RED PANDAS AND CONSERVATION: POLITICAL ECOLOGY, TENURE, LIVESTOCK AND HUNTING IN HIGH ALTITUDE FORESTS OF NEPAL

By

Erik Steffens

A thesis submitted in partial fulfillment of

the requirements for the degree of

Master of Science

(Conservation Biology and Sustainable Development)

at the

UNIVERSITY OF WISCONSIN-MADISON

2004

Mem
AWO
S81627
E744

6717118

ABSTRACT

The red panda, Ailuris fulgens, inhabits the high altitude temperate and sub-alpine forests of the Himalayan Mountains. I focused on the social conservation issues concerning the red panda and their habitat from Eastern to Central Nepal at four sites within Ilam District, Langtang National Park (two separate areas) and Annapurna Conservation Area Project (ACAP) in Manang District. A political ecology and common property theory framework was utilized, and interviews, limited ecological sampling and scat collection (for ongoing genetic analysis) were conducted. The different conservation strategies employed within the four study areas: National Park, National Forest, Community Forestry and Integrated Conservation and Development Project were assessed and analyzed focusing on the history, governance structures and their consequences specifically relating to the red panda and its habitat. Secure and long-term tenure under local communal institutions was found to have the most success in regulating behavior of individuals and encouraging sustainable practices. These local institutions, however, ignored outside conservation concerns that conflicted with their own values or restricted their ability to use resources. Government and conservation organizations therefore need to play an active role in linking the "stick" of conservation restrictions with the "carrot" of continued local access to natural resources. This requires outside organizations to continue to support and monitor the local institutions they devolve management and enforcement responsibility to. Strategies to mitigate the effects of armed conflict are also discussed.

ACKNOWLEDGEMENTS

This study would not have been possible without the help of Miles Roberts and The Smithsonian Institute and the Loucks Distinguished Fellowship Award. Lucy Dueck and Travis Glenn of the Savannah River Ecology Lab were, and continue to be, a source of knowledge, encouragement and enthusiasm.

My research was guided by the wisdom and insight of my guides and the people of the areas I visited all too briefly. Pasang Sherpa and Ganga Jung Gurung were especially invaluable in their enthusiasm, understanding and knowledge.

David and Anita Gibson, Penny Dawson, Steve and Ariane Le Clerq, Brian Peniston and Frances Klatzel were, as expected, my fabulous support base in Kathmandu. Thanks to Pralad Yonzon and Brian Williams for their valuable insights into red pandas and research. Thanks also to Surya Bahadur Pande and Pawan Shrest for their considerable effort and professionalism in helping me through the permitting process.

I am truly grateful and indebted for the services of my advisor and mentor Ray Guries. His enthusiasm, poignant insight and impeccably timed guidance were immensely appreciated during the process. Thanks also to my committee Stan Temple and Lisa Naughton for their positive but challenging critiques.

And to "mero mayalu", Kate.

TABLE OF CONTENTS

ABSTRACT i
ACKNOWLEDGEMENTS ii
TABLE OF CONTENTS iii
LIST OF TABLES AND FIGURES v
INTRODUCTION 1
General Conservation Framework 1
Study Overview 3
Case Study 1: Ilam 6
Case Study 2: Red Panda Conservation Area (RPCA), Langtang National Park 6
Case Study 3: The Annapurna Conservation Area Project (ACAP) at Tilche. 6
Case Study 4: Mangengot, Langtang National Park 7
Objectives 8
Nepal 9
Geography, Climate and Ecology 9
High Altitude Agricultural and Pastoral systems 10
Political History 12
History of Land Tenure, Forestry and Conservation in Nepal 13
Community Forestry 17
Conservation, Paradigms and Donors 19
The Red Panda 22
Physical Description 23
Taxonomy 23
Geographic Distribution, Historic, Present 24
Red Panda Natural History 25
Status and Threats 27
Red Pandas in Nepal 32
CONCEPTUAL FRAMEWORK 34
Political Ecology 34
Property Rights and Regimes 36
Common Property 38
Relevance to High Altitude Forests and Red Pandas in Nepal 41
METHODS 43
Use of Local Guides 44
Identifying the Key Issue 44
Interviewing Techniques 45
Scat Sampling, Ecological and Disturbance Plots 47
ILAM 48
Red Panda Habitat 52
Uncertain Land Tenure: Conflicting Government and Local Systems 55
The Kipat and the Limbus 56
The Legitimization and De-legitimization of the Kipat 57
The Four Kipats 58
The Southern *Kipats*: *Panchayat* and Community Forestry 59

The Cadastral Survey 61
"no" Leasehold Forestry 63
Conclusions 64
LANGTANG NATIONAL PARK, RED PANDA CONSERVATION AREA 70
Red Panda Conservation Area Introduction 70
Langtang National Park and Geography of the Study Area 71
Red Panda Ecology and Status 73
Pastoral Systems 75
Cheese and the Chinese: External Factors Causing Change 78
Conservation in the Red Panda Conservation Area 81
The Army and the RPCA 82
Present Status of the RPCA 83
Conclusions for the RPCA Case Study 85
MANGENGOT 87
Red Panda Ecology and Status 88
Logging Pre-State of Emergency 90
Logging and the "Invisible" State 91
Overview of the Effects of Conflict on the Environment and Conservation Efforts 92
Strategies for Conservation During Conflict 94
The Effect of Conflict on the Rural Poor 96
Effects of Conflict on Red Panda Habitat 97
Effects of the Conflict on Nepal's Environment 97
TILCHE 101
Introduction 101
Annapurna Conservation Area Project (ACAP) 102
The Tilche Study Area 107
Red Panda Status and Ecology 107
History of Tilche 109
Tilche Community Forest and CAMC Subcommittee 110
Hunting 111
The Paradox of Outside Regulation and Local Enforcement 112
Creating Community Consensus; Linking Hunting Restrictions to Community Forests . 113
Connecting the "Carrot" with the "Stick": Conclusions for Tilche Case Study 116
CONCLUSION 119
Red Pandas 119
Political Ecology 123

LIST OF TABLES AND FIGURES

Figure 1: Map of Case Study Locations in Nepal.....5
Table 1: Summary Table of Potential Threats to the Red Panda and Habitat.....28
Figure 2: Map of Ilam Case Study.....50
Figure 3: Map of Red Panda Conservation Area.....72
Figure 4: Map of Mangengot Case Study.....89
Figure 5: Map of Tilche Case Study 103
Table 2: Summary of Red Panda Natural History and Threats of the Four Case Studies..120
Table 3: Summary of the Effectiveness of Conservation Strategies of the Four Case Studies.....125

INTRODUCTION

General Conservation Framework

While biodiversity is defined in taxonomic or ecological terms, biodiversity conservation is inherently political. It is essentially social intervention to accomplish ecological goals in complicated macro-political settings (Brandon *et al.* 1998). The underlying causes and cures of environmental degradation are often social in nature (Blaikie 1985). Yet most conservationists tend to be more skilled in the "biodiversity" aspects while having less experience or understanding of the equally complex "conservation" aspects. The constraints of biodiversity conservation normally revolve around social issues- topics with which conservationists tend to be inexperienced or uncomfortable (McShane and Newby 2003). Because of this we know more about the "what" and "where" of conservation than the equally important "how" (Redford *et al.* 2003).

During the past two decades, proponents of two conflicting conservation strategies have argued over the role of which social institution, either local "community" or national government, should play the leading role in biological conservation in developing countries. While the top-down, government protection approach relies on national government regulation and enforcement, community based conservation (CBC) places the responsibility for protection and management of natural areas in the hands of local communities and institutions[1]. Proponents of both sides have overemphasized their preferred institution's role. The reality in most developing countries is that institutions at all levels are weak and no one

[1] For a comprehensive overview, see Agrawal 1999.

organization is capable of effective and durable conservation management (Brandon *et al.* 1998). Therefore, successful conservation often requires a distribution of authority, commitment and responsibilities across many organizational levels and institutions (Barrett 2001).

Planning for long-term conservation requires an interdisciplinary approach that must include analysis of historical, political, ecological and social trends (Sanderson and Redford 1997). Conservationists have recently focused on broadening the historically ecological driven conservation framework to include fields such as political ecology, environmental history and common property theory as a means to develop a deeper understanding of the intricacies of human- ecological interactions (Berkes 2004). Many factors play into conservation in developing countries at a national policy level including the interplay between foreign donors, national governments, non-governmental organizations (NGOs). Individuals, local and regional institutions play a greater role in resource management and enforcement of conservation regulations at the site-specific level. Corruption and public sector ineptitude combined with the debilitating effects of armed conflict can also play an enormous role in the effectiveness of conservation efforts. Variations and nuances at all levels historically, socially and environmentally do not allow for the adoption of a "cookie cutter" approach to conservation (Brandon *et al.* 1998).

Yet this one-size-fits-all approach is largely the *Modus operandi* of international conservation organizations in their competition to promote and market their own unique conservation approach to donors. These approaches are based largely on untested theories

of conservation (McShane 2003) and often lack clear goals and measurable outcomes (Salafsky *et al.* 2002). This has led to a dearth of definitive research concerning existing conservation approaches. There is now a clear need for greater synthesis of site-specific information in order to compare the relative effectiveness of conservation approaches (Saterson *et al.* 2004).

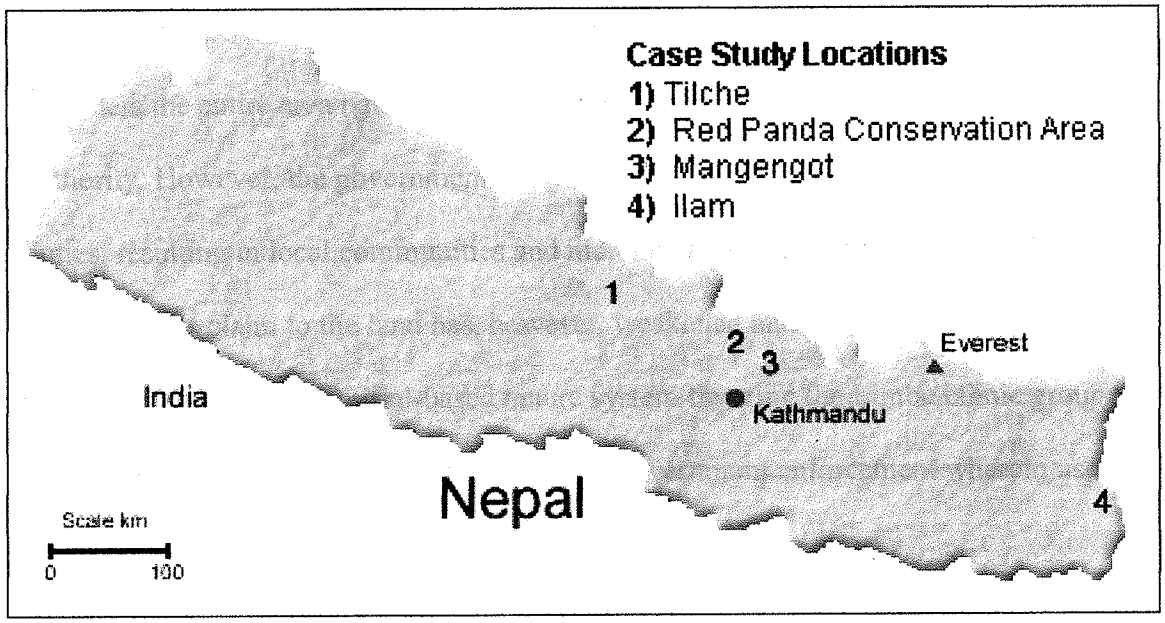
Study Overview

This study focuses on the historical, socioeconomic and political factors affecting conservation of Nepal's high altitude forests. More specifically, it focuses on social conservation issues of the red panda (*Ailuris fulgens*), a habitat specialist found only in forested regions of the Himalayan Mountains and Southwestern China. Although considered threatened it is not in imminent danger of extinction. Rather, its main threats in the wild are thought to be the slower acting processes of fragmentation and degradation of its forest habitat leading to local extinctions (IUCN 2004). Timber and fodder harvesting, poaching and the indirect effects of grazing are regarded as the main human activities affecting the red panda (IUCN 2004, Yonzon 1991, Yonzon and Hunter 1991).

I have attempted to concentrate on the root causes or "social drivers" that lead to changes in the condition of red panda habitat in Nepal. These include insecure land tenure; weak institutions; inappropriate relationships or distribution of authority between local and government institutions; shifting economies and the effects of armed conflict.

I present the results of my work using four case studies. Each case study involves a different geographic location in Nepal (see Figure 1) and a unique social, political, historical and ecological narrative illustrating the complexities of conservation in Nepal. The four study areas are representative of existing conservation strategies and provides for limited comparison between the sites. For each case study, a specific key topic related to red panda conservation provides a basis for discussion of long-term conservation in the upland forests of Nepal. All studies identify an activity which threatens the red panda or its habitat and considers the underlying social factors driving these activities.

Figure 1: Map of Case Study Locations in Nepal



Case Study 1: Ilam

The Ilam study site in far eastern Nepal illustrates the 'normal' circumstances and conservation activities that exist for most of the upper forests of Nepal. The government considers the entire area national forest and claims full ownership and management authority. However, the government has provided only token management and enforcement duties, resulting in local communities and individuals retaining *de facto* control. The government's claim to the land has, however, weakened and eroded the historical tenure regime of the *Kipat*, a familial-based tenure system favoring the Limbu ethnic group. This has created a void of accountability and weak government enforcement wherein users have little responsibility and incentives for conservation.

Case Study 2: Red Panda Conservation Area (RPCA), Langtang National Park

The Red Panda Conservation Area (RPCA) represents the national government's most active authority, as government control of forested land is both legally and socially accepted. However, even during a period when army personnel were stationed in the area, enforcement was lackluster. The community management committees of the RPCA showed promising results in terms of specific conservation measures but have not been given the authority needed by the National Park to manage effectively.

Case Study 3: The Annapurna Conservation Area Project (ACAP) at Tilche.

Tilche is located within the Annapurna Conservation Area Project (ACAP) which is touted as one of the most successful examples of the community–based conservation approach (Stevens 1996, Hough and Sherpa 1989). Although the positive effects of strengthening

local institutions are evident, this case study also illustrates the limitations of the CBC approach as illustrated by the continued practice of hunting. The case study emphasizes the importance of the role of government and non-governmental organizations (NGOs) in supporting local conservation efforts, monitoring and, if necessary, enforcement.

Case Study 4: Mangengot, Langtang National Park

The Mangengot area is illustrative of the effects of military conflict on conservation. Nepal's civil war, and the consequent lack of conservation authority on either side, has led to an open-access system in the void of any legitimate conservation enforcement. Strengthening and empowering local institutions seems to have the greatest success as an approach to mitigating the impacts of conflict.

In conjunction with interviews and data collected for this study, ecological information and red panda fecal samples were collected as part of an ongoing study on wild and captive red panda populations and their genetic makeup. Where possible, this biological information is utilized to explore the interface between red pandas, their habitat and anthropological disturbances.

Objectives

The objectives of this study were to:

1) Identify existing uses of high altitude forests and evaluate their effect on red pandas and their habitat;
2) Explore the range of existing local and government institutions and their interactions;
3) Determine the effect of tenure, use rights, and institutions on individual actions and the potential for long-term conservation.
4) Compare and evaluate the existing conservation strategies occurring within Nepal's high altitude forests; and
5) Explore the effects of civil war on institutional effectiveness and potential strategies to mitigate conflict.

The case studies illustrate the range of complex political realities of land tenure and management regimes in Nepal's Himalayas, but they only provide limited exposure to the diversity of political, historic, environmental and socioeconomic nuances which play a large role in determining the success of conservation at any given place. In a land where language and culture can change from one valley to the next, it is difficult to extrapolate lessons learned from a single site to other areas. Flexibility and allowing for a range of possible management and tenure systems is required as there is no single approach that will work for every location. The case studies collectively suggest that successful conservation in Nepal's high-altitude forests and red panda habitat is best accomplished with local, communal tenure

and management, with the national government and NGOs playing key roles in strengthening local institutions and tenure, and through the provision of incentives for local enforcement of conservation goals.

Nepal

Geography, Climate and Ecology

Nepal is separated into three broad geographic zones: the flat and subtropical Southern *tarai* region, the Mid-hills zone comprising the foothills of the Himalayas, and the Himalayas themselves lying along the Northern border of Nepal and Tibet. The Himalayas in Nepal are a series of mountain ranges often divided by low-lying valleys.

The country has a continental monsoon climate with most of the rainfall occurring during the summer monsoon months. The effects of the monsoon weaken as it travels westward so that eastern Nepal is significantly wetter than Western parts. Monsoon clouds typically release moisture on the Southern slopes causing a rain shadow effect on the Northern side of the mountain ranges. In addition, the mountains create highly localized weather patterns.

Given the large ranges in elevation, temperature and rainfall, the ecology of Nepal is naturally diverse. Therefore discussion will focus on the ecology of the study area: the mountain slopes and inner valleys where red pandas are found. Temperate broad-leaved evergreen oak forests predominate mixed with rhododendron trees on lower slopes (1900 to 2600 m) of the mountains. At higher elevations (2600 to 3000 m) forests are broadleaf

deciduous dominated by maple, rhododendron and magnolia. Sub-alpine fir, rhododendron and birch forests are found above 3000 m up to treeline at around 3700-4000 m. Bamboo is an important understory plant for much of the forest types above 2600 m and grows up to 5 m high (Klatzel 2001).

High Altitude Agricultural and Pastoral systems

Rice is the staple food crop of Nepalese farmers below 1500m and is supplemented by millet, corn, potatoes and wheat. Higher elevation subsistence farmers rely more heavily on millet and potatoes as well as wheat, buckwheat and corn. Cultivation occurs on mountain slopes with the use of terraced risers. The practice of shifting cultivation on the upper fringes of agricultural land is still practiced in Eastern Nepal on steeper, low grade agricultural land. This practice is an important land use for marginalized farmers as it provides a buffer strip between the forest and agricultural fields reducing the threat of crop-raiding animals such as rhesus monkeys (*Macaca assamensis)* and Himalayan black bear (*Selenarctos thibetaus*).

Cool temperatures and persistent cloud cover during the monsoon growing season makes agriculture usually unfeasible above 2000-2400 m. Temperate and sub-alpine forests dominate the landscape above the agriculture limit. Upper elevation forests tend to be pocketed with open grazing areas where herders set up temporary dwellings and live for a number of weeks before moving to different areas. Typically the upper forests are used as a transitional area in between the winter pastures close to villages and alpine pastures during

the summer. Most forests are grazed and pocketed with small clearings on ridgetops and flat areas. Selective logging of valuable timber species and collection of bamboo and other non-timber forest products (NTFPs) are also commonplace in temperate and sub-alpine forests.

Alpine areas above 4000m with large relatively flat areas are utilized in the summer months for grazing sheep, goats, yaks and yak/cow crossbreeds. Livestock are usually kept in villages in the winter months. This agropastoralist system allows utilization of the lush summer alpine pastures and also the manure fertilization of agricultural fields during the non-growing season. Life at this elevation is harsh for the herders with frequent movement between semi-permanent shelters for over seven months of the year. Livestock typically spend a portion of spring and summer in small clearings in the upper forests in transition between winter and summer pastures. The natural diversity of climate and geography of the Himalayas has molded a wide variety of pastoral production practices appropriate to specific conditions of a given place (Miller 1998).

Fire is a management tool used in slash and burn agriculture in Eastern Nepal and elsewhere to improve fodder for livestock. Although not a common practice in high altitude forests, there are a number of high ridgelines devoid of trees in eastern Nepal due to intentional fires by herders. It is suspected that fire historically deforested areas within Ilam and RPCA case study areas. The ecological effects and history of fire in high altitude areas of Nepal has not been adequately researched.

Political History

Prithvi Narayan Shah conquered and unified sixty small feudal kingdoms into Nepal in the late 1700's. After seventy years of familial reign, the Rana family usurped power from the Shahs in 1842 and instated a series of Rana prime ministers. Soon after the fall of the British Raj, an Indian-backed popular movement toppled the Rana regime in 1951[2]. The fall of the Rana regime signaled the end of complete feudalistic rule and the opening of the Nepalese borders to foreign influence after over one hundred years of closed borders. The 1950s were a politically unstable period as successive attempts at democracy went awry due to ineptitude and corruption. King Mahendra Shah assumed full authority in 1960 and implemented the partyless *Panchayat* system of government with little actual authority. In contrast to the Rana systematic exploitation of natural resources and the rural people, the *Panchayat* system was largely geared towards rural development. After mass demonstrations in 1990, King Birendra initiated a period of multi-party democracy under a constitutional monarchy (Moran 1996). With the murder of the King in June 2001 and the increasing civil war with Maoist rebels, Nepal has entered a phase of great uncertainty and chaos. In November 2001, the Maoists attacked the Royal Nepalese Army which had, until this time, not been involved in the fighting. A state of emergency ensued and the army began to actively engage in the fight against the Maoists. The state of emergency also led to a redeployment of army and government personnel. Army posts and many national park site

[2] The period following WWII in many parts of Asia was an unsettled and tumultuous period where the retreat of colonial powers led to great changes politically and environmentally. Although Nepal was never colonized, the withdrawal of Britain from India had profound impacts on the Nepalese political system.

offices in remote areas were evacuated. As of the end of 2003, the civil war has claimed more than 7000 lives and government services have come to a halt in most rural areas as the Maoists largely control the countryside.

History of Land Tenure, Forestry and Conservation in Nepal

Pre-1950: Land and the State

Throughout Nepal's history, the acquisition and control of land has played a central role in political motivation and in the initial unification of Nepal under the first Shah king, Prithvi Narayan Shah.

> "...land provided the basic motive for the unification of Nepal. Prithvi Narayan Shah's ability to interpret his dream of conquest into the more prosaic forms of land and crops made it possible for his hill men to dream their own dreams. It has always been a truism in the Hills that land was life and that those who wished to live a more abundant life must acquire more land or more fertile land. Prithvi Narayan Shah changed that truism into the dynamism of conquest." (Stiller 1995)

Following Nepal's unification, arable land continued to be a major focus for both the ruling Shah Kings and subsequent Rana prime ministers. Land registration systems were quickly instituted reaching even the most remote villages. Land was considered property of the state

with government holding the sole authority to grant private use rights. The state's control over land provided the basis for government support as a way of paying for individual services or loyalty and as way of extracting money and labor from its subjects. Especially important to the workings of the state was the granting of *Birta* to loyal individuals. These rights essentially gave private ownership of agricultural and forested land to the grantee (Malla 2001).

> "Divestiture of ownership rights in the land through *Birta* grants in favor of priests, religious teachers, soldiers, and members of the nobility and the royal family was thus the pivot on which rested the social and political framework of the state. *Birta* ownership not only insured a stable and secure income to the beneficiary, but also symbolized high social and economic status… The *Birta* system thus helped create a (local) feudalistic class that gave social and political support to the rulers" (Regmi 1977).

Both the Rana and Shah dynasties encouraged the conversion of forests to agriculture. By the turn of the nineteenth century, most arable land in the hills of Nepal had been deforested and converted to agriculture use, and forest/agricultural boundaries have remained largely unchanged since (Fisher and Gilmour 1991, Messerli and Ives 1989). There remained a clear lack of forest policy or interest towards the forest in the hills of Nepal during the Rana period (1841-1950). On the other hand, the Ranas tightly controlled the subtropical forests of the *tarai* region as their timber was sold to the British Indian Empire to make railroad ties ('sleepers') at an enormous profit (Malla 2001).

Post-1950: Private Lands and National forests

A series of land reform acts was enabled in the 20-year period after the fall of the Rana regime in 1951. The *Birta* system was abolished, tenants were given more rights and the concept of private property and ownership was strengthened. At the same time the new "democratic" government nationalized all forest lands and resources under the Forest Nationalization Act of 1957. This policy had the effect of making illegitimate all existing management systems and in their place, enforcement and management responsibilities were given to the newly formed and understaffed Forest Department with six trained forest rangers for the entire country (HMG 1996, Gilmour and Fisher 1991).

Forest nationalization indeed led to negative consequences in some areas. But the claims of significant deforestation (Bajracharya 1983; Furer-Maimendorf 1964) have perhaps been exaggerated. Clearing of forest land for agriculture is an historic event and, as mentioned, the current boundary between forest and agricultural land has remained mostly unchanged for over a century (Messerli and Ives 1985). To this day, some people still remain unaware that the government nationalized the forest (Gilmour and Fisher 1991). Not all people's behavior, therefore, was changed after nationalization. One group that was disenfranchised was the local elites who had lost their ownership and control of *Birta* forest lands and therefore had lost any incentive to protect forests (Messerschmidt 1995; Springate-Baginski *et al.* 1999).

Perhaps a larger underlying social cause for degradation during this period was the overall political instability in Nepal during the 1950s (Malla 2001). Gilmour and Fisher (1991) state that the degradation of forests during the 1950s diminished forest resources[3], which in turn caused a response by villagers to develop indigenous management and protection systems. Some political stability returned to Nepal starting in 1960 with the reinstatement of the Royal family. This allowed for the formation of new forest management systems that were highly variable and dynamic in response to changing environmental and political circumstances.

The Nepalese government has consistently demonstrated an inability to effectively enforce and govern hill forests throughout history (Malla 2001, Gilmour and Fisher 1991). District Forest Offices (DFO) have been chronically understaffed, lacking motivated personnel and corrupt (Malla 2001). The DFOs rely heavily on the same local elites who once held *Birta* title as their power and influence within their communities allows them to enforce DFO regulations. In this way, the period of the *Panchayat* from 1960 to 1990 resembled the former *Birta* system of tenure as local elites remained largely in control of forest resources and were supported by the government (Gilmour and Fisher 1991, Malla 2001). Enforcement of rules was particularly blind towards the elite and "it was only the weaker section of society which was brought under purview of this law enforcement activity" (Mahat *et al.* 1986). Sousan *et al.* (1995) state that the Forest Department was primarily a police force operating in favor of the elites and against the needs of the primary users.

---

[3] Nepal's population has grown from seven to over 23 million today since the 1950s. This rapid growth has also been viewed as one of the causes of forest degradation.

Community Forestry

Although there was a provision for community forestry in the Forestry Act of 1961, it was only in 1976 in the National Forestry Plan that the Forest Department made weak steps towards implementation. By 1990 only a few hundred hectares of the entire country was legally handed over to communities for forest management under this provision (Gilmour and Fisher 1991).

With the democratic reforms of 1990 and subsequent Forest Act of 1993, community forestry in Nepal rapidly spread and there are now over 11,000 community forests covering over 847,000 hectares of land, 23% of Nepal's forested land[4] (Acharya 2002). Community forestry has been successful in minimizing degradation and protecting biodiversity (Gautam 2004; Malla 2001; Springate-Baginski *et al.* 1999). After an application process including the development of a formal constitution and management plan, the DFO can cede management responsibilities to a community forest user group (CFUG) directed by a 12-15 member CFUG committee. The committee has the responsibility to manage the forests, hold regular meetings, manage accounts and fine individuals for violations. The community forest has proprietary rights to the forest. But the DFO maintains ultimate ownership rights and is able to de-authorize a CFUG (Acharya 2002).

[4] Community forestry has made little headway in the *tarai* region as the forest department has maintained control of the lucrative forests. Therefore, the total coverage of community forests in the hill regions of Nepal is significantly larger than 23 %. In Gautum *et al.* (2004) community forests covered nearly 50% of forested land in one mid-hill district.

Local elite's enthusiasm and participation in community forestry is one of the major reasons for success of the program but is also largely responsible for its shortcomings. Community forestry allows local elites to continue to strengthen their controlling role in forest management, seek donor funds, control CFUG accounts and be invited on study group tours, among others (Malla 2001). The elites and "less poor" male individuals of a CFUG tend to dominate decisions of CFUGs, but these individuals have less dependence on forests for livelihoods (Springate-Baginski *et al.* 1999). The poorest households commonly have little or no land and depend on tenuous livelihood strategies: agricultural labor, portering, fuelwood selling, alcohol distilling, NTFP collection, blacksmithing and artisanal and small-livestock production. All wealth rankings commonly rely on local forests for fuelwood needs. Poorer households may have specific needs from the forest distinct from the other groups. For example, poorer households often depend on collection and sale of fuelwood, or production of charcoal for livelihood and often these activities are banned by CFUGs (Springate-Baginski *et al.* 1999).[5] Overall community forestry has been less than equitable and the poor continue to benefit less than other groups (Adhikari *et al.* 2003). Restrictive community forestry measures have not improved the agriculture or livestock systems on which people rely (Doughill 2001).

[5] For a more complete review of the criticisms of community forestry in Nepal see Lachapelle *et al.* 2004. These include: control and benefits of community forest being held by local elite; gender and caste disparities; and the problems associated with the multiple, often conflicting, interests within a "community".

The Forest Department has also long been opposed to using community forestry as a means of livelihood and commercial profit for CFUG users (Malla 2001, Springate-Baginski *et al.* 1999). In response, a federation of community forest groups was formed in 1994 named the Federation of Community Forest Users Nepal (FECOFUN) and has pressed the Forest Department for reforms.

Conservation, Paradigms and Donors

Nepal's borders remained tightly closed during the Rana period, and it was only in the 1950's that foreign governments and outside influences invaded the country. Coinciding with the start of the Cold War, Nepal became strategically important and donor funds and projects became plentiful and less than critical of the monarchy government. Similarly, the Nepalese government was malleable to the changing interests of donors. It is important to note that the impetus and funding for all conservation policies, projects and approaches in Nepal have come from international donors.

It was not until the 1970s that the environment became an important issue for donors in Nepal. Coinciding with the growing concerns over world population growth, poverty and environmental degradation, the "Himalayan degradation theory" was developed and quickly accepted as it was both intuitive and politically attractive (Guthman 1997). First expounded by Eckholm (1975) in the international journal, *Science*, the theory was based on the recent high rate of population growth in the Himalayas. This was purported to cause massive deforestation, while the spread of poor agricultural practices and overgrazing over the

mountains slopes caused massive landslides and degradation. The consequences were thought not only to affect the Himalayas, but also India and Bangladesh downstream, as the degradation caused high sedimentation and floods in the Gangetic plains. The theory "provides a comprehensible, plausible, *intuitively attractive* picture of mountains and man in disharmony" (Brower 1991).

The ensuing research in the 1970s and early 1980s designed to understand and minimize degradation in the Himals resulted in the awareness that the Himalayan degradation theory was largely not true. Although the human population of Nepal has risen drastically since the 1950s from seven to over twenty-three million people (UNPD 2003) the forest/village boundaries throughout Nepal have predominantly remained unchanged since the turn of the nineteenth century due to centuries of government pressure to convert all arable land from forest to agriculture (Ives and Messerli 1989). The supposed soil erosion due to agricultural practices and increased fuelwood use may have localized affects but are highly variable across the Himalayas and have little effect at the larger national or regional scale. The most convincing argument against the Himalayan degradation theory, however, is the Himalayas themselves. The presumed erosion effect of deforestation and overgrazing pales in comparison to the natural erosion occurring in these steep, upward lifting and geologically new mountains (Brower 1991) [6,7].

---

[6] For a complete review of the arguments against the theory of Himalayan degradation, see Brower 1991, Ives and Messerli 1989 and the special edition of *Mountain Research and Development* 7:3 devoted to "The Himalayan Ganges Problem".

[7] I was a personal witness to the scale of naturally occurring landslides of the Himalaya. A landslide upstream of a lodge where I was staying in ACAP sent car-sized boulders hurtling downstream and a large amount of sediment. It caused the ground to shake continuously for

The legacy of the Himalayan degradation theory has played a significant role in shaping policies and conservation projects in Nepal for the last three decades (Guthman 1997). The national park system, established in 1973, was modeled on a Western model of strict control and enforcement of conservation regulations. The seven national parks established in the 1970s and 1980s were designed to stem the perceived rapid environmental degradation and for the government to strengthen government control of tourist revenues and donor funding. Foreign conservationists and members of the Nepalese national government orchestrated the foundation of the national park system. This included campaigns to dramatize the environmental problems within areas they wished to see as national parks (Brower 1991).

The adoption of the Western-modeled national park system, with its top-down restrictive approach, created significant conflict between parks and the people living within and surrounding parks. Attempts were made to reconcile these groups through the United Nations Development Programs (UNDP) "Parks and People" program and the creation of buffer zones around national parks in 1992 (Heinen and Mehta 1999). These strategies retained the traditional park management system and added a largely peripheral and separate development component. In contrast, the establishment of conservation areas in Nepal created a less strict conservation alternative to the national park system. The conservation

---

about one hour. As the area of the landslide has negligible grazing and wood collection, it is likely that the landslide was due to the steep slope and geology of the area.

area designation was ratified in 1996[8] and allowed non-governmental organizations (NGOs) to manage areas for the purpose of conservation through rural development (Heinen and Mehta 1999).

The rationale of the conservation area approach was echoed throughout donor conservation strategies in Nepal in the 1990s. Projects that combined conservation with rural development such as community forestry, CBNRM and decentralization were enacted. These projects tended to focus on local and district level implementation. More recently, there has been an increasing recognition that more collaborative efforts are needed to address livelihood issues, multi-level institutions and multi-stakeholder perceptions about needs within the community[9].

The Red Panda

Red panda habitat in Nepal is found both within areas the government and donors have placed emphasis on (national parks and conservation areas) and in areas under more local control (community forests and national forests). Although the focus of this research is on the conservation issues of the high-altitude forests, the red panda is a commonality shared by all four sites and provides an interesting focal point for the entire study. Each site illustrates

---

[8] Previous amendments of the 1973 National Parks and Wildlife Conservation Act had allowed the formation of two conservation areas prior to the 1996 conservation area act.
[9] For instance, see Springate-Baginski *et al.* (1999) for a review of British bilateral funding (DFID) and how successive projects have emphasized different aspects. The current project called the Livelihood Forestry Project focuses on the needs of the poorest households while also influencing government policy and implementation

a different threat to the red panda or its habitat. And at the same time, the study allows for analysis of the effects of different conservation strategies on the red panda. It is therefore pertinent to provide a natural history of the red panda and discuss threats facing wild populations.

Physical Description

An adult red panda in the wild weighs an average of 4 kg and measures 1 m in length including its 40 cm tail. It has a mostly white head, chestnut brown back and black underparts with a brown and black ringed tail. With its roundish head, pointed ears, stocky body and bushy, ringed tail, it is similar in appearance to the raccoon. Its roundish head and body, short, stocky legs and semi-retractable curved claws, also give it a bear-like appearance. Similar to the giant panda (*Ailuropoda melaonoleuca*), the red panda has a special "thumb" or radial sesmoid on its front feet which are used to clasp bamboo (Roberts 1984; Yonzon 1989).

Taxonomy

The taxonomy of the red panda has been the focus of considerable debate for nearly two hundred years. Investigations into morphological, biochemical, immunological and behavioral traits have revealed that the red panda shares similarities with the bear family

(*Ursidae*), giant panda and the raccoon family (Procyonidae)[10]. Until recently its closest relatives were thought to be the Procyonidae (Glatson 1989), A recent genetic study showed that the red panda is actually more closely related to *Musteloidea*, a clade including skunks (Flynn *et al.* 2000). There is general agreement the red panda is the sole remaining representative of the subfamily Ailurinae (Glatson 1989).

There are two recognized subspecies: *A. fulgens fulgens* found in the Himalayas, and *A. fulgens styani* found in Yunnan and Sichuan provinces of China (Glatson 1989; Roberts 1984). Although morphologically similar, the subspecies are sufficiently genetically divergent to be considered sub-species (Gentz 1989).

Geographic Distribution, Historic, Present

Parailurus, the evolutionary ancestor of the red panda, had a large geographical distribution across Eurasia (Mayr 1986). Fossils of red panda dating back to the mid-Pleistocene have been found in Yunnan province, China (Kurten 1968). The present distribution of red pandas is found along the Southern slopes of the Himalayan Mountains from Western Nepal east to the Hengduan Mountains in Sichuan province, China (Glatson 1994). Wei *et al.* (1999) report anecdotal evidence of recent extinctions in Shaanxi, Gansu, Qinghai and Guizhou provinces of China.

[10] See Yonzon 1989 for extensive review.

The known density of red pandas in the Himalayas is the highest between the far east of Nepal and the eastern border of Bhutan (Yonzon *et al.* 1997). Little is known about density of red pandas in India but they are widely distributed throughout Sikkim, Arunachal Pradesh, parts of Darjeeling and a small, isolated population in Meghalaya (Choudhury 2001). Neither is much known about the distribution and status in Burma. The species may be more common in the far eastern Himalayas in Burma and Yunnan (Roberts 1984).

The Himalayas are bisected by a number of deep gorges and large rivers, which act as physical and ecological barriers to migration. The wild population of red pandas is therefore is not one continuous interbreeding population, but a series of distinct populations (Roberts 1984).

Red Panda Natural History

Red pandas live in the temperate and sub-alpine forests of the Himalayas and the Hengduan mountains in China (Yonzon *et al.* 1997, Wei 1999). Although in the carnivore family and having a short digestive tract adapted to a high protein diet, the red panda primarily eats bamboo leaves and shoots supplemented by seasonal fruits and mushrooms[11] (Reid *et al.* 1991, Yonzon and Hunter 1991). Preferred bamboo species include understory (less than 4 m) bamboo which, in Nepal, is usually of the genera *Arundinaria* and *Thamnocalamus*. The switch from meat to a bamboo diet occurred relatively recently and was probably a response

[11] A fecal sample from Langtang National Park contained what appears to be marmot hair. Red pandas in captivity are known to eat meat (L. Dueck, personal communication, October 10, 2003).

to low prey abundance and the readily available bamboo food source (Schaller 1985). With this low quality food source red pandas consume up to 30% of their body weight daily (Oftedal *et al.* 1989) which provides them with little more than daily metabolic requirements (Schaller *et al.* 1985). Red pandas have significant hair growth on the soles of the feet, a trait typically found only on arctic mammals (Prater 1980). Their thick fur, low skin temperature and metabolic rate are adaptations to minimize energy loss (Roberts 1984; Yonzon 1991).

The red panda also has behavioral adaptations to efficiently acquire and conserve energy (Reid *et al.* 1991). Yonzon's study (1991) revealed that red pandas spend on average 56% of a 24 hour period actively foraging for bamboo[12]. Red pandas feed most actively around dawn and dusk with smaller activity around midday and midnight. The considerable length of time spent on the ground makes them susceptible to common and clouded leopards. Cubs may also possibly be preyed upon by raptors (Yonzon 1989).

Red pandas are skilled tree climbers and spend a great amount of time resting on large branches where their chestnut brown upper body fir matches the thick mats of moss typical of the wet temperate and sub-alpine forests of the Himalayas. Yonzon (1991) noted that red panda's habitat was highly correlated with being 100 m close to streams which also tend to be the steepest areas in a given location.

[12] This behavior may result in a increased susceptibility to predators and human disturbance (Yonzon 1991).

Densities of red pandas are low, ranging from 2.9km^2 in Langtang National Park (Yonzon 1991) to 1.67 km^2 and 1.38 km^2 in Singalila National Park in India and adjacent Ilam district in Nepal (Pradhan *et al.* 2000; Williams 2004). Individuals are typically solitary except during the winter mating season from January to February. In captivity, one to four cubs are born in a litter (Roberts 1984) whereas wild females tend to give birth to one or possibly two cubs (Yonzon 1989) in the summer monsoon months. Mothers use holes in large, old trees to nurse and spend a higher proportion of time foraging to provide the necessary energy and nutrients for nursing (Yonzon 1991). Cubs reach maturity within two years and most mature females appear to give birth to cubs every year (Yonzon 1989).

Status and Threats

The red panda is listed as endangered (Encr2) in IUCN's red list of species (2001). It has also been listed as Appendix I under CITES since 1995 (CITES 2003). Due to its long but narrow geographic distribution and relatively remote and undisturbed habitat, the red panda in the Himalayas and Nepal does not appear to be in imminent danger of extinction (Yonzon *et al.* 1997). However, little is known about the status of the red panda in the wild as only a few small geographic projects have been conducted. Choudhury (2001) estimates the total wild population at 16,000 to 20,000. There are approximately 6000-7000 in China (Wei *et al* 1999). Yonzon (1991,) estimated the population in Nepal to be around 300 individuals[13].

[13] Yonzon's estimate is based on a GIS analysis measuring habitat as *Abies* forests between 3000 and 4000 meters using a density of one individual per 2.9 km^2. The significantly higher population density in the east as seen in William's (2004) study combined with his anlysis that red pandas also use non *Abies* forest and other forests below 3000 meters,

Populations in Bhutan appear to be widespread and continuous in many areas (Yonzon *et al.* 1997)

The main threats to red pandas are deforestation, habitat fragmentation and human disturbance, such as hunting and dogs (IUCN 2004; Yonzon 1991). Threats are summarized in Table 1. China's population of red pandas is thought to have decreased by 40% in the last 50 years due to deforestation leading to loss of habitat and fragmentation (Wei *et al.* 1999). Widespread deforestation in the red panda range has occurred mostly in China but still remains a future possibility in other areas. The Chinese government's ban on logging in Sichuan and Yunnan following the 1998 floods of the Yangtze river will likely improve the condition of red panda habitat in China (Wei *et al.* 1999).

Table 1: Summary Table of Potential Threats to the Red Panda and Habitat [14]

Threat	**Causes**
Widespread Deforestation	Commercial logging
Habitat degradation	Small scale logging, overgrazing, fodder collection leading to degradation of forests and lack of regeneration
Fragmentation of populations	Localized destruction of habitat due to serious degradation or deforestation of habitat, roads
Human disturbance (esp. during summer breeding season)	Livestock herding in forests and nearby clearings
Predation by domestic dogs	Use of dogs to protect from livestock predation and human protection in herding camps
Hunting	Pelts as culturally significant or commercially

suggest that the actual red panda population in Nepal is significantly higher than Yonzon's estimate.

[14] Sources for table include Yonzon 1989, 1990, 1991; Reid 1990; Wei 1999; Choudhury 2001; and personal observations

	valuable. Secondary prey of hunters after more desirable prey species
Capture/harassment	Desirability as pets
Scarcity of maternal nest trees	Natural scarcity or high grade logging
Bamboo die-off	Natural cycle of bamboo

Hunting of red panda for its pelt to make decorative hats and coat linings has been documented in China (Wei 1999), Bhutan (Yonzon *et al.* 1997), and the Ilam and Manang districts of Nepal. The warden of Kachenjunga Conservation Area in far-Eastern Nepal stated that the selling of red panda pelts to Tibet was common up until five years ago but has reportedly stopped (J. Kharkhi, personal communication, June 30, 2003). Two individuals I met in Ilam district possessed red panda pelts, one of which was a lining for a coat. Two individuals in Manang District each said they had killed a red panda[15]. In the same district, a third red panda was brought dead to an Annapurna Conservation Area Project (ACAP) ranger station from Tilche village after a number of researchers had stated that the area did not have red pandas[16]. Many of the ethnic groups in Nepal are supportive of hunting-especially the Gurung and Rai peoples who are known for their hunting prowess and culture[17].

---

[15] One individual later denied he had killed a red panda. The other individual stated that he had also eaten the red panda. When asked about the taste, he remarked that it was quite good and resembled chicken.

[16] The pelt was then stuffed with newspaper and its picture taken with the resulting photo used in an ACAP calendar

[17] The motivation for hunting appears to be the enjoyment of hunting and eating wild game. A smaller number of families rely on game to supplement their diets. In stark contrast, the

Along with hunting, red pandas seem to face a considerable amount of harassment as their appeal as a pet creates impetus for individuals to catch them upon chance meetings[18]. Yonzon (1989) states a herder chased a mother and two cubs up a tree, then felled the tree killing one cub. During this study two individuals stated that they had chased red pandas upon chance sightings to capture the red panda for a pet. The Taplejung District Police Office in Eastern Nepal reportedly had a pet red panda for a number of years (S. Le Clerq, personal communication, June 16, 2003). A reported 6 sick red pandas had been "rescued" by local residents and turned in to authorities in eastern Nepal. Due to increased awareness of the legal and endangered status of the red panda, individuals seem less likely to injure or try to capture the red panda if one is happened upon (Poudel 2004).

Livestock do not appear to be in direct competition with red pandas for bamboo resources as livestock graze the lowest one-meter of bamboo stalks while the red panda eats primarily the shoots and young leaves found above the reach of livestock (Yonzon 1989)[19]. Yet trampling and loss of regeneration of bamboo may lead to a decline in bamboo within heavily grazed areas. With sustained heavy grazing pressure it is likely that bamboo, and therefore red

---

Sherpa ethnic group is opposed to hunting. As one Sherpa said "those Rais, they are the *shikari jhaat* (hunting ethnic group or caste). They will kill and eat anything!"

[18] There is historic precedence for this behavior. Red pandas caught in the wild in Ilam and Sikkim up until the early 1980's were sold to zoos and provide the majority of the initial specimens for the captive zoo population. Capturing red pandas was a lucrative business for local individuals (Choudhury 2001; Pradhan *et al.* 2001). An older Rai man interviewed during this study took part in numerous red panda hunts and described how a bamboo noose was used to capture the red panda.

[19] Red pandas grasp individual stalks of bamboo and pull them down to reach the new shoots and leaves.

pandas, will be relegated to areas inaccessible to livestock. In this way, livestock grazing may directly limit the habitat off red pandas.

The indirect effects of livestock represent a larger localized threat to red pandas. Disturbance created by herders, livestock and their dogs in areas close to maternal nest sites apparently contributes to increased cub mortality. The timing of grazing in red panda habitat typically occurs during early summer months when red panda females are birthing and nursing cubs (Yonzon 1989, 1991). In his study, Yonzon (1991) observed that the arrival of livestock, herders and their dogs in a nearby pasture caused a mother to move cubs to another den site several hundred meters farther away from the pasture.

Reid *et al.* (1990) posit that den trees may be a limiting resource to red pandas. This may be especially relevant in areas where naturally occurring old and large trees are absent. High-grading or selective logging may also have a long-term effect on the frequency of nest sites available. They also speculate that bamboo die-off may be a limiting resource to red pandas. One sixty-five year old herder in Langtang National Park described a bamboo die-off occurring in the RPCA twice in his lifetime. Given the low frequency and the patchiness of die-off events combined with the unlikelihood that all bamboo species would experience a die off at the same time, bamboo die-off probably does not lead to a catastrophic decline in red panda numbers.

Red Pandas in Nepal

Most of what is known about red pandas in Nepal and in the wild has come from the research of Pralad Yonzon and his two-year study of seven radio collared individuals in Langtang National Park. Based on the habitat preference and population density of the Cholang Dokache study site (my second case study), the total population inside Langtang N.P is estimated to be 24 (Yonzon *et al.* 1991) with only 6% of land cover as potential habitat (Yonzon 1991)[20]. Using the same model, the total population in Nepal was estimated to be around 300 (Yonzon *et al.* 1997). As mentioned, extrapolating habitat requirements and density to other areas has probably led to low estimates.

Yonzon *et al.* have also conducted multiple surveys and interviews about the red panda with individuals living and working in various parts of Nepal. From this information, the red panda occupies a continuous belt along the Himalayan Mountains from Eastern Nepal to Central Nepal, and is more patchily distributed further West. From his studies, Yonzon asserts that habitat is primarily sub-alpine fir forest between 3000 and 4000 meters on predominantly North facing slopes. In the East, Yonzon *et al.* (1997) also noted red panda between 2500 and 3000 m in Makalu- Barun National Park and above 2800 m in Kanchenjungha Conservation Area.

---

[20] Yonzon's estimate is based on a low- resolution GIS model based on elevation, aspect and forest cover. Although not highly accurate, the estimate nevertheless illustrates the small percentage of actual habitat available to red pandas in Nepal. In areas of higher density to the east of Makalu Barun National Park the total percentage of habitat is probably higher.

Two recent studies along the border of Nepal and Darjeeling, India show that, compared to Yonzon's findings in Langtang National Park, red pandas in Eastern Nepal appear to occupy broader elevation ranges and habitats while also having a higher population density. Pradhan (2001) conducted a three-year study in Singalila National Park on the Indian side of the border using direct sighting and indirect evidence (scat) to assess distribution, relative abundance, habitat use and food habits of red pandas. Broad leaf deciduous forests between 2800-3100 m had the highest relative abundance of red pandas, followed by the sub-alpine forest (3100-3600 m) and oak forests at lower elevations (2600-2800m). Density of red pandas was estimated to be 1.67 km^2. The second study by Williams (2004) focused on the ecology of red pandas and land-use patterns on the Nepal side of the border ridge. Using similar methods, Williams also found broad-leaved deciduous forest (2800-3100 m) to have the highest abundance of red pandas. His western facing border site (my first case study) was estimated to have a population density of 1.38 km^2.

CONCEPTUAL FRAMEWORK

The combination of political ecology, land tenure, use rights, and common property theory provides the theoretical framework for this study. These disciplines highlight the role of governance and rules of access in human/environment interactions and are particularly relevant to red panda conservation in the high altitude forests of Nepal

Political Ecology

Political ecology combines ecology with political economy to provide a conceptual framework to view human/environment interactions (Blaikie and Brookfield 1987). While political economy analyzes the power relationships between stakeholders and interprets behavior of individuals and organizations pursuing their own political agenda political ecology goes beyond to view environmental processes as not only influenced by human utilization and political structure, but also as an active force in shaping human behavior and organization (Zimmerer and Bassett 2003). It uses historical, political, social and ecological analysis at multiple levels to analyze human-environment interactions. Political ecology also stresses how ecological, social and political processes are nested in hierarchies of scale with each level operating and influenced by its context. Ecological processes naturally shape human activities and society, which in turn reshapes ecological processes, all in a nested hierarchy of social and environmental processes (Blaikie 1985).

The approach of political ecology interweaves ecological and geographic analysis with social science approaches (surveys, interviews etc). This allows for interpreting social/environmental change while using different approaches for cross-checking purposes (Zimmerer and Bassett 2003). It also incorporates environmental history and the more qualitative nature of human understanding and perception. These narratives give meaning and context (Cronon 1992) to the physical processes studied quantitatively. Yet they also affect policy and management. Political ecology allows for the recognition and questioning of narratives, especially of outside observers with narratives of degradation (Blaikie and Brookfield 1987).

The political ecology approach is particularly relevant and self-evident in Nepal as it a country with a diversity of human/environment interactions and a long history of local and government interactions and conflict. It is not surprising then that much of the early political ecology research and theory was first developed in the mountains of Nepal by Piers Blaikie and Barbara Brower.

Blaikie's research focused on the political economy of the Mid-Western hills of Nepal. His work largely described the interactions between government policies and structure and its effects on rural development and subsistence agriculture (Blaikie 1980). He went beyond political interactions to recognize the link with soil degradation and rural livelihoods; soil degradation was caused in part by government policies, but just as important were the impacts of soil degradation on local/ government interactions (Blaikie 1985). In follow up

research, Blaikie (2002) illustrated the inability of the Nepalese government to change from its feudal system and dependency on foreign aid.

Brower's political ecology research (1991) in the Khumbu region with the Sherpa people focused on their interactions with the harsh mountain environment, livestock and, more recently, the establishment of Sagarmatha National Park. She states, "it is only through awareness of the interconnections of people, livestock and landscape through time and change that the patterns evident today are intelligible and interpretable." The Sherpa people have significantly altered their mountain ecosystem through grazing, fire and timber harvesting. At the same time, the low productivity of the landscape has forced the Sherpa communities to regulate and cooperatively manage their exploitation of these scarce resources. With the establishment of the national park and its dialog of environmental crisis and restrictive edicts, government and international conservation agendas have eclipsed local decision making and communal management systems and created resentment among the Sherpas.

Property Rights and Regimes

In most Western countries, property rights are conceptualized as a "bundle of separable rights" (Bac 1998; Jacobs 1998). These include the ability to utilize or extract resources, manage resources, exclude others and the right to sell, lease or withdraw rights from others (Demsetz 1967; Agrawal and Ostrom 2001). As such, property rights are social constructions built upon relationships and society's acceptance of an individual or a groups

claim to rights (Bromley 1992). As society changes, so also does the perception of property rights (Jacobs 1998). "Property is process; and therefore to understand it, one must focus on the social processes through which people define and struggle over access to and control of property" (Fortmann 1998). Property rights held by an individual are contestable, and therefore require the owner to protect and confirm the rights they hold (Agrawal and Ostram 2001). It is important to emphasize that the development of property rights are also interdependent on the nature of the resource itself. The environment and the characteristics of the resource help shape its governing use rights. Changing natural resource conditions (e.g. yield, intensity or predictability) can lead to a change in property rights regime (Bac 1998)[21].

Users often do not possess the full bundle of rights to the land they utilize. A common example is utilization of nationally held land by individuals and groups for grazing or firewood collection. Agrawal and Ostram (2001)[22] define four categories of users with increasing rights: authorized user, authorized claimant, proprietor and owner. Authorized users have the rights of access to lands and to utilize a given resource. Authorized claimants include these rights and also the right to manage the resource or land. Proprietors have more rights as they can exclude other groups or individuals. "Owners" alone hold the right of alienation (i.e. the ability to sell management or exclusion rights). Therefore, private property is defined by the right to alienate (Demsetz 1967). Private ownership does not

[21] See Berkes (1989) interesting account of changing environment tenure regimes in James Bay, Canada.
[22] From Ostrom and Schager 1992

normally mean control of the complete bundle of rights by one owner. Society always reserves at least a portion of these rights (Demsetz 1967; Jacobs 1998).

For authorized claimants or users, obtaining assurances of continued use rights encourages long-term interest in a resource. Yet it does not necessarily provide strong incentives for sustainable management. Authority remaining in state control does not give locals power or incentive to manage sustainably (Agrawal and Ostrom 2001). Proprietary rights, on the other hand, have been found to provide sufficient incentives for sustainable and long-term management of a resource. Full ownership of a resource is not required (see Agrawal and Ostrom 2001, Ostrom Gardner and Walker 1994).

Common Property

Most of what is considered common property falls under the category of proprietary rights. States (usually the legitimate determining agent in property rights classification) retain alienation rights to the land itself and often over certain resources (e.g. protection over an endangered species). Proprietary rights therefore generally change resource use and management towards long-term sustainability only if the users perceive commitment by the state to keeping rights amongst the users (Agrawal and Ostrom 2001).

Much of the literature on common property until recently has focused on disproving the logic of Hardin's (1968) "tragedy of the commons" article. In Hardin's common, "rational" individual users are caught in a downward spiral of degradation and increasing overuse of

the resource they are dependent on. Hardin's logic painted a grim, unrealistic picture of local individuals and communities ability to manage natural resources (Ludwig *et al.* 1993) and was widely used to rationalize private property and government control of land and over natural resources (Ostrom *et al.* 1999).

A major criticism of the tragedy is that it does not distinguish between common property and open access systems. In fact, groups have often successfully created self-governing institutions to manage common resources. Irrigation, forestry, fisheries are common examples of resources managed commonly (Ostrom 1999, 2003, Bromley 1992; Berkes 1989). The Hindu-Kush/ Himalayan mountains have a particularly long history of common property management including widespread indigenous communal irrigation, forestry and grazing systems (Messerschmidt 2002). As seen in Nepal, these systems often arise due to increasing scarcity. Thus scarcity provides an impetus to increase the the level of cooperation amongst users (Gilmour and Fisher 1991).

Tragedies nevertheless do happen and common property theorists have identified some conditions where they are more likely to occur. Grima and Berkes (1989) postulate that Hardin's tragedy occurs if: demand is greater than sustainable level of harvest, rights to use are poorly defined, or there is a breakdown in enforcement of either access or use rights. Gibbs and Bromley (1989) explain that a tragedy will occur when members of a group do not subscribe to rules governing the commons. This often leads to anarchy and the commons are replaced by an open-access system. Blaikie (1985) emphasizes inequality and marginalization, which lead to break down of existing management systems. Privatization

of land excludes and marginalizes certain individuals who then come to rely on the commons more intensively leading to degradation and continued lessening of livelihood. In this way the tragedy of the commons is better described as a "tragedy of the commoners" (Berkes 1989).

Within the last two decades, there has been a resurgence in the interest of what Agrawal (2003) calls the "New Commons." This has been brought upon partly by the generally poor outcomes of top down approaches to conservation and development in third world countries and the growing interest in alternative management regimes, such as indigenous knowledge and community based natural resource management (CBNRM). But it has also received attention from a broad variety of scholars and practitioners because it analyzes the influence of institutions on human behavior. Common property theory looks at how institutions, both formal and informal, and norms shape human behavior, especially towards cooperation. It is not surprising therefore, that common property is especially of interest to policy makers (Agrawal 2003).

Particularly important in understanding how institutions affect conservation is their regulation of individual behavior. The theory of repeated games applied to common property theory analyzes how "cooperative outcomes can be sustained among a group of self-interested agents with conflicting objectives" (Bac 1998) present within "communities." Community-based management institutions play an underappreciated role in altering community members' values (Gibson and Koontz 1998) as they can regulate individual actions that affect the well-being of other members. The key for communal institutions is

providing enough selfish motivation for its members to regulate their actions for the well being of all members. This occurs when the individual's short-term gains for not conforming to the wishes of the community are less than the perceived long-term private gains of compliance (Bac 1998).

Relevance to High Altitude Forests and Red Pandas in Nepal

Sustainable use of high altitude forests and conservation of red pandas is largely dependent on the behavior of the people who directly utilize the forests. Their day-to-day actions and decisions -where to graze, what tree to cut for firewood etc-are guided by their perceived access and ownership of the resources they use. Between the case studies, and different individuals at each site, users have varying degrees of access rights to resources in a continuum between full ownership and alienation (i.e. no rights). Depending on these perceived rights, the user acts accordingly to best maximize personal gain. As illustrated through common property and repeated game theory, different tenure, use rights and ownership regimes have varying effects on individual behavior. The rights given to users are not self-conferred. They are formally and informally bestowed on users through social and political mechanisms. It is important, therefore, to understand the social and political factors determining the relationship of the user to the resource. The consequences are environmental, but the causes are indeed socially and politically mediated.

Political ecology is also useful for this study in its recognition of the importance of environmental narratives. Specifically, it allows for the analysis of narratives concerning

degradation in the Himalayas and about the status of the red panda. These narratives translate into specific actions, regulations and approaches used by the government and conservation organizations which have significant effects on the forests and the users.

METHODS

The study was conducted from May to July of 2003. Four weeks were spent obtaining official approval for the research and export of scat. The remaining period was spent at or traveling to the four sites: Ilam, Park Red Panda Conservation Area (RPCA), Kutumsang (both within Langtang National Park) and Annapurna site in Tilche Village in Manang district.

As my responsibilities included the collection of scat and habitat data of red pandas and to understand conservation issues in Nepal's upland forests, sites were selected primarily on credible reports of existing red pandas and the presence of interesting or representative land tenure/management regimes. Accessibility during the monsoon, obtaining a geographically spread scat sample collection and existing site-specific literature were also factors in site selection.

Initially, only two sites, Ilam and Langtang N.P, were to be studied in greater detail. Safety concerns over returning to the Ilam site required the Annapurna site to be added. The inclusion of the Annapurna case study broadened the scope of the study significantly as it expanded the study geographically close to the western-most extent of the red pandas natural range and allowed the study of the community based conservation approach of the Annapurna Conservation Area Project.

Use of Local Guides

Due to time constraints a systematic search pattern was not employed. Guides were hired for their experience and knowledge of the forests and included herders, hunters and loggers who were considered economically poor by their communities. This approach expedited scat collection by their knowledge of the forest and red pandas. A number of the hired guides were excellent tree climbers and were able to locate scat in areas where a thorough ground search revealed no evidence of red pandas. My guides were also extremely knowledgeable about local ecological and social systems and provided an under-represented perspective on conservation and resource management. By spending a concentrated amount of time with each, a rapport was built and much interesting information was gathered concerning the ecology, resource use and conservation of the forests.

This reliance on local informants, however, also led to circumstances of misinformation. During the research there were three known occurrences of individuals stating that a certain area did not contain pandas when in fact they knew that it did. All were instances where the individual was concerned over losing use rights of these areas if red pandas were known to exist.

Identifying the Key Issue

For each site, an important issue facing the area and red panda conservation was determined and focused upon in order to gain more detailed information on this one issue given the

short time period in each place. Key topics were determined using the researchers knowledge and experiences in Nepal, site-specific literature, direct observations and discussions and informal interviews with local individuals. For instance, uncertain land tenure in Ilam was recognized due to my previous experience in Eastern Nepal and researching the *Kipat* tenure system. In contrast, the research by Yonzon and Fox allowed me to recognize the importance of the history of grazing rights under differing National park regulation in RPCA study area.

For the other two sites the development and realization of the important focal issues required immersion at the site. Observing and talking to local individuals about illegal wood cutting led to the recognition of the importance of the breakdown of government control due to civil war in Mangengot. Similarly, I recognized the importance of hunting in Tilche due to the pleasure individuals discussed previous hunting trips and the remorse shown when discussing the hunting ban.

Interviewing Techniques

Unstructured and informal interviews focusing on the major theme of the study area were conducted with a variety of local individuals, researchers, government and non-governmental organization (NGO) staff. Key informants such as elected officials of community organizations, local teachers and business people provided the most information and about half of the interviews. These interviews were conducted using the methods as described by Bernard (2002). Names were coded and interviewees were assured anonymity

and confidentiality. Notes were written during the interview. Information gathered from all sources was cross- checked whenever possible in subsequent interviews or conversations. The use of phased assertion and probing by leading techniques were particularly successful approaches.

Informal interview techniques were also employed with herders and other forest users. This technique is useful at the beginning of field work to build rapport and explore potentially overlooked topics (Bernard 2002) and was helpful in determining the focal issue. Note taking during conversations in many circumstances would have often limited the candidness of responses. Many interviewees were concerned about government restrictions on resource use which could have a considerable impact on their livelihoods. As a high percentage of time at each site was walking with guides, herders and other forest users, conversations while walking provided a large amount of useful information. A daily log was employed to catalog information collected.

Care was taken to interview a broad selection of individuals from different socioeconomic and occupational groups- especially those whose livelihoods are directly related to their access to the forests (e.g. herders, non-timber forest product collectors). The study did not, however, have an equal representation of women interviewees. Valuable information on interpersonal relationships was obtained from discussions with many women. But overall their perspective is under-represented in this study.

Scat Sampling, Ecological and Disturbance Plots

In concurrence with interviews, scat was collected for genetic research. Preliminary results of the genetic analysis are discussed when appropriate. Ecological, grazing and human use data of scat-centered plots were also collected. These data were used to qualitatively illustrate key ecological and human/livestock use differences between the sites.

ILAM

The border of India and Eastern Nepal is a long, high ridge running South from the Kanchenjunga massive, a series of peaks including the third highest in the world. The study area is situated on the Nepalese side of the ridge in Ilam district along a 6km relatively flat portion of the ridgeline ranging between 2800 and 3000 m. To the North of the study area the ridge abruptly climbs to 3600 m to Sandakpur. The upper slopes of the ridge are a mixture of temperate and subalpine forests with considerable patches of open grazing land. The lower slopes of the ridge are well populated with a mixture of tea estates and subsistence agriculture.

The ridgeline historically was used as spring and summer grazing pastures for local agropastoralists. This changed when the British built a road along the ridgeline in the late 1940s and '50s (Williams 2004). The ridge became the closest roadhead for a number of districts with locals traveling to the road to sell potatoes and other produce and to buy supplies. The road created livelihood opportunities along the ridge, and there are a number of teahouses and small stores along the route[23]. Tourists have increasingly traveled the road from Darjeeling (19 km to the east) to Sandakpur to watch the sunrise over four of the five

[23] Williams (2004) gives a fascinating historical account of the impact of roads throughout the region. Kalopokhari has a particularly interesting history. Between 1956 and 1964 it was the closest roadhead for Panchtar district and the area was transformed from being an area of seasonal grazing and no permanent structures to a bustling trading post. During this time, nine houses were erected and lucrative buying and trading opportunities attracted a number of businesses. With the completion of the Ilam to Panchtar road in 1964, and the subsequent continuation of the border road, Kalpokhari lost its significance as a trading town and has only within the last decade started to rebuild with the increase in tourism.

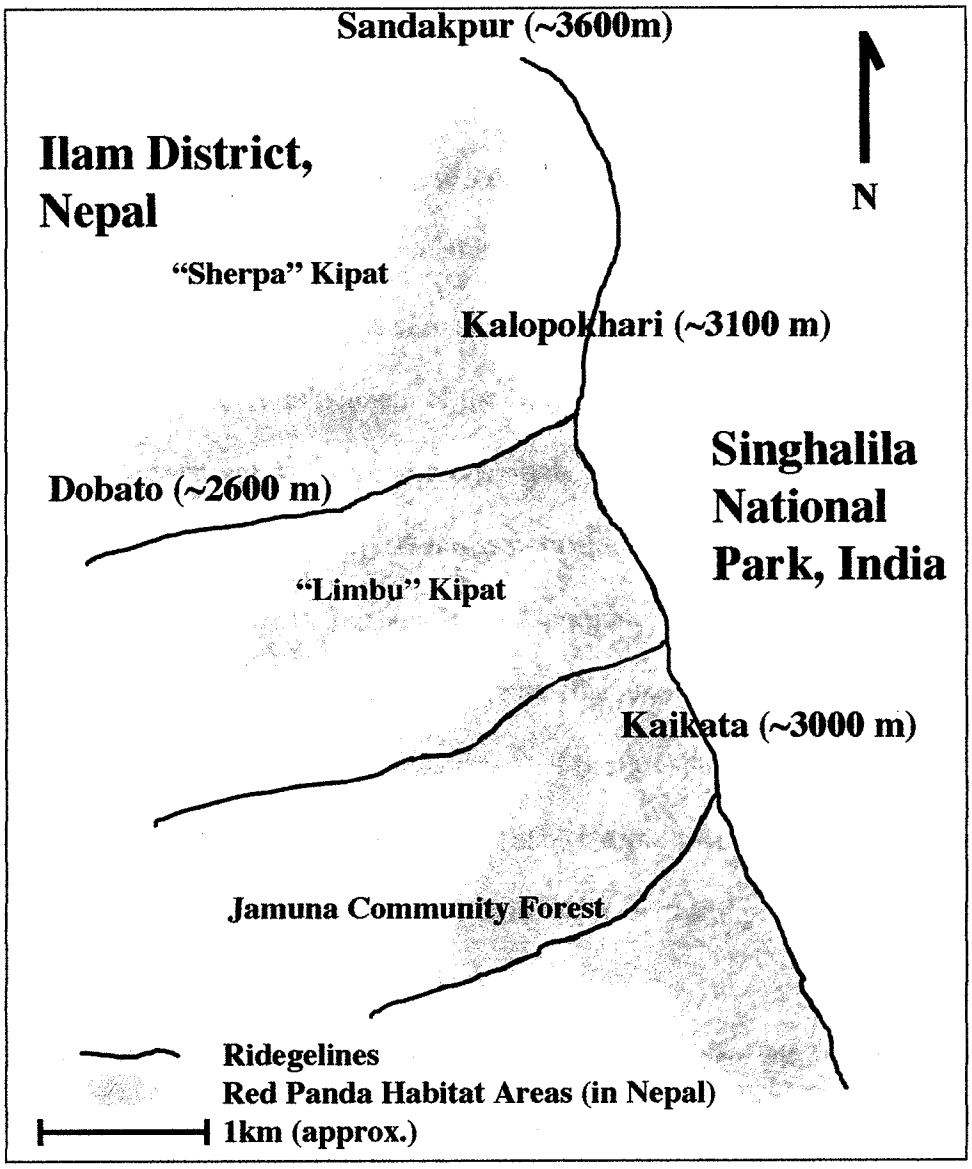
highest peaks in the world, including Mt Everest. There are now a number of hotels catering for backpackers along the route. The village of Kalopokhari is the largest settlement with over ten "hotels" and stores. Kaikata has two small lodges and a store.

Permanent residency has altered the utilization of the ridgeline from seasonal grazing use, with its subsequent limited firewood requirements, to an increased demand for timber and firewood. Sub-alpine fir forests, with their straight trunks and easily cut wood, have been significantly affected by the change from seasonal to permanent use. Household livestock also produce localized intense grazing pressure surrounding these settlements.

The Indian government designated the Eastern side of the ridge as Singhalila National Park (SNP) in 1992. The reserve design includes a core area at higher elevations and a buffer zone at lower elevations around existing settlements. At least 80 herds of cattle containing a minimum of 30 head each were removed from the core area of the park between 1991 and 1993 (Pradhan *et al.* 2001). A majority of these herds belonged to Nepalese who grazed their livestock during the summer months on the Indian side (Williams 2004). The core area is now heavily forested with previous grazing areas covered in early successional bamboo and tree saplings. In stark contrast, most of the Nepalese side above 3000 m to the North of the study area is largely devoid of trees and is heavily grazed. A combination of logging, human introduced fire[24] and heavy grazing has caused complete deforestation in many

[24] Pradhan *et al.* (2000) state that fires from around buffer villages on the Indian side have caused extensive damage to SNP. Fire on the ridge itself is undocumented but most certainly played a large role in deforesting the area.

Figure 2: Map of Ilam Case Study



Red panda habitat is a compilation of the results of this study and Williams (2004).

places. As one person stated, "the ridgeline is like a head with the Indian side full of hair and the Nepalese side completely shaven bald."

The cause of degradation on the Nepalese side is undoubtedly rooted in a mix of historic land use patterns, specifically the conversion of forests to pasture; tenure and ownership regimes (as will be discussed in this case study); and the new road facilitating extraction of forest products. Yet the establishment of the National Park has also played a role in that it has forced users to extract and use resources solely on the Nepalese side where previously, resource utilization was evenly spread across both sides of the ridge. The quick eviction of at least 2400 cattle from the Indian side at least temporarily increased grazing pressure on the Nepalese side. There are continuing processes that exacerbate the differences; while the protected Indian side becomes greener and former pastures turn into forests, the Nepalese side continues to take the brunt of resource utilization and extraction, with livestock grazing and supplying the timber and firewood for tourists, herders and permanent residents. [25]

To the South of Nepal's "bald head," the lower elevation forests within the study area are in considerably better shape. The slopes up to the border are covered in temperate broad-leaved evergreen and deciduous forest with a dense understory of shrubs and bamboo and

[25] The negative effects of protected areas on adjacent land has been well documented. In Nepal, the forests near Sagarmatha National Park have been heavily denuded to supply timber for tourist lodges within the park (Stevens 2003).

provide continuous habitat for red pandas on both sides[26]. The upper forests from 2800 m to the ridgeline are relatively intact but have a high ratio of trees associated with disturbance. Large old-growth stands of oak are present between 2600 and 2800 m. Below 2600 m, forests are more disturbed and in closer proximity to villages (Williams 2004)[27]. Despite the forest's lush appearance, grazing is heavy in areas accessible to livestock; small one hectare patches are present on ridgetops and relatively flat areas. Grazing and bamboo cutting of the larger species of bamboo (*Arundinaria malingo*) is widespread, whereas firewood and tree fodder collection, timber harvesting and hunting are more localized occurring in parts of the area (Williams 2004).

Red Panda Habitat

The Ilam site lies within the area between Makalu Barun National Park to the West and Bhutan to the east where red panda densities are probably the highest in the entire Himalayas (Yonzon *et al.* 1997). Pradhan (2001) estimated adult red panda population density in Singhalila National Park to be one per 1.67 km^2, while Williams (2004) in his study of the Nepalese side estimated population density to be 1.38 per km^2 with a population

[26] Elevation, steepness of the ridge and the unsuitability for grazing or agriculture are probably the underlying reasons why this is the only intact corridor from Singalila N.P and the forest on the Nepal side.

[27] Williams (2004) sees the distance away from villages as a major cause of lack of disturbance in oak forests. Another potential reason explained to me by Nepaleses on several occasions is that oak is not a preferred timber wood as it is more susceptible to rot and insects than others. Other more preferred timber wood has been already extracted from these forests leaving only undesirable species.

of at least four individuals [28]. This is a considerably higher density of red panda compared to Langtang National Park with an estimated density of 2.9 km^2 (Yonzon and Hunter 1991).

The elevational range of the red panda is considerably broad with a primary altitudinal range of 2800-3600 m in Singalila National Park (Pradhan, Saha *et al.* 2001). Williams (2004) determined the highest density of red pandas in Ilam from 2800 to the top of the ridgeline at 3000 meters, but noted they are relatively abundant down to 2600 m. Numerous unconfirmed reports from residents, however, suggest that the red panda also inhabit, or occasionally can be found at considerably lower elevations. The red panda observed by guide Pasang Sherpa was at approximately 3500 m and is said to live there permanently by nearby residents[29]. One report was of a red panda captured in Gurung Gau at approximately 2200 m[30].

The initial genetic results show the Ilam site to have the highest diversity of all the sites showing 12 different haplotypes (n=33) including one individual whose haplotype was considered of the subspecies *styanni*. The high genetic diversity suggests that the total

---

[28] A number of individuals seem to have territories on both sides of the ridge. Others found in lower elevation plots may stay exclusively on the Nepalese side. Williams (2004) population estimate is probably conservative in estimating the total number of red pandas solely dependent on the Nepalese side.

[29] Due to time constraints, inclement weather and increased maoist insurgent activities in the area, confirmation of this information was not possible. Three fecal samples were collected from this site.

[30] According to one informant the red panda was treed by dogs in the small tree lots around the village. It was then caught and put in a sack where it was beaten with a stick and then released. The people involved thought that the red panda was eating their crops, but are Buddhist and do not believe in killing animals. The red panda may have been sick or trying to disperse.

interbreeding population with which the Ilam site is a part is significantly larger than previously thought[31].

Most of the red panda habitat is found in national forest land but is represented in both community forest and *Kipat* held land as well. The red panda appears to live predominantly in steeper areas in patches of heavy forest and understory bamboo. As these areas are inaccessible to livestock and present a more difficult terrain for utilization, they remain relatively safe from most forms of utilization except bamboo cutting and hunting. Nevertheless, it is safe to assume that the sustained viability of the red panda population in this area is dependent on the surrounding matrix of continuous forest to allow for movement between patches and facilitating the microclimate (especially humidity and water conservation) needed for the preferred bamboo species *A. aristata*[32]. The area along the border ridge is especially important to ensure connectivity with SNP.

Of the four study areas, Ilam was the only one where people had a surprisingly detailed knowledge of the natural history of the red panda including knowledge on differences of physical appearance between individuals, preferred food and daily activity cycles. Approximately 30% of the areas where scat was found were also areas frequented by livestock. The most surprising location was a scat collection in a small gulley between two

---

[31] In future analysis, population size will be estimated by genetic diversity through a coalescent statistical approach. For a relative comparison, both sites in Langtang N.P. contained 8 haplotypes (n=43) while Tilche had only two haplotypes (n=6).

[32] Pradhan (2001) determined the red panda eats both *Arundinaria maling* and *A. aristata*, but prefers the latter. *A. maling* is the larger species growing to over 4 m in length. Although seen in the understory, it also is an early sucessional species recolonizing former pastures within SNP.

agricultural fields and houses at about 2500 m. The inhabitants of the nearby houses reported that they often saw the red panda in the gulley less than 200 m from their houses[33].

With only 15km^2 of suitable habitat (Williams 2004) and its proximity to the large protected area of SNP the Ilam study area is not of high importance to red panda conservation[34]. The existing population is probably a spillover, and potentially a "sink" population of the SNP. The Ilam site, however, is an interesting study site for the ecology of red pandas in lower elevation broadleaved and deciduous forests, which are outstanding in their quality and rarity in Nepal. The heavy utilization of the forest combined with its proximity to agricultural villages also make the site ideal for studying human/red panda interactions.

Uncertain Land Tenure: Conflicting Government and Local Systems

According to the Nepalese government, land ownership on the slopes above the villages is simple; almost the entire ridge is national forest and lies under the control of the Ilam District Forest Office (DFO). Property ownership maps of the area at the Ilam mapping office show the land to be national forest (*rastriya bon*) with a few small private landholdings around the ridgetop settlements.

---

[33] This was reported by my guide and an individual from Dobato. I was unable to verify their report due to inclement weather and time constraints.

[34] The nearby Panchthar-Ilam-Singhalila (PIS) corridor is a more important conservation priority as it would connect SNP to Kachenchunga Conservation Area and other areas in Tibet and Sikkim (Wikramanayake *et al.*. 2001)

The reality of land tenure, however, is far from simple. The area contains a mixture of traditional and historic land use and tenure patterns in varying degrees of local social acceptance. The government's lack of enforcement of their proclaimed ownership has led to the continuation of a number of historic tenure regimes. Recently, as has been seen in a number of places in eastern Nepal (Forbes and Bhattarai 1995; Danigelis 1997), the traditional tenure system of the *Kipat*, a system where familial clans have inalienable ownership of territories, is finally eroding more than forty years after the Nepalese government banned the system. The ability of the *Kipat* to persist illustrates its importance in shaping land tenure patterns. The present day uncertainty over land ownership can be explained through the history of the four *Kipat*s that historically covered the area. It is therefore worthwhile to look in some detail at the origins and decline of the *Kipat* system.

The Kipat and the Limbus

The Limbu are of Tibetan-Burmese origin and have lived in what is now Nepal for over two millennia. At different times in history, they controlled large areas of the Himalayas and the Indian plains. For the last 500 years, they have lived in a small area in the far Eastern corner of Nepal, including Ilam (Subba 1995). Familial clans ruled over large areas and the right to use clan land was patrilineal. Land could never be alienated from the clan. There was however, a "Lockean" notion that utilizing the land gave use rights to the person that worked the land. In this way, use rights were transferable and outsiders could be given land to utilize, giving their descendants eligibility for the use of the same land. These outsiders were required to pay a yearly fee to the *Subba*, the local clan chief (Caplan 1970, 1990).

The Legitimization and De-legitimization of the Kipat

In a proclamation sealed with his own blood, the first king of Nepal, Prithvi Narayan Shah, declared in 1831 that the Limbu tribe would own their land "Until cats grow horns, until the snow on the mountains melts, and the water in the rivers run dry."(Forbes and Bhat*tarai* 1995, Caplan 1970, 1990). The newly formed Nepalese government was essentially legitimizing the Limbus claim to inalienable rights to far Eastern Nepal. The proclamation strengthened the tie between the Limbus, the land and their traditional system of tenure, while solidifying ownership and legal authority in the hands of the Subba clan chiefs (Caplan, 1970, Regmi 1977). But it also signified the beginning of the end of their independence and traditional way of life. Accepting this proclamation also meant accepting the Nepalese government's sovereignty over their homeland and set the stage for processes that have occurred the world over to indigenous cultures and their land: government reneging on existing promises, encroachment by outsiders and the struggle to retain cultural identity through control of traditional lands.

Initially, outsiders of different ethnic groups and landless Hindu "peasants" were welcomed into the area to clear and farm new land. The Subbas encouraged migration into their areas for two reasons: more people in their area meant they could collect more taxes and land-use fees. Second, the Limbus did not have the labor resources to clear the land. As tenure remained securely in the hands of the Limbus, the newcomers were seemingly helping the

Limbus by clearing the land for more agriculture and making Limbu land more productive (Caplan 1970, 1990, Regmi 1977).

It is important to note that the Limbu's relationship with the land was considered inalienable; clan land could not be bought or sold. The newcomers, and more importantly the Nepalese government, however, believed in a "class" based economy in which land is separate and alienable from the owner (*raikar* system), that is, land is a commodity that can be bought or sold freely (Caplan 1990, Regmi, 1977). This is a crucial distinction and the Limbus failed to recognize its implications. Slowly, successive Nepalese governments eroded *Kipat* rights and adopted rules allowing transfer of land from the *Kipat* system to private property in the hands of the non-Limbus. Finally in 1961, the government of Nepal officially banned the *Kipat* land tenure system and privatized all agricultural land while nationalizing forest and grazing lands. Many of the Limbu were forced to sell their lands because they were heavily in debt to outsiders and had lost the leverage provided by inalienable land ownership. A mass exodus of Limbus occurred in the nineteen-sixties moving away from traditional *Kipat* land to the southern *tarai* area of Nepal (Caplan 1970, 1990).

The Four Kipats

The study area lies within the historic boundaries of four separate *Kipat*s. Because the area is not suitable for agriculture and therefore less valuable, the traditional *Kipat* land tenure

system remained relatively intact in places[35]. Land ownership for large tracts of land remained in the hands of a Subba, or was sold off to newcomers who then assumed the role of the Subba and continued to collect yearly fees from users[36]. While the two southern *Kipat*s lost legitimacy at the time of abolishment of the *Kipat*, the two northern *Kipat*s still retain some ownership- over forty years after the *Kipat* was officially abolished.

The Southern *Kipats*: *Panchayat* and Community Forestry

According to Williams (2004), the two southern *Kipat*s were tightly managed by the non-Limbu families who had bought them from Limbu owners. Within five years of nationalization of forests and the abolishment of the *Kipat*, the area was designated a panchayat forest and ownership and rights were severed from the *Kipat* holders. Control was held by the *Panchayat* elite and as the *Kipat*s were held by non-limbus there appears to have been little conflict over the conversion of *Kipat* to government control.

In 1973, the area became known as Jamuna Community Forest, and the brother of the local *Panchayat* leader, Hom Khar, was appointed head of its managing committee[37]. Under his

---

[35] More valuable kipat land such as ricefields had long since been converted to private lands. Only about a third of cultivated areas was still in Kipat by the end of the 1950s (Regmi 1977)

[36] Kipat was initially considered inalienable and not a commodity (Regmi 1977). The interpretation of Kipat by successive governments in undermining the inalienable rights (Regmi 1977) gradually led to the acceptance of the practice of selling traditional Kipats to non-Limbus.

[37] The early arrival of "community" forest, when only a few hundred hectares in the whole country were given this status by 1990 (Gilmour and Fisher 1991), reveals the political connectedness and power of the local *Panchayat* leader. Only a few local *Panchayats*

rule for the ensuing 18 years, he controlled and managed the forests, employing five forest guards and nursery managers. Timber harvesting was banned.

It is interesting to note that the initial survey of the area under community forestry was 600 ha of the lower forests and the upper forests were designated national forest lands. Hom Khar, however, worked hard to control the entire area and was successful in creating the perception that the entire area was part of the community forest.

Hom Khar lost power with the fall of the *Panchayat* system in 1990-91 and the lower forests became controlled by a locally elected committee with the support of the DFO. The community forest is not, however, legally recognized to this day. The DFO has yet to officially hand over management rights to the forest user group[38]. Nevertheless, the community forest is locally accepted to the point that the upper forests are still perceived to be within the jurisdiction of the community forest group. The committee has been successful in stopping grazing and recently banned the collection of all firewood and timber harvesting within the forest. The large area of the forest and little funding means that enforcement relies on communal acceptance of the rules and the ability of community members to regulate other members' behavior.

---

capitalized on the provisions in the 1961 Forest Act allowing panchayat management of forests. The dates stated may not be historically accurate as they seem to suggest legal changes a number of years before these were nationally instated. For instance, community forestry was not legalized until 1976 in the *Panchayat* system. Yet the community forest was said by local individuals to have started in 1973 (Williams 2004). The legal status, however, is inconsequential. It is the communities' acceptance of these facts that makes them relevant and real to the tenure system of the area.

[38] The previous DFO officer informed me that the process has been slowed by the remoteness and the inclement weather of the area. It is unusual for a well-organized forest user committee to not be authorized as of yet. One informant told of DFO involvement in timber smuggling and this could be a reason for lack of progress towards handing over the forest.

It is likely that the DFO will soon officially authorize the community forest after ground surveys and demarcation. The effects of this will likely decrease the area controlled under the community forest user group now and place the upper forests under national forest. To date, the upper forests have been managed, albeit loosely, by the CFUG.

The Cadastral Survey

It was not until the government cadastral (land mapping) survey in 1971 that the two Northern *Kipat*s weakened and were replaced, at least in the eyes of the government, with private agricultural landholdings and government-controlled forest.

The father of Dorje Gela Sherpa (an ethnic Sherpa) was the first to live permanently at Kalapokhari in 1953 and ran a potato buying and transport business. He bought from a Limbu Subba a *Kipat* comprising much of the Northern part of the study area and started collecting yearly use fees from herders and wood cutters using the land. In this way, the *Kipat* system remained intact, only the ownership of the land had been sold to a non-Limbu. At the time of the cadastral survey, Dorje's father did not disclose to the surveyors that he held the use rights for the entire area because he was concerned about paying taxes for the entirety. He therefore told the surveyors to map out only 500 ropanis (about 62 acres) to be

his privately held land[39]. The rest of this area he had controlled under *Kipat* was then classified as national forest. Williams (2004) stated that he continued to collect *Kipat* user fees for the entire area apparently until his recent death. With his five sons now in "control" of the area, users have started to question the legitimacy of their right to charge users fees and are now demanding to see official government title of land before paying the yearly user fee. In this way, the *Kipat* system continues on government sanctioned private land. But the Sherpa family has lost ownership and the right to rent land rights for the large areas outside their private land.

The remaining Northern part of the study area is *Kipat* controlled by a Limbu family from Piple. While the Sherpa *Kipat* has lost control due to a loss of credibility in their ownership, the Limbu family have taken a more aggressive role in protecting their *Kipat*[40] and have been known to roll rocks downhill towards users who have not payed a user fee. Nevertheless, most houses in Dobato are built of "poached" wood from the limbu *Kipat*. Villagers of Mabu are petitioning the DFO to create a community forest on the existing Limbu *Kipat* (Williams 2004).

The DFO has asserted more control over the area within the last few years and has forced the removal of two herder's shacks and their livestock from the small area known as Batase

---

[39] Williams (2004) explains that uneducated people, like Dorje's father, concealed their land-holdings while educated people did the opposite and claimed more land than they actually controlled and profited from it.

[40] Given the historical context, it is not surprising that the ownership rights of Limbu- held Kipats are more aggressively held than non-Limbu held Kipats. The Kipat has become for the Limbus more than a land tenure system; it is a symbol of their cultural identity (Caplan 1990).

south of Kalapokhari. Another herder was not forced to leave as he had recognized private property ownership in the area.

Shortly before my visit to the area, the DFO had sent a similar eviction letter to herder shacks within national forest land in Mabu VDC. I was witness to three separate and intense conversations in Kalapokhari on the letter as it was a source of confusion, uncertainty and importance to the livelihoods of people of the area. Enforcement of the no grazing rule on national forest lands would mean the end of livelihood for individuals without recognized private land. As of the completion of my visit, none of the herders had left and were continuing to graze on the national forest land.

"no" Leasehold Forestry

During an interview with a resident of the ridge, he stated that he owned the rights for use of forest land which he called "*no jugga*" (which translates literally as "nine land"). As he pointed to the forest to the west of his small privately owned property, he explained that he could utilize this forest in nine different ways including harvesting firewood, food, lumber, fodder, grazing, medicinal plants, etc. Land ownership maps of the area made in 1971 show this individual to have ownership of a small landholding of about an acre and a larger area of approximately 4 acres labeled "*no*" on the map. The legal basis of his belief in his rights is probably from the provision in the 1961 Forest Act allowing for ownership of small private forest plots. This system has been replaced for over 20 years (Ilam DFO pers.comm), yet it still remains a valid justification for his continued use of forested land.

It is also interesting to note that the forests in the direction he pointed to were actually not the area actually labeled on the map as "*no*". He had pointed to the west whereas the labeled "no" forest was directly north. Although possibly a deliberate act of misinformation[41], it is nonetheless evidence that there is still significant confusion over use rights. A number of other individuals also used it to explain tenure on the ridge. Although legally invalid for over two decades, the system was legally documented at the time of the only cadastral survey of the area in 1971 and thus is still considered valid as no further land surveys or other government activity has challenged the legality of this type of use rights on the ridge.

Conclusions

The land tenure of red panda habitat along the ridge is a mixture of eroding *Kipat* tenure, locally unrecognized and unenforced national forests and an illegitimate community forest that extends far beyond its previously legitimate boundaries. Such conflicting and opposing tenure systems have created tensions between government, local groups and individuals.

---

[41] The truthfulness and motives of this individual remain questionable. He trusted me enough to show me a red panda pelt he had skinned which he had not shown another researcher. Yet he reported that he had found the red panda already dead in the forest. Others informed me that his dog had killed it. He also informed me that there were no red pandas present nearby and they only came into this area when a certain fruit was ripe. William's study shows red pandas are present in high densities year round. Overall his motives were to give information that would not jeopardize his use rights of the area, which he undoubtedly felt were threatened.

The *Kipat* system worked well when land was plentiful, and labor was limited. As with other top-down systems, the management of the land does not fall on the *Kipat* owner but the user. Seasonal tenure does not make for long-term security of tenure nor positively affect the everyday choices of users towards ones of sustainability and long-term investment. Subbas and *Kipat* holders do not play an active role in management of their lands, and have more to gain by increased use of their land as they can collect more user fees. Even during the period of *Kipat* predominance before 1961, insecurity of tenure had adverse affects on conservation. Non-Limbus controlling or using *Kipat* lands had little incentive to think long term (Forbes 1995) and "naturally sought to extract as much benefit as possible from the land while it remained in his possession." (Regmi 1977).

As seen on the Milke Danda, a nearby ridgeline to the west, erosion of traditional *Kipat* rights has led to environmental degradation as users start to question the rights of traditional "owners" and replace them with the assertions of the state (Forbes and Bhattarai, 1995). It is at this intermediary stage, when existing systems and means of regulation lack validity and government enforcement remains weak, that common property regimes are not successful (Bromley 1992; Bac 1998). The Northern *Kipat*s have eroded to the point that even Limbu owners have lost most social legitimacy over their claims of ownership. As evidenced by the poaching of timber from *Kipat* lands, the *Kipat* rights have not been totally socially accepted or enforced for many decades.

The DFO has asserted its position over allowing grazing rights in the area and has successfully limited grazing in certain areas. But the DFO will continue to be ineffective at

management and enforcement[42]. As the DFO is also in charge of devolving forest to communities, the likelihood of further community forests in the near future is negligible. The continuation of "*no*" is also threatening to long-term conservation as the flexible-user defined area under "*no*" rationalizes heavy utilization of forests for personal profit and use.

The community forest of the Southern part of the study area holds the greater long-term possibility of conservation. Social legitimacy of tenure is strong and actually exceeds the technical boundaries of the community forest. As seen by the quality of the oak forests, forest protection has been largely successful. But the lack of clear tenure and enforcement of regulations in the higher elevations has resulted in some degradation as observed in the prevalence of trees and shrubs associated with disturbance. The eviction of cattle herds, and the concomitant requirements for wood, may eliminate a major human influence on the forest.

It is important, however, to recognize the history and shortcomings of community forestry in the area. Firstly, "community" control of the forests has largely been control in the hands of a few elite. Banning of grazing and bamboo, fuelwood and timber collection in the forests proportionately affects the poorer households to a greater degree than less poor while hardly impacting the local elites. The recent restrictions imposed by the elected community forestry committee demonstrates its emphasis on protection and not on the needs of the poorer households. Local individuals have mostly negative perceptions of both the community

[42] With the increasing presence of Maoist insurgents in the area, the likelihood of DFO staff visiting the area is decreased even further.

forest and the DFO due to poor communication and the lack of perceived benefits from the forest (Williams 2004). Compounding the restrictions implaced on forest users, two sources (one from Williams 2004 and an interviewee) stated that the community forest leaders have been smuggling timber from the community forest into India. One informant complained that the forests are now stripped of their value as all the commercially valuable tree species have all been cut.

The authorization of the community forest will shrink the forest area currently socially accepted to be under the authority of the CFUG. The forest has benefited from local control and has certainly seen more increased protection than in the national forest. Due to the recent restrictions on firewood, timber and bamboo extraction within the lower community forest, the upper area might become more heavily utilized to compensate for the added protection within the community forest.

This case study illustrates the importance of secure tenure and social acceptance of land ownership regimes in conservation. The general consensus among common property literature is that groups successfully manage common pool resources only under the certainty of future tenure as it gives users incentives to abstain from personal short term interests in favor of long-term communally shared benefits (Bac 1998; Berkes 1989). This indeed is illustrated by the differences between the *Kipat* and community forest. The yearly rent system of the *Kipat* encouraged owners to allow heavy use while pushing the user to exploit the resources available. In contrast, the shared (if unevenly) ownership of community forest provided individuals the incentive to limit their use of resources.

Uncertainty of tenure has had mixed effects on the *Kipat* and the community forest. Uncertainty and confusion over the government's land ownership and lack of enforcement allowed continued existence of the *Kipat*. Yet this confusion has recently caused an erosion in local social acceptance of *Kipat* rights and has led to a breakdown of ownership and created an open access system for much of the Northern part of the study area. Conversely, the confusion over the boundary of the community forest in the southern part of the study area has been exploited by local elites who have historically controlled a larger area of forest than designated. This has led to their personal benefit but also a greater emphasis on conservation at the expense of the poorer individuals who would benefit from increased resource use. The future ratification of the community forest will create clearly demarcated boundaries and could actually allow for more extraction in the areas formerly considered to be in the community forest.

Many people were tired of the uncertainty surrounding land tenure, and they were annoyed that the government had not clearly defined the ownership and use rights of the forests. Along with the community forest ratification, the government had also stated it would resurvey the area within the year. Both will be positive steps in providing certainty of tenure for both the community forest and private lands. The remaining national forest lands will continue to be utilized heavily. Without the DFO providing sufficient enforcement of its rules concerning these forests, they will continue to be *de facto* open access systems where users have no tangible incentive to limit their use of the forest. These areas, as previously

stated, comprise much of red panda habitat of the area. But for now, the red panda remains relatively safe in its steep and secluded habitat.

LANGTANG NATIONAL PARK, RED PANDA CONSERVATION AREA

Red Panda Conservation Area Introduction

After a harrowing bus ride crossing large, active landslides, the bus halts in front of a gate guarded by several Nepalese Army personnel armed with automatic rifles. All passengers of the bus (livestock excluded) are forced to disembark with their luggage and proceed on foot through the army check post. Bags are perfunctorily checked and a number of Nepalese are harassed by the army concerning their papers or the content of their bags. Tourists form a line into a small shed where a National Park clerk gruffly adds their nationality and passport number information onto a large paper ledger. An army soldier stands in the corner watching the proceedings; occasionally swinging the barrel of his assault rifle over the tourists' expensive hiking boots. The clerk unceremoniously hands an entry permit to the first tourist in line. At this point the tourist stands around waiting for something else to happen until, eventually, the clerk looks up and says "go." Unhurriedly he then takes a sip of his milk tea and starts working on the next tourist's entry in the large ledger.

The Langtang National Park check post is more than a physical barrier. It is a social assertion of the power and influence the Nepalese government has over the area. Crossing through the gate symbolizes entry into an area where the authority of the government is heightened and ownership and management responsibilities lie solely with the National Park. But the checkpoint is a small island of centralized control in an otherwise locally managed area inside the National Park. The physical show of force and importance at the

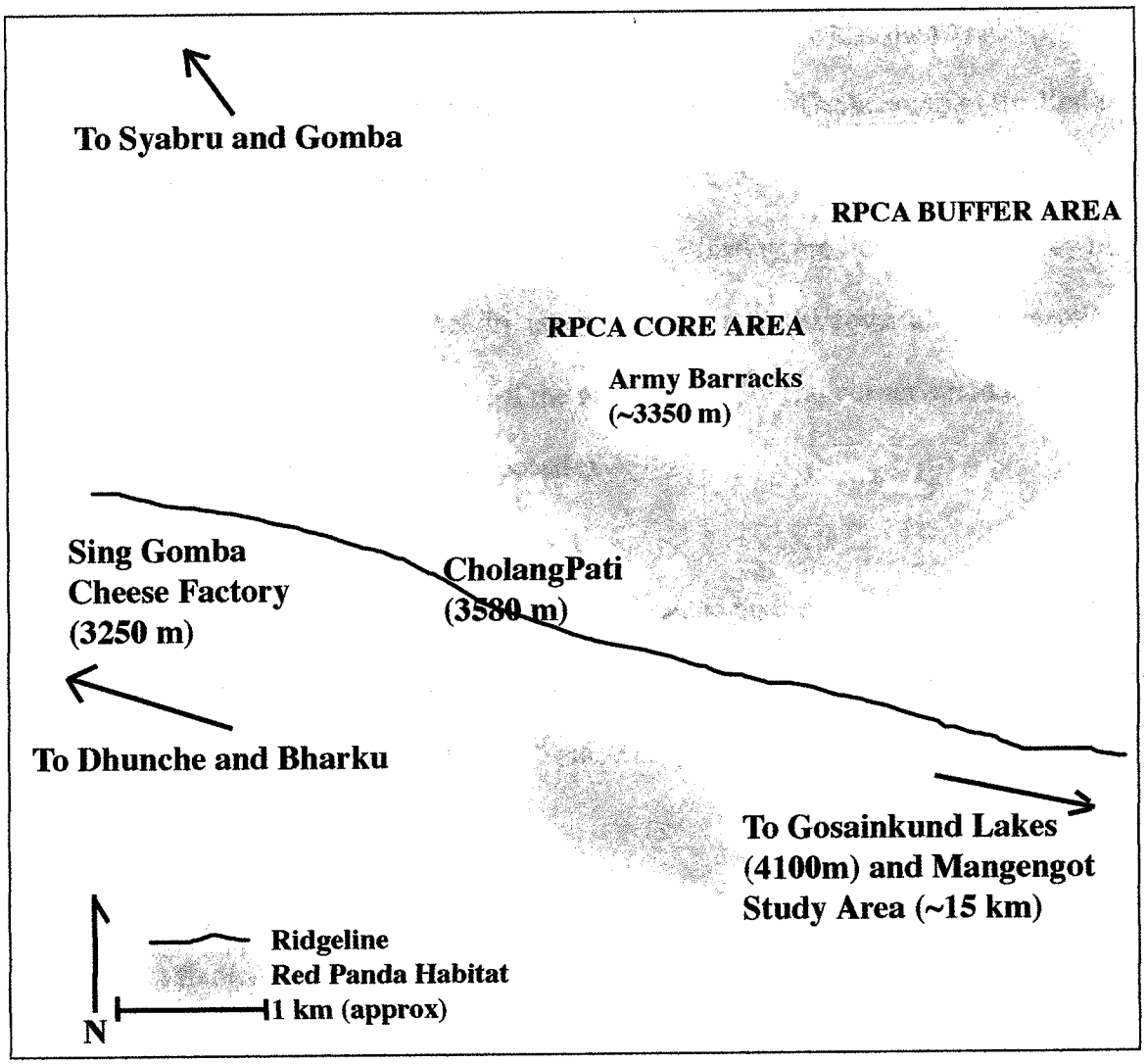
check point seems to be designed to make up for the lack of substantial involvement in the rest of the park. Outside of this bubble of control, the rest of the Park is reminiscent of the Ilam case study where local control exists amidst the government's full claims to land ownership and management. But, overall, there is a greater degree of government presence and involvement inside the National Park due largely to the presence of the Nepalese army. Authority over the Park is divided between the National Park and the Royal Nepal Army Protection Unit. Nationwide, over 80% of the Department of National Parks and Wildlife Conservation's budget supported the army's presence inside National Parks throughout the 1990s (Chaudhary 1998).

Langtang National Park and Geography of the Study Area

Langtang National Park is located North of Kathmandu along the border of Tibet. Gazetted in 1976, the park encompasses 1,710 km^2 (Chaudhary 1998) and is home to about 30,000 people. As only 1.6% of the park is agricultural land that is privately held, pastoralism and tourism are the major livelihoods of the area (Fox *et al.* 1996)

To the east of Dhunche a ridge steeply climbs up into 6000 meter peaks cradling the sacred lakes of Gosainkunda (4000 m elevation), the site of a major Hindu pilgrimage for the Janai Purnima. The route is also popular with tourists and a number of hotels and tea houses dot the trail. The slopes between 2600 and 3000 m contain thick forests of oak and rhododendron. Extensive stands of Himalayan Silver Fir are found from 3000 to

Figure 3: Red Panda Conservation Area



Red panda habitat is a compilation of the results of this study and Yonzon (1989)

3600 m. Birch and species of rhododendron cover the slopes above 3600 m to treeline (Yonzon and Hunter 1991)

The north facing slopes of the ridge are home to a small population of red pandas. This area, known as Cholang-Dokache, covers 22.2 km^2 and has had relatively intensive conservation/management activities for the last fifteen years. The creation of the Red Panda Conservation Area (RPCA) resulted from Yonzon's research on red pandas, as well as his continued conservation efforts in the area. The RPCA history provides a telling story of common property resources, market driven economies and local/government interactions. It also allows an interesting comparison of the outcomes of several conservation approaches undertaken over a short period of two decades.

The three villages of Syabru, Barku and Gomba situated on the lower slopes of the ridge all graze their livestock in the general area. But the focus of the study is mostly confined to the traditional grazing areas of the village of Syabru as these herds have the largest potential impact on the red panda.

Red Panda Ecology and Status

Yonzon (1989) estimated the red panda population of the area to be nine and seven individuals in 1986 and 1987 respectively. Radio collared animals almost exclusively (92%) used the fir with an understory of bamboo forest type within the area (Yonzon 1991).

Movement of red pandas was found to focus around patches of bamboo. Most movement was either within or between these small patches of habitat (Yonzon 1989).

Although Yonzon concluded that red pandas and livestock were not in direct competition for bamboo[43], livestock negatively affected regeneration of bamboo and trees by trampling and grazing (Yonzon and Hunter 1991). In my sampling of scat-centered plots(n=14), over 70% of sites did not contain any evidence of livestock use. As the location of red pandas is largely determined by bamboo patches (Yonzon 1989) which typically occur in steeper, rocky areas inaccessible to livestock, it appears that livestock and the red panda utilize largely separate territories within the same general area. But it is not clear whether livestock grazing restricts red pandas to patches where livestock cannot access. Fox *et al.* (1996) found that heavy grazing occurrs in all areas livestock can physically access. This accounts for 62% of forested land in the area, leaving only 3.4 km^2 of forest undisturbed by grazing. Sustained heavy grazing pressure largely in the matrix between patches of red panda habitat may have negative long-term impacts such as loss of regeneration of bamboo and tree species and increasing threats from natural predators.

A larger concern is the proximity of grazing areas to red panda habitat. Fifty-seven percent of known deaths during Yonzon's study were caused by the effects of herders and grazing in the area (Yonzon and Hunter 1991). Red panda young are born in early summer, which unfortunately coincides with the arrival of herders, livestock and dogs into the area. In one

[43] He found that red pandas predominantly eat the tips of the shoots while livestock eat the leaves below 1 m in height (Yonzon 1989)

instance, the arrival of livestock to a nearby pasture caused a mother red panda to move her young to a different area, resulting in stress and death of cubs. In another event a herder chased a mother and two cubs up a tree and killed one of the cubs by chopping the tree down. Herders also bring with them 25-40 often ferocious Tibetan Mastiff dogs to protect livestock that traditionally are allowed to roam freely at night. Dogs have killed adult and infant red pandas in the area (Yonzon 1989).

The timing of the movement of herds and grazing within the area coinciding with the birth of red panda young is unfortunate and little can be done to prevent disturbance other than physical separation of grazing camps and maternal den sites. Nevertheless, the other indirect effects of livestock such as human and dog predation of red pandas are largely social in nature and therefore can be socially remediated.

Pastoral Systems

The overall structure of the pastoral system in the area has remained unchanged for centuries. Grazing areas of Cholang-Dokache are divided separately between the three villages located on the lower slopes of the ridge: Bharku, Gomba and Syabru. Within each village, pastures were collectively managed by regulating access to pastures and also the timing of their use. Violators of rules face strict sanctions and outsiders are largely excluded (Fox *et al.* 1996). Livestock can only stay in one place for a few weeks before fodder is depleted. This requires herders to rotationally graze a large area. The low density and transient nature of fodder combined with a tradition of free ranging livestock has naturally

led to communal management of most pastureland. Livestock are oblivious to socially created borders and the rugged terrain and thick forests make it difficult for herders to keep track of a large herd[44]. Within each village herders synchronize movements to provide equal access to resources. In isolated pastures where, livestock access can be regulated, use rights are held by individual herders or households (Fox 1996).

Historically, yaks were the livestock of choice as they were hardy enough to access the abundant alpine pastures to the north in Tibet. Yak/cow hybrids, called *chauri*, were also kept as they produced more milk than pure yaks. *Chauri*, however, are not as hardy as yaks and the male *chauri* is sterile and is usually slaughtered for meat. Maintaining a *chauri* herd requires that a breeding population of yak and cows be maintained. Sheep and goats were historically grazed but are decreasing in number[45].

Along with the need for rotational management of pastures, grazing follows a seasonal pattern. In the winter months between November and April, livestock are kept below 2000 m on fallow agricultural land. In May, livestock are moved up into the forests and grazing areas between 2000-3000 m. With the warmer weather in June, livestock move further up into red panda habitat above 3000 meters and in midsummer move into alpine pastures above 4000 m. Livestock start to descend in September and occupy a zone between 2000-

---

[44] *Chauri* can reportedly walk up to 4 km in a single day. They also remember where the best grass is and will return to preferred sites.

[45] Sheep are the most itinerant of the herds. The only herd observed was at Gosainkunda pass in early July- about 1000 meters above the *chauri* herds at the time. Sheep herding is dwindling in the Himalayas due to a number of reasons including the decrease in demand for wool, diminishing access to private agricultural land in the winter and the hardship of tending sheep at high elevations for much of the year.

3000 m in September and October before returning to the villages. All herders using the same grazing area move on the same day as they migrate upwards. The decision about when to move is decided in a meeting a week or two before the move (Fox *et al.* 1996). The communal move is a traditional practice and provides fairness to each user as it does not allow one herd to graze and deplete the pastures before others have a chance to arrive[46].

The move from lower pastures to Dokache was observed in early July, 2003. A total of 15-17 *chauri* herds from Syabru village moved on the same day through prime red panda habitat. Starting well before sunrise, the shouts and whistles of the herders combined with the constant deep clanging of the livestock's brass bells echoed through the forest. Although creating excitement for children along the way as frightened and aggressive *chauri* and yaks stream through settlements, the move is difficult on the herders as they must pay attention to the whereabouts of each livestock and keep them moving in one direction; often running off trail and throwing a rock at a chauri intent on escaping into the woods and sampling the local greenery. Once arriving at the new pasture, a temporary shelter is erected out of bamboo mats with juniper branches for flooring. With the cold and rainy climate, it often takes a week for the shelter and firewood to dry out and the shelter to feel comfortable. Terrestrial leaches heartily prey on both livestock and herders.

The descending migration of livestock is not communally determined and each herder is free to move downward. A number of herds have recently stayed in traditional winter pastures

[46] Nevertheless, some herders left for Dokache in the middle of the night before to arrive 12 hours earlier than other the herds.

below 3000 meters and had not moved upwards during the summer months. At least one individual was concerned that this leads to a shortage of fodder in the winter; already the period of greatest shortage (Fox *et al.* 1996).

For most high altitude pastoral areas of Nepal, milk is still processed into butter and solidified buttermilk protein called churpee. Most products are used within the household or within informal village level market systems. With greater access to markets in cities in Nepal, these products are now sold and provide a moderate income for herders.

Cheese and the Chinese: External Factors Causing Change

The Chinese invasion of Tibet and the closing of the Nepalese border in 1959 severely restricted the grazing lands available to pastoralists on the Nepalese side (Fox *et al.* 1996). The closing of the border did not, however, lead to a diminished role in the importance of livestock as it did in most other border areas. At around he same time, the United Nations Food and Agriculture organization (FAO) and the Swiss Association for Technical Assistance (SATA) established two cheese factories within the Langtang Valley.

Today, these factories produce 20% of the cheese made in the Nepalese Himalayas (Yonzon and Hunter 1991). The large scale of production, 19,000 kg of cheese in one year, requires a large and constant supply of milk[47]. Each factory collects milk from a 50 km^2 area and

[47] 10 litres of milk make 1 kg of cheese. Information obtained from the Sing Gompa cheese factory chief.

makes delivery relatively easy for herders as mobile collection and pre-processing camps move with the herders throughout the summer grazing season. The Singh Gompa factory, now owned by the government Dairy Development Corporation (DDC), paid 3,200,000 Nepalese rupees (roughly $42,000) to herders for one-years supply of milk. Previously, the DDC had given herders a full cash advance of the upcoming years milk supply (Yonzon and Hunter 1991). It now gives 40% advance at the beginning of each year.

The Langtang valley area was historically used by herders from outside areas (Fox *et al.* 1996). With the establishment of the Singh Gompa Cheese Factory, herders from neighboring Helambu increased their presence (P. Yonzon, personal communication, 08/06/03) to capitalize on the new market opportunity created by the cheese factories.

Indeed, the cheese factories created a decidedly more market driven approach to pastoralism. The makeup of a herd traditionally was not geared towards maximum production as cultural values and economic security often played a large role in determining the makeup of the herd. The traditional pastoral production systems were developed over centuries in response to local conditions (Miller 1998). With the cheese factories and the increased economic incentive for milk production, *chauri* became the preferred livestock as a female *chauri* produces more milk (approx. 2.5 litres a day) than a yak and is well suited to the elevations of the area. The traditional yak and cow herds decreased in number from14 to 4 in the Langtang Valley over a forty year period (Fox *et al.* 1996).

Although the incentive to increase milk production for the cheese factories seems to provide a scenario where the overall numbers of livestock, specifically *chauri* are likely to increase, it is not known whether indeed this is the case[48]. Strong arguments have been made to suggest that degradation has occurred due to the increased demand for milk (See Yonzon and Hunter 1991, Fox *et al.* 1996). Yet there is little evidence available to interpret whether livestock numbers, and consequently degradation and pressure on fodder resources, have increased within the last few decades. The location and movement of the cheese factories and collection and processing camps certainly would seem to concentrate grazing activities around them, perhaps creating localized areas of higher grazing intensity.

Despite the uncertainty over long-term changes there is ample evidence illustrating the disturbance associated with present intensive grazing practices. All land accessible to livestock, 62% of the Cholang Dokache area, is heavily grazed (Fox *et al.* 1996). Grazing disturbance is heaviest at 3050m within the elevation range of prime red panda habitat (Jendrewski 2001).

---

[48] Existing studies logically imply that the market-based economy brought about by the cheese factories has led to increasing numbers of livestock which in turn has led to degradation of grazing lands. But it is not clear whether actual numbers of livestock increased from 1960 to 1992. According to different reports, Syabru village had 393 livestock in 1992 (Fox *et al.* 1996), 510-607 *chauris* in the mid-nineties (Jendrewski 2001) and 252 *chauri* for Nepalese year 2059. The last two are from the Singh Gompa cheese factory records and are probably less than accurate. Most individuals thought that rangeland had deteriorated in the last two decades. A number of herders complained that they now had to move their livestock every 20 days whereas in the past they could stay in one place for over a month before depleting fodder.

Conservation in the Red Panda Conservation Area

A number of events during the 1980s and early 1990s[49] led to changes in the management of the area. These activities were largely shaped by Yonzon's research and subsequent conservation efforts. First, the National Park evicted the Helambu Sherpa herders from the area, giving rights to the three villages of Syabru, Bharku, and Gompa. Redistribution of the Sherpa grazing lands was conducted by local committees organized by Yonzon.

The Palungpati area was then designated as a Red Panda Conservation Area (RPCA) by the National Park. Initially all grazing inside its boundaries was restricted and herders were not allowed to use historic herder's camps within the area. As the RPCA included the traditional spring and fall grazing land of Syabru village livestock were now required to transition from low to high pastures rapidly without their historic transitional period within the RPCA. This restriction was eased after 2-3 years and livestock were allowed one month in the spring and fall to graze in Dokache pastures inside the designated buffer zone of the RPCA. Historic pasture within the core RPCA remained off-limits to grazing and livestock were given only one day in the spring and fall to cross the RPCA. As synchronized movement was historically practiced, this was not a new burden on livestock or herders.

After establishment of the RPCA, locally represented Red Panda Conservation Committees (RPCCs) were organized for each of the three villages. The committees were given legal authority to impose and enforce conservation measures. In return, the National Park granted

[49] Different informants gave conflicting reports on the exact year in which events occurred. The sequence of events remained mostly the same between informants

the herders access to grazing lands inside the buffer zone. The committees were required to ask permission to graze inside the buffer area every year. Yonzon acted as a liason between the committees and the National Park. In this system the RPCCs gained grazing rights in return for restricting the activities of their members. Dogs were required to be permanently chained, cutting of live wood was banned and grazing was restricted within the RPCA core area. The committee could levy fines ranging from 200-500 rps on people found grazing within the conservation area. From interviews, the RPCCs were apparently successful in enforcement of these conservation measures.

Use rights were in a period of change and had created tension between villages as livelihoods of the villages required access to adequate grazing. Meetings of all three RPCCs were spent resolving issues around the grazing land allotted to each village. These meetings generally lasted two days with the first day spent drinking, arguing and fighting over use rights to pastures. On the second day the committees would settle down, problem solve and come to resolution (P. Yonzon, personal communication, 08/06/03).

The Army and the RPCA

For most of the 1990s, the National Park stationed army personnel inside the core area of the RPCA during the summer grazing months to stop grazing within the core area. The impacts of the army, however, were largely negative while also failing to enforce the no-grazing policy. According to local individuals, the army often turned a blind eye towards grazing inside the RPCA and sometimes actively encouraged it in return for a fresh supply of milk.

Army personnel hunted *mirga* and wild boar and collected wood from inside the RPCA. The location of the army post in the heart of the RPCA undoubtedly led to the army disturbing the red panda. Overall, their impact was largely determined by the individuals stationed there. Informants said that some personnel enforced the no-grazing laws while others did not[50]. The physical presence of the army undoubtedly modified the behavior of the herders, but overall did not provide adequate disincentives to significantly curb grazing. One herder stated that grazing was only restricted for two years even though the army was stationed for almost ten years in the area[51].

Present Status of the RPCA

With the state of emergency called in 2001, the army pulled all personnel out of remote locations including the RPCA. In response to the loss of presence in the area, the National Park has not given buffer-zone grazing rights to the three communities since. Although the motives of the National Park are unknown, it is assumed that the park was trying to decrease overall grazing in the entire area by not permitting grazing in the buffer area.

The results of the grazing restriction are completely the opposite of their desired intent. Grazing inside the RPCA is widespread and unchecked. There now is complete disregard for

---

[50] The stationing of army is a mixed blessing for local residents. It proved lucrative to nearby hotels in Cholangpati. Drunk army personnel also forcibly kidnapped a teenage girl from a Cholangpati hotel.

[51] A former park warden recognized that the army could not strictly enforce the no-grazing rule due to the terrain and the location of the base being in the center of the core area and not at the perimeter where grazing occurred more often. He stated that the purpose of the army was really to severely limit grazing as much as possible (J. Kharkhi, personal communication, June 30, 2003)

the restriction on grazing inside the buffer and core areas. The timing of the move from lower pastures to Dokache coincided with this study and at least 15 herds from Syabru were observed in Dokache, inside the RPCA buffer area. Widespread grazing was observed inside the core area as well. One herder's livestock was repeatedly observed grazing around the former army barracks within the core area.

The result of the National Park's ban on all grazing essentially de-legitimized the local RPCCs and their capability of self-enforcement. The RPCCs were given an incentive to manage and comply with the RPCA regulations as this would grant them legal use rights within the buffer zone. With the denial of permission to graze in the buffer zone, the RPCCs lost social credibility and any incentive for them to enforce any of the RPCA regulations. It also meant that enforcement was solely back in the hands of the national park.

According to a number of informants, my National Park employee guides visit inside the RPCA during my research represented the first time in over two years that National Park staff had actually stepped foot inside the RPCA. Along with unchecked grazing within the RPCA, two hunting camps were also found, including one within the core area in prime red panda habitat. The camp contained numerous carcasses including Himalayan *thar*, musk deer and pheasant. It is likely that the herders in the area were aware of this activity but obviously were not motivated to stop it.

Conclusions for the RPCA Case Study

The present status of the RPCA in many ways resembles the situation at the Ilam site. Government claims to ownership have eroded local management and land use systems but have failed to give a clear and enforceable alternative. Progress has been made in divesting authority and responsibility to local institutions. At the same time, these institutions have not been given the needed incentives and support to adequately manage grazing lands and enforce regulations. As a local institution within communities with long histories of communal management, the RPCCs had great potential to manage grazing lands and enforce conservation measures in the area. Although the yearly permission for grazing in the buffer area gave the committees incentives for conservation, the presence of the army followed by the government's failure to authorize grazing in the buffer area de-legitimized the potentially effective conservation actions of the RPCCs.

It is clear that the national park is not able or willing to enforce its own regulations. Even with significant government presence in the form of the army, the wishes of the Nepalese government were still only loosely followed[52]. The RPCCs have great promise to lessen the threat of dogs and herders and have taken positive steps to reduce human-induced mortality of red pandas. The national park is now in the process of forming a single committee to manage grazing, firewood collection and control hunting within the RPCA. The three villages have different priorities and requiring them to work under one committee may not be feasible (P. Yonzon, personal communication, 08/06/03). Nevertheless, the committee

[52] The army has little commitment to conservation. The presence of a single park ranger in the area might have produced more effective results than the army.

may be quite effective at conservation measures since it is the best situated institution to provide enforcement and regulate the activities of its members. The committee will have little reason to enforce the national park rules without incentives in the form of greater autonomy and long-term grazing rights. The national park needs to grant these rights and also maintain a monitoring presence in the area. If the the national park continues to stay away from the area, the committee will continue to have no incentive to change their behavior- even with added autonomy and long-term grazing rights.

MANGENGOT

The Mangengot study area is also located within Langtang National Park (Figure 4). Although it lies only 15 kilometers southeast of the Red Panda Conservation Area, the conservation problems and existing red panda habitat are drastically different. While the RPCA has seen a relatively high level of involvement, Mangengot has received little attention from the park. Mangengot represents the norm for most areas of Langtang and other parks in Nepal. The state retains full rights and management responsibilities, but lacks the capacity or ethic to provide adequate enforcement. With the increasing intensity of the civil war, the state plays a virtually non-existent role in these areas leading to a vacuum of enforcement and management responsibility.

Mangengot is located on a southward running ridge from the Himals to the North. The ridge slowly descends from 3600 to 3000 meters between Thadepati and Mangengot. A trail popular with tourists and religious pilgrims to the Gosainkund Lakes follows the top of the ridgeline. Along with a few small tourist hotels in Mangengot and Thadepati, the ridgetop is dotted with small pastures, while the steep slopes remain in dense forests of rhododendron, alder/birch and juniper with scattered large fir trees. The ridge continues descending to the South through highly degraded oak forests to the border of the National Park in Kutumsang.

Above the village of Kutumsang lies the burnt out remains of the National Park Ranger Station, a casualty of the civil war between the Nepalese government and the Maoist insurgents. The army camp in Mangengot also suffered a similar fate after the army

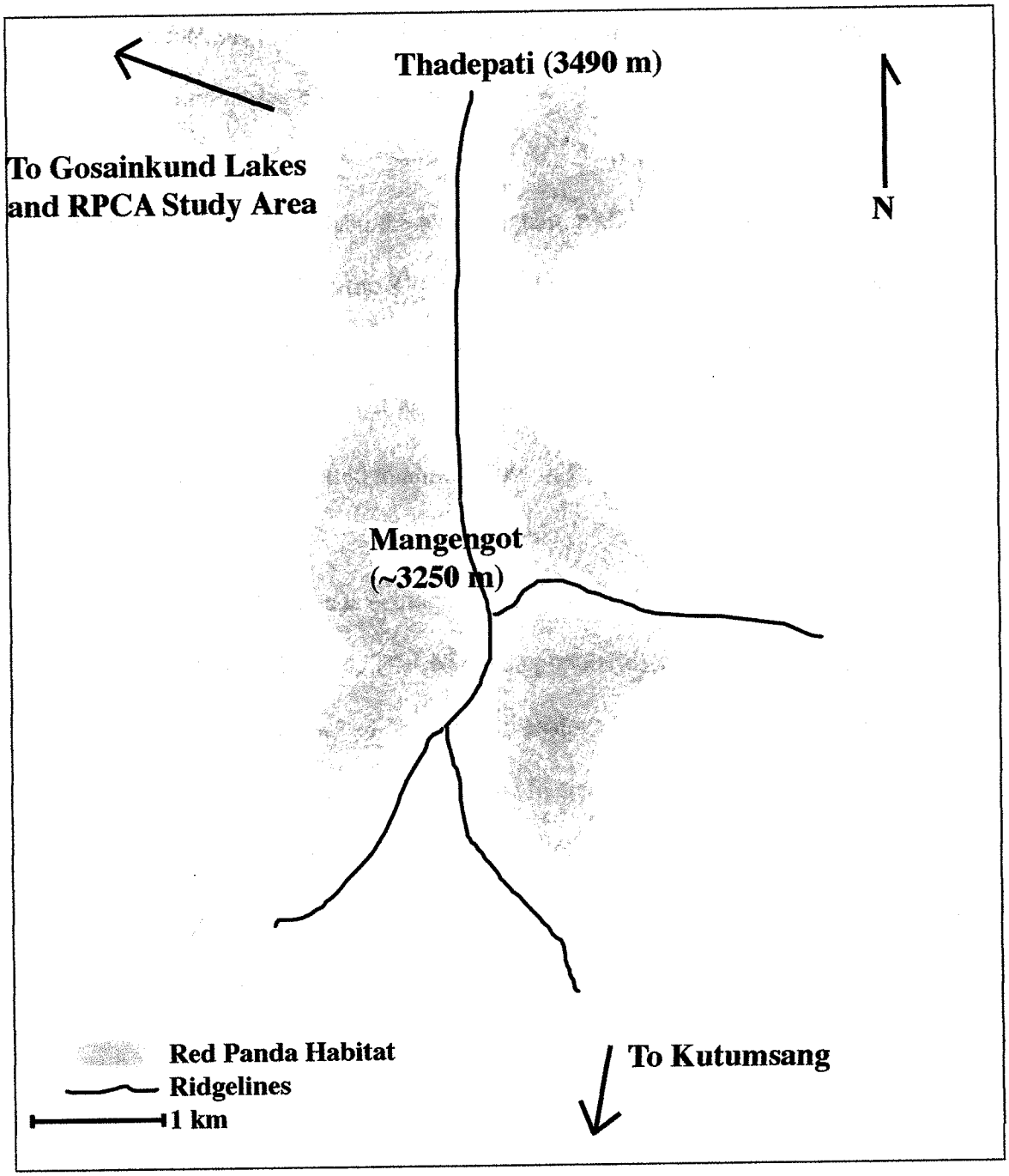
evacuated the post after the state of emergency was enacted in 2001. According to local reports, the Maoists often come and stay nights in the village of Kutumsang. Since government, in the form of police, park staff or army, currently has no sustained presence in the area, the Maoists largely have complete authority over the area. But as they are currently solidifying power and are largely involved in a guerrilla campaign against the better armed government forces, they have not spent much energy on forming "peoples government" in areas like Kutumsang where government forces still occasionally patrol.

Red Panda Ecology and Status

My limited data and the study of Jendrewski (2001) both suggest that the forests around Mangengot appear to contain a larger population of red panda than the RPCA[53]. Elevational range of observed habitat was between 3100 and 3600 m, usually in small, steep gullies in close proximity to water. Local informants stated that the red panda were usually not seen in areas close to grazing while livestock (and subsequently herders and their dogs) were present during the summer months. Sixty percent of scat-centered plots (n=17) had evidence of human or livestock disturbance. This stands in contrast to the RPCA site where over 70% of plots in the RPCA contained no evidence of disturbance.

[53] Whereas 15 samples were collected in the RPCA in one week of searching, 17 samples were collected in Magengot in three days.

Figure 4: Mangengot Case Study Area



Red panda habitat based solely on this study and likely does not include all areas of actual habitat.

Another difference between the two Langtang National Park areas was aspect. Unlike the RPCA, where Yonzon (1989) and my study noted a strong habitat preference towards northerly aspects, the Mangengot site had no strong directional preference except for the absence of habitat facing directly south.

The greatest difference between the two Langtang National Park study areas was the dominant tree species. While the RPCA site is predominantly tall fir trees, Mangengot is largely covered in species of rhododendron, birch and juniper, all species with characteristically low canopy height and heavy branching. Less than 1% of trees in the sample plots were fir compared to almost 30% in RPCA plots.

The cause for this difference is ecological and, to a much lesser degree, the selective, high grade logging of large fir trees. The red panda population in Mangengot appears to be relatively robust, and the lack of large, tall trees does not seem to be a limiting factor for red pandas in the area. The logging of the scarce fir trees may be of long-term concern as old trees are known to be used for den sites. An old juniper tree of approximately 80 cm diameter near Thadepate was known by locals to be used as a den site for mothering red pandas and cubs, but very few junipers of this size were observed.

Logging Pre-State of Emergency

Before the state of emergency and evacuation 2001, the ranger post in Kutumsang housed National Park staff responsible for enforcing rules and collecting tourist fees. One of the

staff's major duties was to enforce the no-logging restriction. According to one source[54], the rangers could easily be bribed to turn a blind eye towards selective logging of large fir trees inside the park. Regardless of whether the logging was abetted by bribery, or was due to lackluster enforcement, the large number of old and fresh cut tree stumps and log-cutting pits (called *dharans*) observed in the forests around Mangengot are evidence that logging of large fir trees was, and continues to be, a common occurrence[55].

Logging and the "Invisible" State

From local accounts and evidence observed, logging has increased with the evacuation of the National Park staff. One informant explained that the timber was being used to build houses and tourist lodges owned by wealthier individuals of local communities. This type of logging with axes and cross cut saws requires significant labor, and the wealthy residents are in an advantageous position to benefit from the state's lack of enforcement.

The increase of logging after the departure of the National Park staff implies that their presence had some limiting effect on the amount of logging occurring. Since their departure the area has largely devolved to an open access system. Ownership lies with the invisible

---

[54] Mangengot consists of three hotels, the burnt out army camp and a few scattered herder camps. Only one of the hotels was occupied at the time of this study. Three herders were informally interviewed but were hesitant to talk to me because I was accompanied by a national park staff person. The proprietor of the occupied hotel was used as a key informant and also as a knowledgeable field assistant.

[55] Most of the stumps and *dharans* observed were a significant distance away from major trails and were discovered because of the extensive off-trail searching for red panda scat. A tourist, or a national park staff, walking only on the trail would perceive the forest to be essentially untouched thus far.

state, but locals have no incentive to conserve resources or enforce conservation rules as they lack legal rights to use or own the forests inside the National Park. This is especially true since the wealthier and powerful locals, that is, individuals with considerable ability to evade laws, appear to be the people taking personal advantage of the lack of enforcement.

The Maoists recently publicly posted a notice in the nearby village of Kutumsang outlawing logging in the area. Although the penalty for logging was not stated, the likely range of possibilities from which the Maoists could choose from includes fines to execution. This would seem to provide sufficient incentive to halt the logging, but thus far the Maoists have not enforced their declaration as conservation is understandably given a lower priority than gaining political power and local support [56].

Overview of the Effects of Conflict on the Environment and Conservation Efforts

The impacts of war on the environment are highly variable. In some circumstances conflicts between groups can create disputed territories and demilitarized zones – literally 'no man's zones' - in which wildlife can flourish (Martin and Sutzer 1999; Kalpers 2001); the present demilitarized zone in the Korean peninsula is one example (McNeely 2000). Most often, however, armed conflict results in habitat destruction, loss of wildlife through poaching, over-exploitation of natural resources and/or pollution. Much of this is due to a breakdown of enforcement regulating access to and use of resources, and the increased subsistence

[56] It is possible that the Maoists might be using the logging ban to extract larger "donations" from the wealthier individuals who are paying for the logging.

needs of both combatants and local inhabitants and refugees. (Shambaugh *et al.* 2001; Kalpers 2001). During conflict, actors, from individuals to households to national governments, are required to alter their economic strategies towards basic survival. At the local level this usually equates to a heavier dependence on natural resources.

> On a larger scale, national economies can collapse for a wide range of reasons, including disruption of trade, loss of outside investment, and loss of tourism revenue. This economic vacuum may swiftly be filled by new illicit trade networks, as various actors exploit natural resources to boost the economy and, often, to finance conflict. In sum, armed conflict often reduces access to resources for many, increases access (often illegal) for a few, and creates a new array of winners and losers (Shambaugh *et al.* 2001).

At the same time, government ability to protect natural resources drastically diminishes as government priorities change from management to self-preservation, experienced as budget cuts, diminished infrastructure and a loss of security. These effects can last long after the end of the conflict itself (Kalpers 2001).

Indeed the aftermath of war, the void of enforcement and management immediately following conflict, often escalates negative activities, while government resources and enforcement remain limited. Some of the worst environmental effects of war occur after the conflict cease. For example, Mozambique suffered uncontrolled wildlife poaching and timber harvesting after the end of its recent armed conflicts. Rehabilitation and

reconstruction efforts of the country were undertaken without adequate enforcement of conservation rules and regulations (Hatton *et al.* 2001). Degradation caused during or after war can lead to increased livelihood and environmental insecurity, potentially causing future political instability and conflict (Shambaugh *et al.* 2001).

Strategies for Conservation During Conflict

Undoubtedly the best strategy for conservation during conflict is to focus on ending conflict as rapidly as possible. Although post-conflict degradation is often worse than during conflict, the potential for successful conservation efforts during a conflict is negligible. Nevertheless, there are a number of approaches that can partially negate the harmful influences of conflict. Although the literature focuses on protected areas with limited area, several of these approaches are certainly valid for areas outside protected areas in Nepal as well.

Local involvement in the planning and development of protected areas has proved to be successful in mitigating the effects of conflict. Awash National Park in Ethiopia survived a brief period of lawlessness in 1991. This was largely attributed to community involvement during the drafting of the park-management plan, concessions given to local communities by the park, and initiation of community-based intervention measures prior to the lawless period. The process created a sense of ownership of the park amongst local individuals and sustained the park during a period of lawlessness (Jacobs 2001). During conflict, involving communities in conservation efforts combined with institution and capacity building of local

organizations and staff has proved to be the most successful approach. The key to success is the development and strengthening of partnerships between local, government and international agencies (Dudley *et al.* 2002).

A large reason for the success of capacity building and partnerships is tied to the fact that these approaches lead to the maintenance of personnel, or a physical presence, inside protected areas during conflict. Mountain gorillas in Rwanda's Virunga Volcanoes and Nyungwe Forest were protected during an extended period of internal strife in the mid-nineties. The importance of maintaining a presence, and the conservation efforts of junior staff, were highlighted as major reasons for success (Plumptre *et al.* 2001). Garamba National Park, Okapi Faunal Reserve, and Kahuzi Biega National Park in DRC, and the Virunga Volcanoes national parks in DRC, Rwanda, and Uganda are other examples of parks that have been successful in conservation efforts due to park staff maintaining a presence during a conflict (Hillman Smith and Mafuko 2000). Indeed, it is the lower-level administrative and field-level staff that must maintain a presence to insure continued conservation efforts (Dudley *et al.* 2002).

All of these strategies are greatly enhanced if local involvement and ownership, institutional capacity building and partnerships are existing before violent conflict begins. Such activities are time consuming and may well be impossible once conflict begins. Dudley *et al.* (2002) state that demonstrating continued commitment by government and international conservation organizations is key to local staff and community efforts of conservation.

The Effect of Conflict on the Rural Poor

Before discussing how the conflict has affected Nepal's environment and conservation efforts, it is first important to recognize that the biggest impact of the war has not been on the environment, but on the lives of rural people. An elderly man explained to me how he felt about the conflict by making an analogy between rural people and the *Madal* drum. This type of drum is a common musical instrument in Nepal and is a hollowed out round piece of wood with goat skin on the ends, each creating a different pitch. It is played by alternately hitting one end with the left hand and the other with the right. An old man explained to me that the war 'plays' the Nepalese rural poor like they were the drum, with Maoists and the government alternating the strikes. When the Maoists come they demand food and the villagers teenage sons and daughters to join their fight. When the army comes the next day they face retribution for "welcoming" well-armed Maoists into their houses. Both sides are known to use torture and killings as a means to further their cause[57]. Like the *Madal* drum, the rural population is in the middle between two oppressive groups- hitting them from both sides. As the richer or influential individuals have fled to the cities or abroad, the hardships are disproportionately suffered by the rural poor. The majority of the 7,000 plus people killed during the conflict are the rural poor.

[57] See www.amnestynepal.org

Effects of Conflict on Red Panda Habitat

A mixed blessing of the conflict in Nepal has been the substantial reduction of government authority and presence in red panda habitat, leading to both greater local control and access to forests, and in some instances greater exploitation. Illicit logging and poaching have increased (Yonzon 2002). With sustained conflict, widespread predatory logging could lead to substantial habitat loss and degradation. High-grading of large fir trees, as seen in Mangengot, may significantly decrease the number of present and future maternal den sites available and may make red pandas more susceptible to predators as large trees become more scarce[58]. Nevertheless, these large valuable timber species are a minimal component of the Mangengot forests where red pandas appear to have a large population. The evidence of red pandas coexisting with grazing and firewood collection is also a positive sign and suggests that perhaps the red panda is not severely affected by a limited amount of human induced disturbance.

Effects of the Conflict on Nepal's Environment

The underlying causes of the conflict in Nepal are several and lie outside the scope of this study[59]. Nevertheless, it is important to note that despite the common connection between

[58] Maternal dens are usually found in very old trees that are not suitable for timber harvesting as they are rotted or deformed. The impacts of harvesting large fir trees will be long lasting as the large trees cut would be future den sites.
[59] For a complete review of the civil war in Nepal, see "The People's War in Nepal: Left Perspectives" edited by Arjun Kharki and David Seddon, (2003).

natural resource scarcity and civil conflict[60], the underlying causes of the Maoist conflict in Nepal are connected to poor governance and not because of an inherent scarcity of natural resources. For Nepal, and South Asia in general,

> "...chronic and structural impoverishment- rather than resource scarcity alone- forges the connection between environmental degradation and conflict ... [P]overty and weak institutions of governance are the more immediate triggers of environmental insecurity." (Najam 2003)

As illustrated in this study, there is a widespread pattern of poor governance, management and enforcement, which has led to unequal access to resources and degradation in some cases. And although a source of local conflict between users, government and local institutions, environmental security has not played a large underlying role in the Nepal's ongoing civil war.

Compared to the effects of refugees, land mines, armed militias, and even logging operations by the army (see Price 2003), Nepal's environment has suffered relatively mild consequences of recent armed conflict to date. The presence of national park staff and the army in national parks has been severely reduced. The government has reduced guard posts within 11 parks from 112 to 34, a reduction of 70% (Yonzon 2002). While not adequate or effective before the conflict, the reduction in staff and army has created an even larger void of enforcement inside parks. The decrease in army personnel in parks in the *tarai* area has

[60] See works by Homer-Dixon (e.g 1994) and Kaplan (1994).

led to increased poaching of Rhinoceros. The insurgency has also increased illicit timber harvesting and smuggling to India and Tibet. These operations are relatively small scale and geographically isolated in nature (Yonzon 2002). As observed in Mangengot, illicit harvesting for local consumption may be widespread and increasing as individuals take personal advantage of the void of enforcement within the national park.

The effects of Nepal's conflict have varied from park to park, and within different areas of each park. For most, the state continues to maintain a presence at least at park headquarters. While some parks like Makalu Barun National Park and Conservation Area in Eastern Nepal have been completely deserted, others such as Langtang National Park retain park staff around headquarters and in areas largely unaffected by the conflict such as the inner Langtang Valley. As the Mangengot site illustrates, maintaining a presence throughout the park is required in order to remain a legitimate authority in the eyes of local residents.

The problem with maintaining a presence in national parks in Nepal at the time of this study was that government workers are specifically targeted by the Maoists and are required to pay a considerable proportion of their monthly salary to the Maoist cause. In many places, Maoists have restricted all access to government workers who rightfully fear for their safety. In order for park staff to travel to many park locales, they would need to be accompanied by a substantial army patrol. It is unlikely that either the army or the government is willing to expend the energy or risk to do this. But even if possible, park staff and the army are not highly effective conservation forces when they do maintain a presence, as illustrated by the

army permitting grazing in the RPCA, and park staff allowing logging to occur around Mangengot.

Conservation in Nepal during the conflict appears highly dependent on the actions and intent of local residents. The system in place before the escalation of the conflict affects the success of conservation during the conflict. The weak system of enforcement under total government control in Mangengot has degenerated to an open access tenure system. In Ilam, the DFOs' already weak authority over the area seems to have decreased as the letter evicting the herders from Mabu VDC had not been heeded by local herders. In contrast, the Jamuna Community Forest also in the Ilam study appears to have maintained its local control and continues to function. The fourth case study, Tilche, also has retained its community forest management structure despite less involvement by the DFO. From these case studies, it appears that land socially accepted to be owned by the government has largely reverted to an open-access system. Whereas locally controlled and "owned" land has retained its local management system and self-regulating mechanisms. It appears that giving access rights and empowering local community forest institutions creates a more self-regulated system than the non-enforced state control approach.

TILCHE

Introduction

The Tilche study area lies within the boundaries of the Annapurna Conservation Area Project (ACAP), a highly praised community-based conservation initiative in existence for almost twenty years. In contrast to the government's role in Langtang National Park and Ilam case studies, ACAP maintains a high level of involvement in local conservation and management. Its approach focuses on community-based conservation through strengthening local institutions and capacity while implementing infrastructure development projects.

The geographic and sociopolitical situation of Tilche creates a near- ideal setting of CBNRM and for a common property ownership regime. Tilche is home to a small, stable, mono-ethnic population with a long history of communal management. And the population is small compared to the large areas of forests. Land tenure is secure within a large community forest, and, being surrounded by imposing mountains, boundaries are well defined and outsiders are easily excluded. Indeed, Tilche provides a seemingly ideal situation for successful community based natural resource management.

Yet it was obvious that there continues to be a conflict between the cultural tradition and love of hunting and ACAP's protectionist policies and mandates. The history of the area, and recent events and actions by ACAP, provide a compelling example of the potential shortcomings of the CBNRM approach for conservation. At the same time, Tilche also

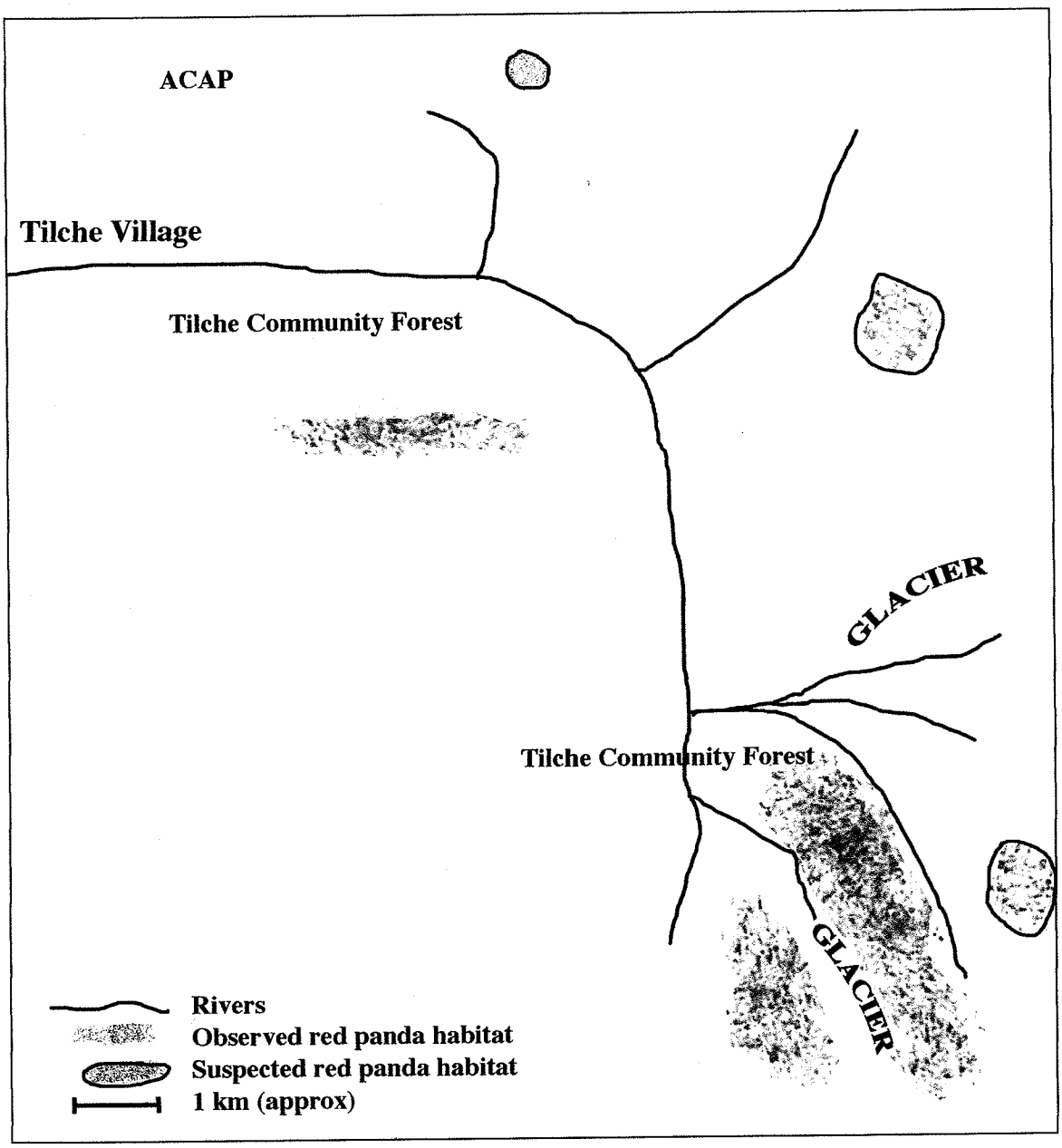
provides evidence that the use of enforcement and incentives by an actively participating NGO and national government can lead to an effective and lasting compromise between local peoples and outside conservation interests.

Annapurna Conservation Area Project (ACAP)

The Annapurna Mountains are the most popular trekking destination in Nepal with the area receiving approximately twice the number of international tourists a year that visit the Mt. Everest region. Tourism steadily increased to upwards of one hundred thousand visitors per year in the late 1990s. The increase in tourists has led to increased fuelwood demand and lumber for new trekking lodges and also some localized degradation around the major trails. Concerns over the impact of the high number of tourists were voiced as early as the mid 1970s. The underlying forces behind this "impending ecological crisis" (Hough and Sherpa 1989) were perceived to be from increased tourism, but also from population growth and poverty of local communities combined with unsustainable resource management (Stevens 1997, Western and Wright 1994). There was a push amongst conservationists and donors to protect the Annapurna Mountains from this perceived rapid degradation.

Given the park-people conflicts created by national parks in Nepal, there was a "felt need" within the government and donor community to explore alternative approaches to conservation that would balance the needs of the local people with conservation. The

Figure 5: Tilche Case Study Area



Suspected red panda habitat was not visited but was known by informants to be used by red pandas.

Nepalese government authorized the designation of a Conservation Area in Annapurna in 1986 based on the concepts of grass-roots conservation and participatory rural development popular in conservation circles at this time. The management and authority over the conservation area was delegated to The King Mahendra Trust for Nature Conservation (KMTNC), a Nepalese NGO (Stevens 1997).

ACAP's continuing goals are to conserve natural resources, encourage sustainable social and economic development and minimize the negative impacts of tourism. One implicit assumption of this approach is that conservation and development are not opposing outcomes, but interlinked and interdependent (Stevens 1997). Convincing the local people of this is a large but understated goal. Conservation efforts have received a lower priority than socioeconomic development and institution building in order to gain approval for the project from the people. The only direct conservation mandate is the prohibition of hunting. Otherwise traditional practices and management are supported.

> "Traditional subsistence activities are woven into a framework of sound resource management, supplemented by conservation, development and alternative energy programs to minimize the negative impacts of tourism and enhance the living standards of the local people." (KMTNC 2000)

Large international grants (equaling about $250,000 per year at the start of the project in 1989) and assistance combined with tourist fees (about $30 per person) fund the project (Western and Wright 1994). The functional units of the project are the village-level

Conservation Area Management Committees (CAMC). CAMCs have legal rights to use and manage forest and rangelands in their area following an approved management plan by ACAP (Mehta and Heinen 2001). ACAP staff act as advisors to motivate and facilitate community efforts and also provide training on a broad range of topics aimed at improving management of resources and enhancing local economies. The staff has no direct enforcement capabilities and strive to allow communities to resolve problems internally, relying on cultural and social norms of enforcement (Hough and Sherpa 1989). If necessary, ACAP can withhold development funds from CAMCs, pressuring communities to act or to enforce restrictions on recalcitrant individuals within the community. As a last resort ACAP staff can bring in police or forest department officials (KMTNC 2000).

The project also has a strong conservation education element entitled Conservation and Education and Extension Program (CEEP). It includes a two-year middle-school curriculum on environment issues and a mobile extension unit which tours the area offering adult education and information sessions. (Stevens 1997)

Like most CBNRM projects, problems and success are difficult to assess because little monitoring has taken place (Western and Wright 1994). Proponents have claimed success in reducing the environmental impact of tourists while increasing local benefits from tourism (Western and Wright 1994). Local participation in conservation policy making, management and institution building has been called "impressive" (Stevens 1997). Undoubtedly there are some truths in these claims as the process of ACAP requires active participation and involvement. The most telling example of empowerment is the recent movement by local

groups to fully devolve power to the local communities and phase out ACAP. This indicates that local residents have successfully been empowered and institutions strengthened to the point where they are now capable of assuming responsibility for the overall project. ACAP itself recognizes this and is planning on handing over complete authority to a locally controlled committee within the next fifteen years (KMTNC 2000).

Development activities apparently have been extremely successful; ACAP is the largest and most successful development agency in the region (Stevens 1997). These infrastructure projects greatly enhance the status of the project (Western and Wright 1994, Stevens 1997), as have useful trainings. Mehta and Heinen (2001) recently surveyed people's attitudes towards ACAP and found that respondents were more likely to respond positively to ACAP if they had taken part in a training and had learned skills that they were then able to use in a productive way. Overall, eighty-seven percent of people surveyed in ACAP held favorable attitudes towards the project. This is a drastic improvement over the eighty and sixty-five percent *disapproval* ratings by people living in or near two National Parks in Nepal. When respondents were asked why they held a favorable attitude towards ACAP, the two most prominent answers were due to community forestry and development programs implemented by ACAP. Indeed, the strengthening of traditional forest management systems is widely agreed to be successful by locals as well as in the literature on ACAP (Heinen and Mehta 1999; Stevens 1997; Western and Wright 1994).

The Tilche Study Area

The village of Tilche is located on the Eastern border of the Annapurna Conservation Area in Manang district. An hour's walk to the West, and a world away, lies the popular Annapurna circuit trail and its profitable tourist trekking lodges and 'snickers bars'. The village is situated in a narrow valley, which winds up towards the base of Mt. Manaslu (8156 m). A pass to the North of the mountain gives access to Gorkha district and is part of the lesser known Manaslu Conservation Area and round-Manaslu trek. The base of Mt. Manaslu and side valleys are rugged, trail-less areas of dense forest, glaciers and turbulent rivers. Much of the valley is heavily forested with large stands of ancient temperate and sub-alpine evergreen forest of fir, hemlock, birch and rhododendron. The harsh terrain restricts most human and livestock use to the valley floor and a few alpine pastures. It is important to note that only half of the valley lies within ACA. The village itself is within ACA while most of the forest on the other side of the river lies outside the conservation area.

Red Panda Status and Ecology

Tilche lies within 300 km of the Western most extent of red pandas and represents the least available and favorable habitat of the four study sites. Although the evergreen forests contain large, undisturbed tracts of temperate and sub-alpine forest and understory bamboo, evidence of red pandas was scarce; only five scat samples were collected in five days of intensive searching. The density of red pandas is probably the lowest of all the four study areas. It appears that red pandas inhabit higher elevation areas close to tree line, from 3550

to above 3700 meters[61] in small isolated patches in the most inaccessible areas of the valley. No signs of grazing or human disturbance were observed in any of the areas or plots where red panda scat was found.

The most important factor influencing red panda habitat, for all the study sites, appears to be the quality of available bamboo. Although six species of bamboo are present in ACA, each is found in distinct elevation levels (G. Gurung, personal communication, 07/21/03), only the higher elevation bamboo species near tree-line appear to be utilized by the red panda. No evidence of red panda was observed at lower elevations, or locally known about, in seemingly ideal habitat of large ancient fir stands with a thick understory of bamboo.

Of the five scat samples analyzed, two haplotypes were observed. The low number of samples does not allow for accurate comparison towards the other sites. Yet it appears likely that the Tilche site has the lowest genetic diversity of all four sites.

The red panda is not a species hunters specifically target. But three separate instances of the killing of red pandas by hunters were reported during my stay at Tilche. The red panda seems to be a secondary prey species of hunters; an animal that is not sought after, but may be killed if encountered. Two of the instances concerned hunters who happened upon a red

---

[61] The elevation where red pandas are found in Nepal generally increases further Westward (P. Yonzon, personal communication, 08/06/03). This is probably due to the overall decrease in monsoon rainfall as one travels west. High rainfall is a significant indicator of red panda habitat (Yonzon *et al.* 1997) and perhaps the cooler temperatures at higher elevations are needed to maintain sufficient moisture for preferred bamboo species.

panda and killed it. With the study area having an extremely low population and density of red pandas combined with low genetic diversity, curbing hunting, the only human activity within red panda habitat, might play a critical role in the long-term survival of red pandas in this area.

History of Tilche

In my interviews with local informants, the history of Tilche was explained to me largely in terms of the history of hunting rights and the local and government interactions concerning these rights. I was informed that the Nepalese government historically imposed a hunting tax on households for specific areas of forest. Payment of this tax gave households the right to hunt in this area of forest. About 30 years ago, the government imposed a hunting ban on the forest. Local communities were upset because they were not legally allowed to hunt but still had to pay the tax, which formerly they thought was levied for their hunting rights in certain forests. A few years later the tax was lifted but the hunting restriction remained. The hunting ban discussed was probably enacted as part of the forest nationalization act of 1957. But it is interesting to note that the history of the forests was not given in terms of forest ownership, but of the right to hunt.

This stems from the fact that the forests in the Tilche valley were not historically managed. Given the small population size compared to the extensive forest, no management was deemed necessary and the only restriction enforced was the exclusion of outsiders. The nationalization of the forest probably had little effect on the utilization or management of the

forest due to the already existing open access system and the lack of government enforcement in the remote valley.

Tilche Community Forest and CAMC Subcommittee

Soon after the newly 'democratic' government was installed in 1990, the village formed a community forest committee and Tilche Community Forest was ratified four years later. The community forest imposes a small fee for every tree cut. All areas are open to logging but the ruggedness of the area effectively restricts logging to only a small portion of the entire forest. Fees for medicinal plant collection and seasonal grazing rights on the alpine pastures are also collected. A number of individuals from other areas have been caught illegally collecting NTFPs and harvesting timber. The community forest has imposed substantial fines on these individuals.

As the community forest lies outside the ACA, a separate CAMC subcommittee was formed in Tilche technically for the area within the ACA. Like the community forest the CAMC imposes fines for wood and NTFP collection. The valley has large numbers of Himalayan yew, from which the leaves were harvested extensively in the 1990s for cancer treatment. Harvesting is now banned[62]. The fees collected from harvesting yew were substantial, and the CAMC has over $20,000 in its bank account- mostly from yew harvesting.

---

[62] It is uncertain as to the reason of the ban on yew harvesting in the Tilche valley and no reliable information was obtained on this subject. One obvious reason would be that the yew was being harvested at an unsustainable rate and that the forest department and ACAP stopped harvesting to protect the remaining resources. Another reason might be the

The money collected from fees remains within the CAMC area. Twenty-five percent of the money raised is used for conservation projects such as nurseries and stipends for community member "forest guards". The remaining seventy-five percent is given as loans to local individuals with the approval of the committee. Most of the loans are used for agricultural or livestock improvement and seem to be strategically given to poorer households to help increase their standard of living and decreasing their dependence on forest products such as collecting NTFPs and logging work.

The boundary of the ACA is not well understood amongst the community and the actual authoritative boundary of the ACA in practice extends over the whole valley. ACAP staff are more frequent visitors to the area than DFO staff and work in collaboration with each other.

Hunting

The signs of hunting, and the love of hunting, were apparent in the village of Tilche: my guide's interest in the signs of mountain goat (*thar*) and musk deer (*kasturee*) while in the forest; a person bragging he had shot a red panda- which he later denied; a person who told me that there was no hunting because ACAP rangers would put them in jail and, after we found snares for pheasants that day in the forest, asked my guide quietly if there were any

---

profitability of harvest to the local community. Government policy has consistently favored the "conserve and protect" model of community involvement and restricted profits of local groups (See introduction section on community forestry in Nepal).

birds in the snares; and the man who told me of the time he killed and ate a red panda. Hunting is arguably more pronounced in ACAP than in National Parks in Nepal due to cultural differences and enforcement activities (Heinen and Mehta 1999).

Hunting in the Tilche valley was, until recently, widespread with a majority of households participating. the thrill of the hunt and the taste of wild game were described by a range of people as the main reasons for hunting and did not appear to be more important to poorer families as a supplementary food source. The Gurung are especially known for their abilities and enjoyment in hunting.

The army in an effort to stop weapons from falling into the hands of the Maoists confiscated all the guns they could find in villages. Judging from the vehement responses of individuals when asked if they still had guns, the army was not completely successful in collecting all weapons. Nevertheless, it decreased the number of guns available and also made possession of a gun a risky venture. As snares are also a common technique to capture birds and ungulates, the confiscation of guns probably did little to curb hunting.

The Paradox of Outside Regulation and Local Enforcement

Both the Nepalese government and ACAP have imposed no-hunting regulations on the community. The Nepalese government outlawed hunting in national forests thirty years ago while ACAP banned hunting in 1986. The Nepalese governments ban was "enforced" by government officials (Forestry staff, police etc). ACAP, on the other hand, has given the

responsibility of enforcing the hunting ban to the local CAMCs; using their influence to change individual behavior with minimal presence of ACAP staff. ACAP rangers and staff visit Tilche and further up the valley less than five times a year.

This approach has not eradicated hunting. Evidence of pheasant snares and a recently used hunting camp observed in my study prove that hunting is still somewhat practiced in the valley. But there was no evidence of large-scale hunting, or recent use of most historic hunting camps. It appears that hunting has been drastically curbed in the valley. Most individuals consistently stated that they had stopped hunting only two years ago, over twenty-five years after the government banned hunting, and over fifteen years since ACAP restricted hunting.

The reasons for the curb of hunting two years ago are several. The near-twenty years of education and community and infrastructure building efforts by ACAP since 1986 possibly created an more conservation-friendly ethic. But this does not explain the sudden, widespread cessation in hunting. One specific event appears to have caused most people to stop, or significantly reduce, hunting.

Creating Community Consensus; Linking Hunting Restrictions to Community Forests

The following sequence of events is drawn together from the interviews of four local individuals and one ACAP staffperson. As the events largely revolve around the actions of

one particular family, local individuals were hesitant to talk in specific terms in order not to identify individuals of their community.

About two years ago, ACAP rangers were visiting Tilche when they heard gunshots from a hunter above the village. They investigated but were unable to capture the hunter. Soon thereafter, a meeting was held between ACAP staff, District Forest Office representatives and at least one individual from each household of the village. According to the ACAP staff person interviewed, the consequences of hunting including fines and jail sentences were explained. Local individuals interviewed expressed that District Forest Office staff warned them that they would lose control of their community forest if they did not stop hunting. The meeting was heated with a small portion of the community adamant about their right to hunt. In the end, the village decided as a whole to accept the ban on hunting.

According to my interviewees, this meeting provided the impetus for most individuals to stop hunting. The united front of ACAP and the DFO linked compliance with the hunting regulation with the control of the community forest. With this, the actions of one hunter could possibly mean the loss of use rights of the entire community of their forest. The threat to the community as a whole of losing the rights to their community forest created impetus for individual restraint for the good of the larger community. Before this meeting, the no-hunting ban was an externally imposed restriction and was not heeded as there was no outside enforcement or internal incentive to obey. For the first time, the community had accepted the no hunting ban as they saw a direct negative consequence for noncompliance. Even though individually most people interviewed still did not agree with the hunting

restriction, they had stopped hunting as they did not want to endanger their or the community's benefit from the community forest

This community acceptance of the hunting restriction also required community self-enforcement. As noted, people now had personal incentive to stop hunting themselves. But they also had incentive to stop the hunting of other individuals within the community. The community enforcement mechanism is the collective community pressure on its members to not lose the forest from which they all benefit from. For instance, one individual interviewed stated that he and everyone else had stopped hunting two years ago after the meeting. When asked why, he explained that ACAP and the DFO would find out. I confronted him with the assertion that one could easily hide hunting from these outsiders who only rarely visited. He responded by stating that other villagers would find out. In this sense, he viewed other community members as enforcers of this rule, even though most do not agree with the rule itself.

Nevertheless, it seems highly unlikely that a community member will tell the DFO or ACAP of instances of hunting as this would endanger community control of the forest. The real motivation therefore is not to actually restrict hunting, it is the stopping of hunting that either ACAP or the DFO *could* discover. The snares for pheasants observed were deep in the forest and were very unlikely to be found by ACAP or DFO staff who largely remain on trails. The owner of the snares rather cheerfully asked my guide whether there were any

pheasants in the traps [63]He was obviously not worried that he would face any punishment or rebuke.

In this regard, the CAMC plays an important role as a link between the community and ACAP. Since it is made up of fifteen community members, most hunting activity will be discovered by them. In fact, twice this has occurred, and the CAMC has put pressure on individuals to stop hunting, which they agreed to do. Otherwise, they have the authority to involve ACAP and police and impose fines and jail terms. With the threatened hold on forests and the possibility of ACAP withholding development funds, it is unlikely that the CAMC would notify ACAP of any infraction. But the CAMC members would do everything possible to stop the individual's behavior. It is not that the community agrees with the no-hunting ban, but it agrees that they do not want to lose authority over their forests. Therefore the community exerts pressure on its members to comply with the hunting ban.

Connecting the "Carrot" with the "Stick": Conclusions for Tilche Case Study

Hunting in Tilche provides an interesting example of how an outside- imposed regulation can be self-enforced by a community that largely does not agree with the regulation. This was only possible through the direct involvement of both ACAP and the DFO. ACAP's

[63] This overheard conversation occurred in earshot of me but was in a mix of Gurung and Nepalese language which I was only partially able to follow. The owner of the snares was not concerned about admitting to my guide that those snares were his, but tried to conceal this knowledge from me by speaking in mostly Gurung.

initial approach of relying upon CAMCs for enforcement did not alter the behavior of individuals. The hunting ban was largely not self-enforced by a community with a strong cultural affinity for hunting. It was only when connected to the threat of losing forest access that the hunting ban became successful.

Tilche demonstrates the appropriateness and weaknesses of the CBNRM system for conservation. By pursuing a development-focused agenda, ACAP successfully gained the support of local communities, which in turn has engendered support for conservation. The CBNRM approach gives direct benefit and responsibility to the users of the resource. Moreover, ACAP appropriately gives management and enforcement responsibility to local institutions as they are undoubtedly the only institution capable of effective management and regulation of its members. Neither ACAP nor the DFO have the ability or sustained presence needed for enforcement.

Nevertheless, this approach leads to concerns over different value systems between the goals of outside conservation interests and beliefs and habits of local communities. This is important because sustainable biodiversity conservation relies on stakeholders perceiving the social and economic benefits of conservation outweighing the negative impact (Kiss 2002; Mehta and Heinen 2001). Practices contradictory to conservation goals may be inherent and unenforced by local institutions and individuals. The suspected over-harvesting of yew within the valley is an example of how communally managed resources can be degraded due to significant personal gain from exploitation in the absence of sufficient regulation.

The shortcomings of CBNRM are also evident in the continued practice of hunting in Tilche. Ceding enforcement responsibilities to a community with a strong hunting ethic appears to have done little to curb the practice even after almost two decades of development projects and conservation education.

It was only after ACAP and the DFO tied hunting with the negative consequence of losing control of forest control and access to ACAP development funds that self-regulation and enforcement became more successful faced with the threat of losing their community forest, individuals were given a unifying incentive to enforce the hunting ban.
Important in this process was the active involvement of ACAP and the DFO in both monitoring and providing incentives towards conservation. The presence of ACAP rangers in Tilche allowed for ACAP to become aware of the continued hunting. And involving the DFO in the meeting increased the threat of losing privileges and gave more incentive to the community to enforce the hunting ban.

CONCLUSION

Red Pandas

The findings of this study support Yonzon's (1997) approximate distribution of red pandas in Nepal; Eastern Nepal has a relatively large and widespread population while the central and mid-western areas have smaller and more isolated populations. There is still a lack of knowledge of total population size, trends in numbers, or an accurate assessment of area of habitat available. Yonzon's (1997) estimate of 300 individuals for Nepal appears to be an underestimate of the population size in Eastern Nepal. His habitat qualifiers of 3000-4000m elevation and fir (*A. spectabilis*) as the dominant tree species do not reflect the presence of habitat at lower ranges of elevation and varying forest type found in Eastern Nepal by this study or Williams (2004) and Pradhan (2001) on the Indian border. There is also perhaps a significant difference between the southern slopes of the Himalayas (Ilam and Mangengot study areas), which appear to have larger areas of habitat and denser populations compared to the more ecologically restricted habitat found in the inner valleys of the Himalayas (RPCA where Yonzon conducted his study, and Tilche). Suitable bamboo appears to be the main habitat requirement, and this is most closely associated with rainfall (Yonzon *et al.* 1997).

Table 2: Summary of Red Panda Natural History and Threats of the Four Case Studies

Case Study	**Habitat**	**Elevation**	**Red Panda Density (km^2)**	**%Scat Centered Plots with evidence of Grazing/Cutting**	**Major Threat to Red Panda**	**Underlying Cause of Threat**
Ilam	Temperate broad-leaved evergreen forest	2500-3300m	1.38 (Williams 2004)	Estimated to be similar to Mangengot	Forest degradation leading to habitat destruction and fragmentation	Uncertain land tenure
RPCA (Langtang N.P.)	Sub-alpine fir forest, N. Aspect. Inner mountain valley	3100-3500m	2.9 (Yonzon 1989)	30%	Direct effects of grazing on bamboo. Indirect effects of increased mortality (dogs, humans)	Grazing intensity related to cheese factory/market economy of milk
Mangengot (Langtang N.P.)	Mixed sub-alpine forests	3100-3600m	Unknown (estimated to be similar to Ilam)	60%	High-grade logging of potential maternal den trees	Lack of enforcement by N.P followed by open-access system following evacuation of park staff
Tilche (ACAP)	Subalpine fir and mixed forests. Inner mountain valley	3550-3750m	Unknown (estimated as having the least density)	0%	Hunting as a secondary prey species	Cultural affinity for hunting

For three of the areas, the red panda lives in a landscape significantly affected by humans and livestock. Yet much of the areas used by red pandas was found to be inaccessible and the least utilized by livestock. Red pandas are predominantly found within 100m of water (Yonzon 1989). On the slopes of the Himalaya, this corresponds with ravines and gullies near streams. These areas not only are largely inaccessible to livestock, they also support the environmental conditions most suitable for the preferred bamboo species of red pandas.

It is unknown if human and livestock activities force red pandas into these most inaccessible areas therefore restricting overall area available for red pandas. This may be the case in RPCA as less than 30% of red panda plots had indication of recent grazing. The sustained heavy grazing within the RPCA may have reduced bamboo resources to the point where sufficient bamboo is only found in livestock-inaccessible areas. In nearby Mangengot, however, grazing was significantly more widespread found in 60% of scat-centered plots. This indicates that limited grazing does not preclude red pandas from areas utilized by livestock. The evidence of disturbance of habitat in Mangengot and Ilam suggests that red pandas can tolerate some human and livestock presence and limited grazing and wood-cutting within habitat patches. In Mangengot, however, red pandas are known to leave areas when herders arrive, probably due to the presence of humans and dogs more than to the presence of livestock and direct competition for bamboo (Yonzon 1989).

Nevertheless, long-term conservation of red pandas in Nepal needs to address these factors, as well as the maintenance of an adequate forest cover within red panda areas. This is required to provide connectivity between patches of habitat[64] and to insure the microclimate (high moisture) required for their preferred bamboo species.

The existing narrative on red pandas largely concludes that human and livestock degrade red panda habitat and imperil the long-term persistence of red pandas in utilized areas. Direct human disturbances, such as logging, hunting and dogs all appear to have some negative effects on the red panda. But it is important to recognize that these are historical occurrences in red panda habitat and need to be analyzed from this perspective. My research demonstrates that red pandas are utilizing areas also used by livestock and humans. At the same time, much of the area where red panda scat was found was off-limits to livestock and the least accessible within the area. These two factors combined appear to suggest that limited human and livestock use may be compatible with the persistence of red pandas in a given area.

Yonzon's work in the RPCA remains the most definitive research on red pandas in the wild. His results are the most accurate information concerning density, habitat use and requirements, home ranges etc. As the best work available, this research has been broadly applied to represent the norm for red pandas in the wild. Yet my limited research suggests that the RPCA alone does not represent the range of red panda density, habitat and ability to coexist with human and livestock use found amongst all four sites. The RPCA, compared to

[64] Red pandas typically do not travel in open unforested areas (Yonzon 1989).

Ilam and Mangengot, has a very limited habitat for red pandas restricted to fir forests and North-facing aspects. Red pandas in Mangengot, 15 km to the south of the RPCA, had a broader range of aspect and were found in mixed species forest devoid of large fir trees. Williams (2004) and Pradhan (2001) also found red pandas in a diversity of forest types and elevational ranges. The RPCA also was unusual due to its heavy grazing pressure caused by the cheese factories. As such, it is important in that it appears to show that sustained heavy grazing may limit the area available to red pandas. At the same time, red pandas continue to persist by utilizing the areas inaccessible to livestock.

Political Ecology

The four case studies illustrate the importance of understanding the political ecology of a region and the interconnectedness of environmental, sociopolitical and historical factors that govern the management and use of Nepal's high-altitude forests. Throughout the case studies, different access rules and governance structures (or the lack thereof) directly shape individuals perceived relationship with resources. Which, in turn, determines the amount and type of utilization of the forests. While devolution of power led to increased ownership and the likelihood of long-term and communal decision making, top-down governance structures (including the *Kipat*) led to the alienation of individuals from the resources they utilized, creating an environment where short-term personal interest outweighs the benefits of restraint.

The study also illustrates the importance of recognizing and questioning human narratives. These narratives, such as the Himalayan degradation theory, help shape policies, governance structures and access rights. Often a narrative is expounded and advertised in order to justify policy or actions by government and international conservation organizations. For instance, the development of the national park system in Nepal was linked to the Himalayan degradation theory and the agendas of these large organizations. But narratives are also locally developed and can be useful in understanding motivations of local individuals and groups. People from Tilche discussed the history of government/Tilche interactions largely in terms of the regulation of hunting. This illustrated not only the importance of hunting to individuals, but also of the conflict between local and conservation efforts by ACAP.

Each of the four case studies presents a unique interplay between government /local interactions, environmental conditions, local resource use and the dynamic management structures created by perceived or actual changing environmental conditions (see Table 3). As a whole they demonstrate the need to understand individual context of place in developing conservation strategies. Nevertheless, a number of underlying themes remain constant throughout the case studies and provide a general conservation "reality" useful for guiding policy and a conservation approach to these areas.

Table 3: Summary of the Effectiveness of Conservation Strategies of the Four Case Studies

Case Study	Conservation Strategy	Tenure/Use Rights forConservation Strategy	Effectiveness	Problems	Effects on Red Panda	Suggestions
Ilam	National Forest	User rights (e.g. grazing, fuelwood collection)	Not effective. Little DFO presence leading to *defacto* local control	Tenure uncertainty and erosion of existing systems	Possible overuse and degradation of areas in *Kipat* and National forests	Establish tenure certainty by resurveying area. Establish and expand community forest to replace national forest
RPCA (Langtang N.P.)	National Park (including use of army)	Restricted yearly grazing rights can be granted by N.P.	N.P. and Army not effective at enforcement	Grazing within Core area	Heavy grazing pressure possibly resulting in restricting available habitat to inaccessible areas	Grant long-term grazing rights in buffer area to RPCC in return for local enforcement of dogs, grazing and cutting within the core area
Mangengot (Langtang N.P.)	National Park	Limited user rights (grazing, fuelwood collection)	N.P not effective at enforcement	Historic high-grade logging, Conflict leading to greater extraction	Logging of potential maternal nest trees	Give local community institutions additional use rights to encourage sustainable use
Tilche (ACAP)	Integrated Conservation and Development Project, CBNRM (CAMC and comm. forestry)	Proprietary rights (DFO and ACAP retain ownership)	Mostly effective. Management of forests effective. Enforcement of hunting ban not effective	Hunting ban not fully enforced	Small population size and low density could be severely affected by continued or increased hunting	Increase monitoring of CAMCs and wildlife

The Nepalese government claims full ownership rights over most of Nepal's high altitude forests in the form of national forests or parks. But the government has largely remained an absentee landlord in most areas with little or no presence. Even in the few areas inside national parks where government presence has been substantial, like the RPCA, the government has shown little success in enforcement of conservation regulations. Local individuals and groups do not have the incentive to comply with or enforce government wishes, and locals largely retain *de facto* ownership and use rights of these areas due to lackluster enforcement.

The government's claim to ownership has led to the de-legitimization of existing informal and socially accepted ownership and management regimes. This has created uncertainty concerning future tenure and use rights, especially since government has not come forward with an enforceable alternative to replace the existing eroding systems. The situation is verging on an open- access tenure system where users see little future benefit in exercising restraint.

Local organizations, on the other hand, were the only institutions found capable of enforcement of conservation regulations and changing the behavior of members. These organizations, as seen in the coordination of grazing activities of the Syabru herd, often have a long history of social acceptance and self-organization. These informal institutions develop around a limiting resource, which requires communal ownership and management. But it is important to emphasize that these organizations are also highly affected by the

policies and regulations of the government. The community forestry program in Nepal is an example of how government can create, enhance and support local level organizations. Devolution of ownership and use rights gives local institutions and individuals the incentives to manage for collective long-term benefits.

However, devolution alone does not ensure local adoption of a biodiversity conservation ethic. There is the need for linking conservation regulations with the benefits of CBNRM. The RPCA and Tilche studies illustrate that there is a delicate balance between not enough and too much devolution. In the RPCA, the government first awarded the RPCCs buffer-zone grazing rights, which consequently required the RPCCs to regulate the activity of its members both in the buffer zone and the core area. This successfully linked the conservation measures desired by the national park to the livelihood of the herders. This was eliminated by the national park when it banned grazing in the buffer zone, a decision that undermined the authority of the RPCC to regulate its members' activity. ACAP, on the other hand, gave full responsibility to the CAMC sub-committee, which then had no incentive to enforce the hunting ban with which they did not agree. Only with the threat of losing the benefits of control of their community forests did they see the benefit of enforcing the rule.

It is important to note that in both instances the lack of monitoring and enforcement of by the National Park and ACAP allowed the local groups to blatantly disregard these top-down regulations. Both the government and NGOs must play a more active role in monitoring the local institutions they empower and devolve responsibility to. Across all sites, monitoring of biodiversity and the effects of different conservation strategies was found to be non-

existent or insufficient to provide for adaptive management. Both the national park and ACAP rely heavily on the notion that prohibiting certain practices such as hunting and resource extraction (which neither has been highly successful in doing) will ensure long-term conservation of biodiversity. Such an approach of benign neglect clearly does not ensure this.

The Community Forestry approach has also tended towards conservation without due consideration of the detrimental social effects on the livelihoods of many poorer, forest dependent households. Addressing the conflicts between the existing oppressive, but conservation friendly, approach and the importance of supporting local economies and livelihoods can somewhat be addressed by an eco-regional approach to biodiversity conservation. This would focus conservation efforts on the areas considered locally, and regionally important for biodiversity conservation, while allowing for greater resource use in areas of less importance. For example, the *Tarai*-Arc program of World Wildlife Fund (WWF) incorporates different degrees of protection and resource extraction into its approach for a landscape level system of habitat for mega fauna conservation (WWF 2004). Such an approach could be useful in the high altitude areas of Nepal as well. This would first require a comprehensive inventory and monitoring program in government controlled land and community forests (Heinen and Yonzon 1994).

Unfortunately, little can be accomplished with the continuation of the civil war in Nepal. Both Ilam and Mangengot are in areas heavily affected by the civil war, not yet in terms of actual fighting, but by the vacuum of power. These two sites are unsafe for either

government or NGO staff to visit. The best conservation approach for these sites is rapid devolution of authority and management to local communal groups. As the fate of these areas is being determined by the unregulated actions of local individuals, the best course of action is to give individuals and community institutions long-term use rights to provide local incentives for long-term decisions and self-regulation. The RPCA and Tilche are located in mountain valleys and are, to date, less affected by the conflict due to their geographic isolation and lack of escape routes for Maoists seeking to evade the army. These areas will likely become more affected by the conflict, and government and NGO presence in the areas will decrease. Therefore, government and NGOs have only a small window of time to strengthen local institutions in such areas. These community institutions would most likely continue to be dominated by local elites. But more democratic, inclusive and livelihood-based approaches and mandates would help lesson the grip of elite control. However, given the current inactivity and self-preservation status of the Nepalese government, implementation and empowerment of community organizations is unlikely.

Regardless of the future course of the conflict, it is clear that local groups are the best situated and most appropriate group to divest conservation responsibilities to. As seen, these groups are no panacea for conservation or equality. Yet they are the only feasible institution capable of enforcement. However, they will continue, as all human organizations will, to work for their own personal interests within their own cultural framework and separate individually-held values. Therefore it is important for the Nepali government and international conservation agencies to work in building capacity of local conservation institutions and giving these institutions the skills and authority needed to continue the long

tradition of collective management in the Himalayas. What is needed is the right balance of incentives such as long-term use rights or proprietary rights over a resource combined with the threats of losing these rights or privileges. Within this general framework, the uniqueness of place and situation must also be considered. Any conservation framework must be flexible to adapt to the great diversity of geography, ecology, history and culture found in Nepal's Himalayas.

BIBLIOGRAPHY

Acharya, K. (2002). Twenty-Four Years of Community Forestry in Nepal. *International Forestry Review, 4*(2), 149-156.

Adhikari, B., Falco, S. D., & Lovett, J. C. (2003). Household Characteristics and Forest Dependency: Evidence from Common Property Forest Management in Nepal. *Ecological Economics, 48*, 245-257.

Agrawal, A. (2003). Sustainable Governance of the Common Pool Resources: Context, Methods, and Politics. *Annual Review of Anthropology, 32*, 243–262.

Agrawal, A., & Gibson, C. (1999). Enchantment and Disenchantment: the Role of Community in Natural Resource Conservation *world development, 27*(4), 629-649.

Agrawal, A., & Ostrom, E. (2001). Collective Action, Property Rights, and Decentralization in Resource Use in India and Nepal. *Politics and Society, 29*(4), 485-514.

Bac, M. (1998). Property Rights Regimes and the Management of Resources. *Natual Resource Forum, 22*(4), 263-269.

Bajracharya, D. (1983). Deforestation in the Food-Fuel Context: Historical and Political Perspectives from Nepal. *Mountain Research and Development, 3*(3), 227-240.

Barrett, C. B., Brandon, K., Gibson, C., & Gjertson, H. (2001). Conserving Tropical Biodiversity Amongst Weak Institutions. *BioScience, 51*(6), 497-502.

Berkes, F. (1989). *Common Property Resources: Ecology and Community-Based Sustainable Development*. London: Belhaven Press.

Berkes, F. (2004). Rethinking Community-Based Conservation. *Conservation Biology, 18*(3), 621-630.

Bernard, R. H. (2002). *Research Methods in Anthropology: Qualitative and Quantitative Approaches* (third ed.). Walnut Creek, California: AltaMira Press.

Blaikie, P. (1980). *Nepal in Crisis: Growth and Stagnation at the Periphery*. Oxford: Clarendon Press.

Blaikie, P. (2002). Understanding 20 Years of Change in West-Central Nepal: Continuity and Change in Lives and Ideas. *World Development, 30*(7), 1255-1270.

Blaikie, P. M. (1985). *The Political Economy of Soil Erosion in Developing Countries*. London ; New York: Longman.

Brandon, K., Redford, K. H., & Sanderson, S. E. (1998). *Parks in Peril: People, Politics, and Protected Areas*. Washington, D.C.: Nature Conservancy : Island Press.

Bromley, D. (Ed.). (1992). *Making the Commons Work: Theory, Practice and Policy.* San Fransisco: Institute for Contemporary Studies.

Brower, B. A. (1991). *Sherpa of Khumbu : People, Livestock, and Landscape*. Delhi: Oxford University Press.

Caplan, L. (1970). *Land and Social Change in East Nepal: A Study of Hindu-Tribal Relations*. London,: Routledge & K. Paul.

Caplan, L. (1991). From Tribe to Peasant? The Limbus and the Nepalese State. *Journal of Peasant Studies, 18*(2), 305-321.

Chaudhary, R. P. (1998). *Biodiversity in Nepal: Status and Conservation.* Saharanpur, India: S.Devi.

Choudhury, A. (2001). An Overview of the Status and Conservation of the Red Panda *Ailurus Fulgens* in India, with Reference to Its Global Status. *Oryx, 35*(3), 250-259.

CITES. (2003). *Lesser Panda.* Retrieved 11/17, 2003, from www.cites.org/gallery/spcies/mammal/lesser_panda.html

Cronon, W. (1992). A Place for Stories: Nature, History, and Narrative. *The Journal of American History*, 1347-1376.

Daniggelis, E. K. (1997). *The Jangal's Hidden Wealth : A Survival Strategy by Foraging Farmers in the Upper Arun Valley, Eastern Nepal.* Unpublished Thesis Ph. D. --University of Hawaii 1997.

Demsetz, H. (1967). Toward a Theory of Property Rights. *American Economic Review, 57*(2), 347–359.

Dietz, T., Ostrom, E., & Stern, P. C. (2003). The Struggle to Govern the Commons. *Science, 302*(5652), 1907-1912.

Doughill, A. J., Soussan, J. G., Kiff, E., Springate-Baginski, O., Yadav, N. P., & Hurford, A. P. (2001). Impacts of Community Forestry on Farming System Sustainability in the Middle Hills of Nepal. *Land Degradation and Development, 12*, 261-276.

Dudley, J. P., Ginsberg, J. R., Plumptre, A. J., Hart, J. A., & Campos, L. C. (2002). Effects of War and Civil Strife on Wildlife and Wildlife Habitats. *Conservation Biology, 16*(2), 319-329.

Eckholm, E. P. (1975). Deterioration of Mountain Environments. *Science, 189*(4205), 764-770.

Flynn, J. J., Nedbal, M. A., Dragoo, J. W., & Honeycutt, R. L. (2000). Whence the Red Panda? *Molecular Phylogenetics and Evolution, 17*(2), 190-199.

Forbes, A. A., & Bhattarai, B. (1995). *Yak Herders and Kipat Holders: Report on Changing Land Use and Rights on the Milke Danda*. Kathmandu, Nepal: Nepal-UK Community Forestry Project.

Fortmann, L. (1998). Bonanza! The Unasked Questions: Domestic Land Tenure through International Lenses. In H. M. Jacobs (Ed.), *Who Owns America? Social Conflict over Property Rights* (pp. 3-18). Madison, Wisconsin: The University of Wisconsin Press.

Fox, J., Yonzon, P., & Podger, N. (1996). Mapping Conflicts between Biodiversity and Human Needs in Langtang National Park, Nepal. *Conservation Biology, 10*(2), 562-569.

Fürer-Haimendorf, C. V. (1964). *The Sherpas of Nepal, Buddhist Highlanders*. Berkeley,: University of California Press.

Gautam, A. P., Shivakoti, G. P., & Webb, E. L. (2004). Forest Cover Change, Physiography, Local Economy, and Institutions in a Mountain Watershed in Nepal. *Environmental Management, 33*(1), 48-61.

Gentz, E. J. (1989). Genetic Divergence between the Red Panda Species *Ailurus Fulgens Fulgens* and *Ailurus Fulgens Styani*. In A. R. Glatston (Ed.), *Red Panda Biology* (pp. 163-170). The Hague: SPB Academic Publishing.

Gibbs, C. J. N., & Bromley, D. W. (1989). Institutional Arrangements for Management of Rural Resources. Common-Property Regimes. In F. Berkes (Ed.), *Common Property Resources: Ecology and Community Based Sustainable Development* (pp. 22-32). London: Bellhaven.

Gibson, C. C., & Koontz, T. (1998). When "Community" Is Not Enough: Institutions and Values in Community-Based Forest Management in Southern Indiana. *Human Ecology, 26*(4), 621-647.

Gilmour, D. A., & Fisher, R. J. (1991). *Villagers, Forests, and Foresters : The Philosophy, Process, and Practice of Community Forestry in Nepal*. Kathmandu, Nepal: Sahayogi Press.

Gittleman, J. L. (1988). Behavioral Energetics of Lactation in a Herbivorous Carnivore, the Red Panda (Ailurus-Fulgens). *Ethology, 79*(1), 13-24.

Glatston, A. R. (1989). *Red Panda Biology*. The Hague: SPB Academic Publishing.

Glatston, A. R., & Group, I. S. M. V. P. S. (1994). *The Red Panda, Olingos, Coatis, Raccoons, and Their Relatives : Status Survey and Conservation Action Plan for Procyonids and Ailurids*. Gland, Switzerland: IUCN.

Grima, A. P. L. (1989). Natural Resources: Access, Rights-to-Use and Management. In F. Berkes (Ed.), *Common Property Resources: Ecology and Community Based Sustainable Development* (pp. 33-54). London: Bellhaven.

Hardin, G. (1968). The Tradgedy of the Comons. *Science, 162*(3859), 1243-1248.

Hatton, J. (2001). *Biodiversity and War: A Case Study of Mozambique*. Washington D.C.: Biodiversity Support Program, World Wildlife Fund, Inc.

Heinen, J. T., & Mehta, J. N. (1999). Conceptual and Legal Issues in the Designation and Management of Conservation Areas in Nepal. *Environmental Conservation, 26*(1), 21-29.

Heinen, J. T., & Yonzon, P. B. (1994). A Review of Conservation Issues and Programs in Nepal - from a Single-Species Focus toward Biodiversity Protection. *Mountain Research and Development, 14*(1), 61-76.

Hillman-Smith, A. K. K., & Mafuko, G. (2000, October 6-7, 2000). *Lessons Learned So Far on the World Heritage Sites of the Democratic Republic of Congo. Proceedings on the Role of World Heritage in Danger Listing in Promoting International Cooperation for the Conservation of World Natural Heritage.* Paper presented at the World Heritage Convention, IUCN Workshop, Amman, Jordan.

HMG. (1996). Conservation Area Mangement Regulations, 2053. *Nepal Gazette, part 3*.

Homer-Dixon, T. F. (1994). *Environment, Scarcity and Violence*. Princeton, NJ: Princeton University Press.

Hough, J. L., & Sherpa, M. N. (1989). Bottom up Vs Basic Needs - Integrating Conservation and Development in the Annapurna and Michiru Mountain Conservation Areas of Nepal and Malawi. *Ambio, 18*(8), 434-441.

IUCN. (2004). *Mustelid Specialist Group 1996. Ailurus Fulgens. 2004 Iucn Red List of Threatened Species*. Retrieved November 30, 2004, from www.redlist.org

Ives, J. D., & Messerli, B. (1989). *The Himalayan Dilemma : Reconciling Development and Conservation*. London ; New York: Routledge.

Jacobs, H. M. (1998). *Who Owns America? Social Conflict over Property Rights*. Madison: University of Wisconsin Press.

Jacobs, M. (2001). *Impacts of Conflict on Biodiversity and Protected Areas in Ethiopia.* Washington D.C.: Biodiversity Support Program, World Wildlife Fund, Inc.

Jendrewski, J. (2001). *Red Panda Research Project* (unpublished).

Kalpers, J. (2001). *Overview of Armed Conflict and Biodiversity in Sub-Saharan Africa : Impacts, Mechanisms and Responses.* Washington D.C.: Biodiversity Support Program, World Wildlife Fund.

Kaplan, R. D. (1994, February). The Coming Anarchy. *The Atlantic Monthly,* 44-76.

Kharki, A., & Seddon, D. (Eds.). (2003). *The Peoples War in Nepal: Left Perspectives.* Delhi: Adroit Publishers.

Kiss, A. (2002). Making Biodiversity Conservation a Land Use Priority. In T. O. McShane & M. Wells (Eds.), *Getting Biodiversity Projects to Work: Towards More Effective Conservation and Development.* New York: Columbia University Press.

King Mahendra Trust for Nature Conservancy (KMTNC) (2000). Retrieved 10/08, 2003, from http://www.south-asia.com/Kingmah/tonproj.htm#1

Klatzel, F. (2001). *Natural History Handbook for the Wild Side of Everest: The Eastern Himalaya and Makalu-Barun Area.* Kathmandu, Nepal: The Mountain Institute and Mera Publications Pvt. Ltd.

Kurtén, B. (1968). *Pleistocene Mammals of Europe.* Chicago,: Aldine Pub. Co.

Lachapelle, P. R., Smith, P. D., & S.F., M. (2004). Access to Power or Renuine Empowerment? An Analysis of Three Community Forest Groups in Nepal. *Research in Human Ecology, 11*(1), 1-12.

Ludwig, D., Hilborn, R., & Walters, C. (1993). Uncertainty, Resource Exploitation, and Conservation - Lessons from History. *Science, 260*(5104), 17-&.

Malla, Y. B. (2001). Changing Policies and the Persistence of Patron-Client Relations in Nepal: Stakeholders' Responses to Changes in Forest Policies. *Environmental History, 6*(2), 287-307.

Martin, P. S., & Sutzer, C. R. (199). War Zones and Game Sinks in Lewis and Clark's West. *Conservation Biology, 13*, 36-45.

Mayr, E. (1986). Uncertainty in Science: Is the Giant Panda a Bear or a Racoon? *Nature, 323*, 769-771.

McNeeley, J. (2000). *Biodiversity, War and Tropical Forests.* Paper presented at the Conference on War and Tropical Forests: New Perspectives on Conservation in Areas of Armed Conflict., Yale School of Forestry and Environmental Studies, New Haven, Connecticut.

McShane, T. O. (2003). The Devil in the Detail of Biodiversity Conservation. *Conservation Biology, 17*(1), 1-3.

McShane, T. O., & Newby, S. A. (2003). Expecting the Unobtainable: The Assumptions Behind Icdps. In T. O. McShane & M. P. Wells (Eds.), *Getting Biodeiversity Projects to Work: Towards More Effective Conservation and Development*. New York: Columbia University Press.

McShane, T. O., & Wells, M. P. (2004). *Getting Biodiversity Projects to Work: Towards More Effective Conservation and Development*. New York: Columbia University Press.

Mehta, J. N., & Heinen, J. T. (2001). Does Community-Based Conservation Shape Favorable Attitudes among Locals? An Empirical Study from Nepal. *Environmental Management, 28*(2), 165-177.

Messerschmidt, D. (1995). Local Traditions and Community Forest Management: A View from Nepal. In D. M. Warren (Ed.), *The Cultural Dimension of Development: Indigenous Knowledge Systems* (pp. 231-244). London: Intermediate Technology Publications.

Messerschmidt, D. (2002). *Cultural Mechanisms for Natural Resource Conservation and Managment in Asian Mountain Ecosystems: Cultures Conflicting, Mediating and Adapting with Selected Case Studies and Analysis*: Asia High Summit 2002.

Miller, D. J. (1998). *Fields of Grass: Portraits of the Pastoral Landscape and Nomads of the Tibetan Plateau and Himalayas*. Kathmandu, Nepal: ICIMOD.

Mueller-Dombois, D., & Ellenberg, H. (1974). *Aims and Methods of Vegetation Ecology*. New York: Wiley.

Najam, A. (2003). *The Human Dimensions of Environmental Insecurity: Some Insights from South Asia. ECSP Report, Issue 9, 59-73.*

Oftedal. (1989). Bamboo as a Source of Digestible Energy for Red Pandas. *Int theriol congr.*

Ostrom, E. (2003). How Types of Goods and Property Rights Jointly Affect Collective Action. *Journal of Theoretical Politics, 15*(3), 239-270.

Ostrom, E., Burger, J., Field, C. B., Norgaard, R. B., & Policansky, D. (1999). Sustainability - Revisiting the Commons: Local Lessons, Global Challenges. *Science, 284*(5412), 278-282.

Ostrom, E., Gardner, R., & Walker, J. (1994). *Rules, Games, and Common-Pool Resources*. Ann Arbor: University of Michigan Press.

Plumptre, A. J., Masozera, M., & Vedder, A. (2001). *The Impact of Civil War on the Conservation of Protected Areas in Rwanda*. Washington, D.C.: Biodiversity Support Program, World Wildlife Fund, Inc.

Poudel, K. (2004, 02/27). Panda Population Red Alert. *Spotlight (Nepali Newspaper)*.

Pradhan, S., Saha, G. K., & Khan, J. A. (2001). Ecology of the Red Panda *Ailurus Fulgens* in the Singhalila National Park, Darjeeling, India. *Biological Conservation, 98*(1), 11-18.

Prater, S. H. (1980). *The Book of Indian Mammals*. Bombay, India: Bombay Natural History Society.

Price, S. V. (2003). *War and Tropical Forests: Conservation in Areas of Armed Conflict*. Binghamton, N.Y: Food Products Press.

Redford, K. H., Coppolillo, P., Sanderson, E. W., DaFonseca, G. A. B., Dinerstein, E., Groves, C., et al. (2003). Mapping the Conservation Landscape. *Conservation Biology, 17*(2), 647-647.

Regmi, M. C. (1976). *Landownership in Nepal*. Berkeley: University of California Press.

Reid, D. G., Hu, J. C., & Yan, H. (1991). Ecology of the Red Panda Ailurus-Fulgens in the Wolong Reserve, China. *Journal of Zoology, 225*, 347-364.

Roberts, M. G., J.L. (1984). *Ailurus Fulgens. Mamalian species, 222*, 1-8.

Salafsky, N., Margoluis, R., Redford, K. H., & Robinson, J. G. (2002). Improving the Practice of Conservation: A Conceptual Framework and Research Agenda for Conservation Science. *Conservation Biology, 16*(6), 1469-1479.

Sanderson, S. E. and Redford, K. H. (1997). Biodiversity Politics and the Contest for Ownership of the World's Biota. In e. R. Kramer et al. (Ed.), *Last Stand: Protected Areas and the Defense of Tropical Biodiversity* (pp. 115–132). Oxford, United Kingdom: Oxford University Press.

Saterson, K. A., Christensen, N. L., Jackson, R. B., Kramer, R. A., Pimm, S. L., Smith, M. D., et al. (2004). Disconnects in Evaluating the Relative Effectiveness of Conservation Strategies. *Conservation Biology, 18*(3), 597-599.

Schaller, G. B. (1985). *The Giant Pandas of Wolong*. Chicago: University of Chicago Press.

Shambaugh, J., Oglethorpe, J., & Ham, R. (2001). *The Trampled Grass: Mitigating the Impacts of Armed Conflict on the Environment*. Biodiversity Support Program.

Springate-Baginski, O., Blaikie, P., Dev, P. O., Yadav, P. N., & Soussan, J. (1999). *Community Forestry in Nepal: A Policy Review*. U.K: DFID.

Stevens, S. (1997). Annapurna Conservation Area: Empowerment, Conservation and Development in Nepal. In S. Stevens (Ed.), *Conservation through Cultural Survival: Indigenous Peoples and Protected Areas* (pp. 237-279). Washington, DC: Island Press.

Stevens, S. (2003). Tourism and Deforestation in the Mt Everest Region of Nepal. *The Geographic Journal, 169*(3), 255-277.

Stiller, L. F. (1995). *The Rise of the House of Ghorkha*. Nepal: HRD Research Center.

Subba, C. (1995). *The Culture and Religion of Limbus* (1st ed.). Kathmandu: K.B. Subba.

UNPD. (2003). *World Population Prospects: The 2002 Revision Population Database*. Retrieved 05/08, 2004, from http://esa.un.org/unpp/

Wei, F. W., Feng, Z. J., Wang, Z. W., & Hu, J. C. (1999). Current Distribution, Status and Conservation of Wild Red Pandas Ailurus Fulgens in China. *Biological Conservation, 89*(3), 285-291.

Wei, F. W., Feng, Z. J., Wang, Z. W., Zhou, A., & Hu, J. C. (1999). Use of the Nutrients in Bamboo by the Red Panda (Ailurus Fulgens). *Journal of Zoology, 248*, 535-541.

Western, D., Wright, R. M., & Strum, S. C. (1994). *Natural Connections : Perspectives in Community-Based Conservation*. Washington, D.C.: Island Press.

Williams, B. (2004). *The Status of the Red Panda in Jamuna and Mabu Villages of Eastern Nepal.* Unpublished Msc Thesis, San Jose Unviersity.

World Wildlife Fund. (2004). *Terai Arc Project*. Retrieved 11/08, 2004, from www.worldwildlife.org/wildplaces/him/projects/projects1.cfm

Yonzon, P. (1989). *Ecology and Conservation of the Red Panda in the Nepal Himalayas, Phd Dissertation.* University of Maine.

Yonzon, P. (2002). The Wounds of Neglect. *Habitat Himalaya, 9*(1).

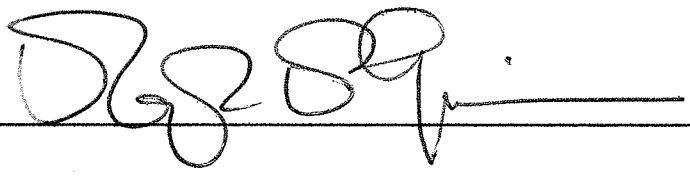
Yonzon, P., Jones, R., & Fox, J. (1991). Geographic Information Systems for Assessing Habitat and Estimating Population of Red Pandas in Langtang National Park, Nepal. *Ambio, 20*(7), 285-288.

Yonzon, P., Yonzon, P., Chaudhary, C., & Vaidya, B. (1997). *Status of the Red Panda in the Himalayas*: Resources Nepal and Metropolitan Toronto Zoo Project.

Yonzon, P. B., & Hunter, M. L. (1991). Cheese, Tourists, and Red Pandas in the Nepal Himalayas. *Conservation Biology, 5*(2), 196-202.

Yonzon, P. B., & Hunter, M. L. (1991). Conservation of the Red Panda Ailurus-Fulgens. *Biological Conservation, 57*(1), 1-11.

Zimmerer, K. S., & Bassett, T. J. (2003). *Political Ecology: An Integrative Approach to Geography and Environment-Development Studies*. New York: Guilford Press.

APPROVED 

Professor and Chair of the Department of Forest Ecology and Management

DATE Dec 16, 2004