harvesting. But conservation goals will fail in the long run if socio-economic objectives are neglected — especially as authorities will increasingly have to deal with impoverished and disgruntled local people. In short, conservation programmes should have the dual objective of protecting nature and improving social development. If they emphasize only the protection of nature, as has been the case in the panda reserves studied, they are likely to be self-defeating in the longer term.

A more flexible attitude in establishing and managing protected areas could open doors for many socially desirable opportunities and actions. Preoccupation would change from “how can people be removed from the parks and resources be protected from poaching” to “how can people achieve improved levels of living so that their reliance on the park resources is reduced and they have a real interest in protecting them”? The questions to be addressed would be: what are the resources that might be used by local communities for their subsistence and for generating income without degrading the park's natural resources? How can extractive activities be organized in ways that are sustainable? How can the park administration mobilize external resources and services in support of local efforts to increase food production and income generation?

As far as Wolong and other panda reserves are concerned, we saw earlier the extraordinary opportunities afforded by the occurrence of distinct panda habitat and human activities zones at different elevations. In Wolong, the existing population could enjoy a much higher standard of living if the potential for yak farming were fully exploited by enabling peasants to keep larger herds of yaks and organizing market outlets. There are also good prospects for assisting increased pig breeding as a source of income. More yaks and pigs could also contribute to improved nutrition by increasing the amount of animal protein and fat in the local diet while posing no dangers to the pandas.

The collection of medicinal plants is one of the major sources of family cash income. Given this situation, the period that the peasants are allowed to enter the

reserve for this purpose could be lengthened. They could be offered wages or food as incentives to regenerate medicinal plants if certain species were to be over-exploited. Some of the medicinal plants might be grown by peasants themselves in their own fields with technical and financial assistance from the reserve. There are many types of forest foods (i.e. game, honey, nuts, vegetables, fruits) which could be both consumed and sold without damage to panda habitat.

Local food availability could be increased by intensifying land use as well as by bringing back into agriculture some of the land earlier appropriated for protection. Marginal areas or the land adjacent to the reserve boundary might be used for agro-forestry. Currently, both expropriated and adjacent areas are used by the reserve for planting monoculture pine trees.

As the reserve is large and undertakes many administrative and protective activities, there are many potential opportunities for local people to be employed in offices, infrastructure construction and maintenance, and protection work. It would seem natural for local communities, who are obliged to bear the burden of the establishment of the protected area, to be given preference for employment in the reserve.

There is much local interest in running shops and itinerant business. The reserve could help people by extending credit for such activities. They could also be given incentives to establish small lodges and restaurants for tourists. Small-scale cottage industries related to the production of tourist handicrafts, processing of forest foods, bottling of fresh water, etc. are some other areas where the reserve could probably help.

Indeed, an in-depth investigation might show many other possibilities. Nonetheless, it can be seen from the above that, for a population of just over 4,000, the opportunities mentioned above are extensive. Improved living conditions would permit peasants to invest more in health and children's education. This in turn would probably lead to smaller families. It might also discourage out-migration to the already overcrowded cities, although of course this would also depend upon the "pull" factors originating in the cities (e.g., job opportunities, higher wages, better schooling and health care, etc.).

In conclusion, protected areas systems offer many opportunities to improve the social conditions of local communities, but they have not been exploited. A socially conscious project worker can make a difference in incorporating livelihood concerns within his or her portfolio of activities. But any such small and often isolated attempts need to be supported by more concerted efforts by larger institutions such as governments, donor agencies and conservation organizations. There is great scope for involvement of these powerful external institutions. Much expertise and additional financial resources are necessary if the social development component is to be truly incorporated in park management activities. This however requires radical changes in the present restrictive concept of protected areas to place a high priority on social development as well as on the protection of ecosystems.

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