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Shifting Cultivation in the Sacred Himalayan Landscape

A Case Study in the Kangchenjunga Conservation Area

Kamal Prasad Aryal, Elisabeth Kerkhoff, Niki Maskey and Roshan Sherchan

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Authors :
Mr. Kamal Prasad Aryal, Agriculture Specialist, ICIMOD (formerly WWF Consultant)
Ms. Elisabeth Kerkhoff, Agro-forestry Specialist, ICIMOD
Ms. Niki Maskey, Program Officer-Sacred Himalayan Landscape, WWF Nepal
Mr. Roshan Sherchan, Program Manager-Sacred Himalayan Landscape, WWF Nepal

Foreword

Shifting cultivation is an indigenous farming practice prevalent in forested highland communities of the Eastern Himalayas. Kanchenjunga Conservation Area (KCA) is a part of Eastern Himalayan landscape. KCA is a community managed area occupying 2,035 sq. km in Taplejung district in eastern Nepal. It is one of the biodiversity hotspots in Sacred Himalayan Landscape (SHL). KCA is endowed with beautiful mountain landscapes and rich in both biodiversity and cultural heritage. In due recognition, the Government of Nepal (GoN) conferred it with protected area status on 9 July 1997. It is the part of the Kang mountain ecosystem which also includes Kangchendzonga Biosphere Reserve in Sikkim-India and an extension of the Quomolongma Nature Reserve in Tibet Autonomous Region-China.

Shifting cultivation also called bhasme locally in KCA is a common practice of the ethnic communities residing in this area. Shifting cultivation mostly termed as slash and burn is constrained by policies and people practicing this farming systems are projected illegal however, this is still found to be a major source of food security for the poor and marginalized people. Therefore, this age old practice of rural farmers require due attention in the changing political context.

Against these backdrops, this publication is an attempt to bring issues in light and help start a policy debate on shifting cultivation for sustainable development, food security and biodiversity conservation. ICIMOD has been collaborating with its partners from Nepal, Bhutan and Bangladesh in studying policies on tenure, institutions, land-use options and extension approaches in shifting cultivation, while WWF Nepal has been working in participatory conservation and continues to strengthen local practices in the mountains. It is expected that this kind of partnership will bring positive impacts in the lives of rural people making biodiversity conservation more sustainable. This book is a reflection of this collaboration. I hope this book will be extensively used both by researchers and practitioners to manage traditional practices of “shifting cultivation” in a sustainable manner.

I take this opportunity to thank MacArthur Foundation and WWF UK for the financial support for the publication of this book. I would like to thank those who have directly and indirectly been involved in making this joint venture and publication possible. Finally, I congratulate the research team.

Anil Manandhar
Country Representative

Executive Summary

Shifting cultivation is a traditional farming system adopted by many ethnic communities in Nepal. In Kangchenjunga Conservation Area (KCA), it is locally referred as *Bhasme* and mostly practiced by Limbu, Rai, and Sherpa people since generations. It is the traditional occupation and livelihood of the people living in the area. However, government officials, researchers and development workers in Nepal see shifting cultivation as unproductive and threat in natural resource management, and believe it no longer exists.

This study was carried out in four villages of KCA namely: Yasang (Tapethok VDC, ward No. 9), Lawajin and Langluwa (Lelep VDC, ward No. 3 and 6) and Sherpagaun (Yamphudin VDC, ward No. 2). The overall objective of the study was to enhance understanding on shifting cultivation practiced in KCA, in order to develop appropriate development goals that are based on local opportunities and constraints, and align them with conservation goals and livelihoods improvement objectives of KCA management plan.

The main objective was to see how to manage the shifting cultivation practices in KCA to address both the conservation and sustainable development goals and what are the benefits in maintaining shifting cultivation practices as a land use? In fact, the findings of this study and past researches show that maintaining and improving shifting cultivation has many benefits to offer for its practitioners, mainly involved in nature conservation through community development. It is clear that in KCA, shifting cultivation is an indigenous knowledge practice doing by farmers since generations to manage natural resources and require recognitions in the policies of natural resources management mainly in the face of changing climate. Most shifting cultivators state that they are using the lands since generations and continue to use in future. The fact that some land is unregistered is because the government has never acknowledged their traditional land rights. Hence, development efforts should be aimed towards modifying and improving the existing shifting cultivation system, rather than trying to convince farmers to replace it. The existing bias against shifting cultivation is not based on any knowledge of the realities on the ground and is unfounded. As a result, they can be counterproductive to conservation and development programmes if not addressed timely.

The way ahead would be to address the specific needs of shifting cultivators, encourage innovation in their practices, strengthen their capacity, provide opportunities to improve and enhance knowledge. Additionally, it is extremely important for the state to recognize their practices within land-use policies secure land tenures and provide accessibility to natural resources within the framework of conservation policies. The study recommends to document traditional and indigenous knowledge and practices and their importance for biodiversity management, with due care for intellectual property rights and cultural sensitivity.

Actually, shifting cultivators are the pioneer of balancing ‘conservation and livelihood’ needs. Most of the conservation and sustainable development practitioners need to learn from them to bring a paradigm shift in natural resource management.

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Acronyms

CBLIS	:	Community Based Livestock Insurance Scheme
CFUGs	:	Community Forest User Groups
DADO	:	District Agriculture Development Office
DFO	:	District Forest Office
DNPWC	:	Department of National Parks and Wildlife Conservation
HCF	:	Himali Conservation Forum
ICDP	:	Integrated Conservation and Development Programme
ICIMOD	:	International Centre for Integrated Mountain Development
ILO	:	International Labour Organisation
KCA	:	Kanghenjunga Conservation Area
KCAMC	:	Kanghenjunga Conservation Area Management Council
KCAP	:	Kanchenjunga Conservation Area Project
NGO	:	Non Governmental Organisation
NTFP	:	Non Timber Forest Product
PTD	:	Participatory Technology Development
TMI	:	The Mountain Institute
RAD	:	Regional Agriculture Directorate
REDD	:	Reduced Emissions from Deforestation and Forest Degradation
RFD	:	Regional Forest Directorate
SLCC	:	Snow Leopard Conservation Committee

Glossary

Adhiya	:	Share cropping
Bari	:	Rain-fed agricultural land, usually with terraces
Bhasme	:	Shifting cultivation
Chiraito	:	NTFP – medicinal plant
Churpi	:	Hard dried cheese
Ghee	:	Clarified butter
Goral	:	Mountain goat
Kharka	:	Common-property grazing areas in the hills
Khoria	:	Shifting cultivation
Kipat	:	Customary land tenure system
Kut	:	Customary land renting system
Lhose	:	Fallow or fallow land
Lokta	:	Fiber used in paper making
Malingo	:	Bamboo type reed used to make matting
Parma	:	Customary practice for share and exchange labour
Subba	:	Traditional village head in Limbu communities

List of Figures

List of Tables

Contents

1. Introduction

Kangchenjunga Conservation Area (KCA)

Kangchenjunga Conservation Area (KCA) covers Walangchung Gola, Lelep, Yamphudin and Tapethok VDCs of Taplejung District and was established on 29 July 1997. It aims to safeguard biodiversity and improve the livelihood of the local people. The conservation area is situated with Sankhuwasabha District to the west, the Tibet Autonomous Region of China to the north, Sikkim, India to the East and other VDCs of same district to the south. KCA has an area of 2,035 km^2, with an altitude ranging from 1,200 to 8,586m from Thiwa Khola up to Mount Kangchenjunga, which is the third highest peak in the world. The area has formally been declared a "Gift to the Earth" under WWF's Living Planet Campaign, following which it was designated as Nepal's third Conservation Area in 1997. It also falls within the Sacred Himalayan Landscape, currently being developed by WWF Nepal in partnership with The International Centre for Integrated Mountain Development (ICIMOD). With the inclusion of the KCA, Nepal became Asia's third country, after Bhutan and Cambodia, to include over 18% of its total land under the protected area system. The area is home to a population of 5,000, 48% of which are Limbu and 25% Sherpa (WWF 2007).

The Department of National Parks and Wildlife Conservation (DNPWC) of the Government of Nepal launched the Kangchenjunga Conservation Area Project (KCAP) in March 1997, with technical and financial support from the WWF Nepal Programme. The project has adopted the ICDP approach to achieve its goals and objectives. The ICDP approach emphasises strengthening the capacity of local communities to improve their livelihoods while at the same time maintaining the biological diversity of the area.

With the aim of strengthening the community management of KCA, a KCA Management Council (KCAMC) was formed in April 2003 with the support of WWF Nepal. The KCAMC comprises of seven Conservation Area User Committees, 44 User Groups, and 32 Mother Groups. These community based institutions support effective implementation of all KCAP activities. In 2004, KCAMC submitted the Kangchenjunga Conservation Area Management Plan to the Department of National Parks and Wildlife Conservation for endorsement, and on 31, August 2006, the Government of Nepal handed over the management of the Kangchenjunga Conservation Area to KCAMC (WWF 2007).

Shifting Cultivation

The term shifting cultivation is often used interchangeably with slash-and-burn or swidden agriculture. A wide variety of practices across the globe falls under these terms, but not all can be considered shifting cultivation. In fact, slash-and-burn is a land clearing method, which is used by many for the permanent clearing of land (Kerkhoff and Sharma 2006). Shifting cultivation is characterised by a short 'cultivation phase' of a few years followed by a relatively longer 'forestry phase,' usually referred to as the 'fallow' (Kerkhoff and Sharma 2006). Fujisaka et al (1996) define 'traditional' shifting cultivation as the form in which indigenous communities clear and cultivate secondary forests, and leave parcels

Figure 1: Shifting cultivation landscape in KCA

to regenerate naturally via fallows of medium to long duration. This is the type of shifting cultivation that is common in Nepal, where it is known as '*khoriya*' and '*bhasme*' (Kerkhoff and Sharma 2006).

In this study, we understand shifting cultivation to be an integrated farming system, not merely a land clearing practice. It generally has the following components: a cropping phase; a (forest) fallow phase; controlled burning; customary regulatory institutions, and indigenous knowledge and skills. Although there are variations in the farming system across different ethnic groups and geographic locations, there are certain characteristic elements that are essential for its proper functioning. These need to be understood before any analysis can take place.

Fallowing is a common practice in many agricultural systems, but specific to shifting cultivation is that there is forest growth on the fallow land. The fallow is called '*lhose*' in Nepali. The fallow forests are an integrated part of the shifting cultivation farming system, and are essential to recuperate soil fertility and structure after cultivation, and to provide a range of products to meet household requirements (e.g. bamboo and wild foods) and socio-cultural functions. In fact, it is these fallow forests that make agricultural production possible on extremely steep slopes in the first place, and it is these that take up most of the space in a shifting cultivation landscape.

Forest fallows require some major adaptations, such as controlled burning for land clearing and the rotation of plots (not necessarily of settlements). If farmers could not get rid of the forests when they were no longer needed, they might not allow them to grow so high on their land in the first place. It is a common misunderstanding that slashing and burning is 'easy' as compared to land preparation in settled agriculture. In fact, it often requires the cooperation of all community members, and good organisation to keep the fires under control.

A particular plot is cleared and cultivated for one or two years with annual crops, usually with other perennial crops grown in between or after these, and then the land is left for the forest to regenerate, and the farmers clear the subsequent plot. After the forest has grown enough, or when the land is needed again, it is cleared once again. Farmers usually clear a new plot for annual crops every year, but the other plots are by no means 'abandoned'. They are managed as fallows, as the farmer will be using them again in a couple of years. This results in a patchy landscape, of plots with annual crops, perennial crops, bamboo (early fallow species) and forests. Rotation requires access to much larger areas of land than permanent agriculture; a fact which is often not understood by outsiders.

The rotational cycle is defined as the cropping phase and the fallow phase combined. Its length and changes therein are often used as an indicator for the ecological sustainability of the system. There are studies which point to fallow phases of 20-30 years, implying that this length is required for ecological sustainability (e.g. Ramakrishnan 1992), but this is based on the understanding that fallows should grow until primary forest regenerates. From the farmers' perspective, however, secondary forests better serve their purpose, providing enough biomass to maintain soil fertility, and enough forest products to meet their requirements. This would mean a fallow phase of around 10 years is sufficient. This figure can be taken as a 'rule of thumb', although the ideal length of the rotational cycle depends on the quality of the land, which is determined by the type of vegetation, steepness, altitude, and aspect. At higher elevations, more time is needed for forest regeneration, so fallows should be longer and take up more space. Social aspects to determine the ideal fallow length are - the land holding size, plus the family size and labour availability.

During the slashing and burning, large trees are left for ecological and practical reasons. In practical terms, they are too thick to cut and burn and they are too heavy to carry away. In ecological terms, they serve as mother trees, helping the fallow forests to regenerate faster and with more of the preferred species, preventing erosion and landslides during the cropping phase.

In shifting cultivation land preparation usually involves mostly slashing and burning and no ploughing is applied. Maize is sown with the help of a dibbling stick and millet is broadcast on the field. Such techniques reduce the risk of soil erosion, as compared to ploughing. Soil fertility is an issue, however, because the soils in these high-rainfall areas are relatively porous and steep, and need high levels of organic matter to hold the soil together. Animal manure is only available to those who have livestock, but chemical fertilizers cause a breakdown of organic matter, so they are used only sparingly. Additionally, agrochemicals are too expensive for most subsistence farmers.

Traditionally, shifting cultivators form groups to work the land together in a labour sharing system called *parma*. Since the work is very strenuous, working together in a group makes it more enjoyable and productive. In remote fields, the group further ensures protection in case of accidents or wild animals. For certain activities, such as controlled burning, a group is needed to prevent the fire from spreading to other areas. This is a common practise among shifting cultivators of many different ethnic communities.

Unlike permanent farmers, who focus on the plot level, shifting cultivators usually manage their land and natural resources at a landscape level. Planning of the rotational pattern is required to make optimal use of local resources and protect fragile parts such as stream banks. Such management requires organisation and coordination, for which most communities have customarily developed institutions (Kerkhoff and Sharma 2006). In sociological terms, institutions comprise shared norms; values; traditions; beliefs; religion; rules; regulations; laws; civil society organisations, and government agencies. It is all of these that form the 'rules of the game' in a society (North 1990). These institutions, particularly those in charge of land holding and management, play a significant role in the tenure system, the organisation of labour and cultural identity.

Adaptive and Co-management

Collaborative or co-management of natural resources is described as 'A situation in which two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory, area or set of natural resources (Borrini-Feyerabend et al, 2000). Theoretically, co-management may mean collaboration between any two or more stakeholders, but most often it is understood to be between communities and governments.

Adaptive management of natural resources is a management approach that is based on where implementing and learning go together, so the managers can adapt to specificities in the local situation. In other words, it is an approach to understanding and practicing collaborative management that is based on the recognition that the management of natural resources is always experimental, that we can learn from implemented activities, and that Natural Resources Management can be improved on the basis of what has been learned. The central tenet of adaptive management is an open, investigative and analytical attitude, which will be fostered with government, research and development agencies.

Adaptive management is especially relevant in the management of rotational agroforestry farming systems, because of the wide diversity in agro-ecological and socio-cultural aspects that has to be dealt with. Each ethnic community traditionally practices its farming in a different way, and as these are mountain areas, agro-ecological diversity is strong. Furthermore, there is a need for communities and other stakeholders (e.g. government departments, companies and the NGO-sector) to learn to work together towards better management. This collaboration can only be achieved if all actors show an interest in each other's approaches and are willing to adapt their ways to come up with a joint approach.

The collaboration can be facilitated through multi-stakeholder processes, defined as 'processes that bring together all major stakeholders in new forms of communication and decision-finding (and possibly decision-making), recognise the importance of equity and accountability, and the democratic principles of transparency and participation (Hemmati 2002).

Figure 2 : Crop and fallow fields

In the case of rotational agroforestry there is one disadvantage of the co-management concept in that in many parts, the management is now largely under community-only control. Therefore, if co-management is promoted, farmers may see this as a way for governments to increase their control. In India and Nepal, this issue has arisen when community forestry and joint forest management were promoted,, In those situations where communities themselves are largely in control a community-based approach to natural resource management in rotational agroforestry is preferred in which the supportive role of governments is enhanced; however it does not necessarily mean resource management is under government control.

At the same time, inequitable access to natural resources and environmental degradation cannot be addressed without significant and durable changes in the distribution of power in society. Management approaches and resource access are to a large extent the result of political choices and processes. Thus, making co-management work requires dealing with the regional, national and international contexts, crucial determinants of which are legislation and policies (Borrini-Feyerabend et al, 2004). In the case of rotational agroforestry in the Eastern Himalayas, the detrimental role of the policy environment in community resource management is particularly pronounced and the failure in current policies increasingly recognised.

Shifting Cultivation in the KCA

Shifting cultivation is a traditional farming and livelihood system adopted by many ethnic groups in Nepal. It is an agroforestry system characterised by a short 'cultivation phase' of a few years followed by a relatively longer 'forestry phase' usually referred to as the 'fallow'. In the KCA, it is mostly the Limbu, Rai, and Sherpa communities who have been practicing shifting cultivation through the generations. However, other groups, who have migrated to this areas, such as Gurungs and Tamangs, have sporadically adopted this agroforestry system too. Shifting cultivation is typically practiced on the steep upper slopes that are unsuitable for permanent cultivation, and often inaccessible for livestock herds. *(Figures 1 and 2)*

For many shifting cultivators, food security is a major concern and the ability to practice shifting cultivation is crucial for their subsistence. On steep slopes farmers see it as the only suitable option. In this area employment opportunities outside agriculture are very limited, unless it means migrating out of the district and even out of the country. This would mean men leaving their families behind. At the same time, however, population pressure is increasing and the land available for shifting cultivation is becoming less. Increasing demands and changing circumstances are apparent, yet there is a lack of appropriate research and development to deal with this.

Prevailing Perspectives on Shifting Cultivation

Perhaps the single most problematic situation shifting cultivators are confronted with is the common perception that their practice is outdated, destructive and unsustainable. The resultant policies across countries in the Eastern Himalayas are either unsupportive or actively discouraging the various traditional practices (Kerkhoff and Sharma 2006). In Nepal, government officials, researchers and development workers tend to see shifting cultivation as a sign of underdevelopment, and believe it no longer exists. However, a recent survey of available secondary information suggests that it is still practiced in around 20 districts across the country (Regmi et al, 2005, unpublished). This strong negative perception has led to a policy environment that is aimed at controlling shifting cultivation. In Nepal, shifting cultivation is not officially recognised

as a land use, and farmers cannot register land for this purpose. Furthermore, some of its basic tenets are discouraged or banned. For example, controlled burning is not officially allowed in the country, and there are cases where farmers have paid fines because of this. Long term forest fallows are discouraged because, as the forest reaches maturity, the Forest Department no longer recognises the land as agricultural land and prohibits clearing (Aryal and Kerkhoff 2008). Inside the KCA, there are additional regulations that have to do with its specific conservation objectives.

The strong bias against shifting cultivation is largely undeserved, and the current problems related to shifting cultivation are often as much a result of counterproductive policies as of inappropriate land use practices (Kerkhoff and Sharma 2006). Shifting cultivation does have benefits to offer, both for its practitioners and for society at large. This realisation is important because the lengthy government efforts to wean farmers away from shifting cultivation and replace it with alternatives have often caused increased poverty and degradation, and are not advisable.

Shifting Cultivation and Biodiversity Conservation

Biodiversity is higher in shifting cultivation than in other agricultural systems, and current practices can be adapted to meet certain specific conservation objectives (Kerkhoff and Erni 2005; Kerkhoff and Sharma 2006, and Kerkhoff 2006). Shifting cultivation contributes to biodiversity by having higher forest cover, higher agricultural biodiversity, and more space for wildlife than other types of agriculture. Indigenous customs and knowledge further enhance the conservation of resources, as well as supporting cultural integrity and social security.

Forest cover is maintained by maximizing the length of the fallow phase[1]. Forest fallows are the most important part of the farming system, (in the areas which use shifting cultivation) as a source of soil productivity as well as for a variety of forest products. Far from 'abandoned land', these fallows are usually actively managed by farmers. It starts during the land clearing, when farmers decide which trees to cut, and which to maintain and protect against the burning to enhance re-growth of preferred species in the fallow. They intercrop more trees during the cropping phase and promote forest growth during the fallow phase. Fallow forest management requires careful land use planning at the landscape level, and enforcement of customary rules and practices such as those regarding controlled burning, managing labour for conservation activities, and traditional knowledge. Aside from the fallows, these communities usually conserve forest patches to protect water sources and to serve ecological (seed conservation) and religious (sacred groves) purposes.

Plant biodiversity and certain wildlife species benefit from the rotation of crop fields, fallows and forests. The patchy landscape that results from this rotation is more diverse than continuous primary forest, and it is more productive at the same time. Additionally, large migratory mammals need access to large spaces with grassy vegetation as well as patches of bamboo and more dense forest. Because of their migratory habits, they often form a threat to sedentary farmers, while the rotation practiced in shifting cultivation enables people and elephants to use the same resources at different times. The pattern of fields and the duration of the fallow period could even be adjusted to meet the specific needs of certain animals. In Meghalaya (India), for example, shifting cultivators maintain specific elephant corridors as part of their village landscape to avoid harm to homes, fields and elephants.

Shifting cultivation systems are usually richer in crop biodiversity than other traditional farming systems, and definitely more so than modern farming systems. The biodiversity includes crop species and their multiple varieties, some of which are unique to the location. The maintenance of several of these species depends on specific traditional practices and knowledge that are inherent to the shifting cultivation, such as rotational fallows and controlled burning, intricate intercropping and relay cropping practices, and the maintenance of trees in the crop field. *Chiraito*[2] (*Swertia*

[1] See "Shifting Cultivation"

[2] A cash crop. See section "*Chiraito* Cultivation"

chirayita) is one such species; it grows best on burned land and has turned into an important commercial crop.

In turn, the farmers depend on these locally adapted species to ensure food security and variety, maintain their culture, and reduce the risks posed by rainfall variability and other factors in the harsh environment where they live.

Climate Change Concerns

Where the climate is concerned, adaptation is the most important issue for shifting cultivators to deal with at the moment. Adaptation is about how communities and agricultural systems can adjust to the expected changes in rainfall pattern, temperatures, and resulting droughts, floods, hailstorms, etc. According to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2007), climate change is going to affect the most disadvantaged people in the poorest regions the hardest; especially communities and sectors which are highly dependent on natural resources. Farmers in mountain areas have to deal with a high variety of micro-climates, and the effects of climate change are even less predictable than in the plains. In the current scenario, rather than predicting how the changing climate will affect them, shifting cultivators should be prepared for any possibility. This means creating resilience in the face of too little water as well as too much water, temperature rise and hailstones etc. The vulnerability of shifting cultivators is different from that of other farmers, and so are the opportunities to increase their resilience. In the KCA, shifting cultivators have to deal with steeper slopes and more stony soils than other farmers, but each year they have some flexibility to choose a suitable location for their new plot according to the situation. The type of land they use makes them more vulnerable to droughts, but vast local knowledge on intercropping, crop diversity, and drought-resistant varieties, provides resilience in a way that other farmers have lost.

Potentially, shifting cultivation has an important role to play in climate change mitigation (the reduction of green house gasses, including carbon), because both the growth and the removal of fallow forests involve large amounts of carbon. Particularly relevant is the REDD[3] mechanism through which communities can be rewarded for maintaining forests on their land as carbon stocks. This would provide an economic incentive for maintaining forest rather than uses with less carbon (GFC, 2009)[4]. At this stage in the global negotiation process, there is still the threat that shifting cultivation may be identified as a major driver of forest degradation, or even deforestation. This is based on the view that forests will replace shifting cultivation once it is eradicated. However, an increasing number of experts recognize that, if at all, shifting cultivation will be replaced by other forms of agriculture in which there is no space for forests. They support the view that REDD may provide a way to recognize and reward shifting cultivators for their role in carbon sequestration.

Improving Shifting Cultivation

It can safely be stated that shifting cultivators, including those in the KCA, have hardly benefited as much from research and development efforts as other farmers. Most research on the topic has had the, sometimes underlying, objective to find out how harmful it is and how it can be controlled, never how it can be improved like any other farming system in the world. On top of that, most conventional agricultural innovations such as ploughs and high-yielding varieties, and even chemical fertilizers and pesticides, are not applicable to most shifting cultivation systems. In this regard, it is no wonder that in many areas these farmers have had more difficulties than others in coping with increasing population pressure, the increasing need for cash income, and in maintaining sustainability.

Like farmers all over the world, however, shifting cultivators constantly try to innovate and adapt their farming system to changing needs and challenges, while maintaining good traditional practices and despite the lack of

[3] Reduced Emissions from Deforestation and Forest Degradation

[4] Global Forest Coalition (2009) REDD Realities: How strategies to reduce emissions from deforestation and forest degradation could impact on biodiversity and indigenous peoples in developing countries. http://www globalforestcoalition.org/img/userpics/File/publications/REDD-Realities.pdf

external support. This innovative process is based on guiding principles that are derived from previous experiences and prevailing values on what is needed and appropriate. It is therefore likely to be more effective for rural development than replacing it with permanent farming or forestry.

2. Aim and Objectives

This study aims to get an overview of the shifting cultivation practices in the KCA. This includes the main good traditional practices and farmer-led innovations, as well as the main constraints farmers are currently facing and the main opportunities for participatory development. It takes the conservation and the livelihood improvement objectives of WWF into account as well as the perspectives of the farmers, the KCAMC members, district-level government officials, WWF Nepal and the researchers themselves. The previous study on the extent slash-and-burn is use in KCA (Bhatta, 2007, unpublished) attempted to give an idea of the extent of shifting cultivation in this area. This study builds on it by trying to understand the practice based on its merits and constraints.

Aim

The overall aim of the study is to enhance understanding of shifting cultivation as practiced in the Kangchenjunga Conservation Area, in order to develop an appropriate development plan that is based on local opportunities and constraints, and in line with the conservation and livelihoods improvement objectives of the KCA management plan.

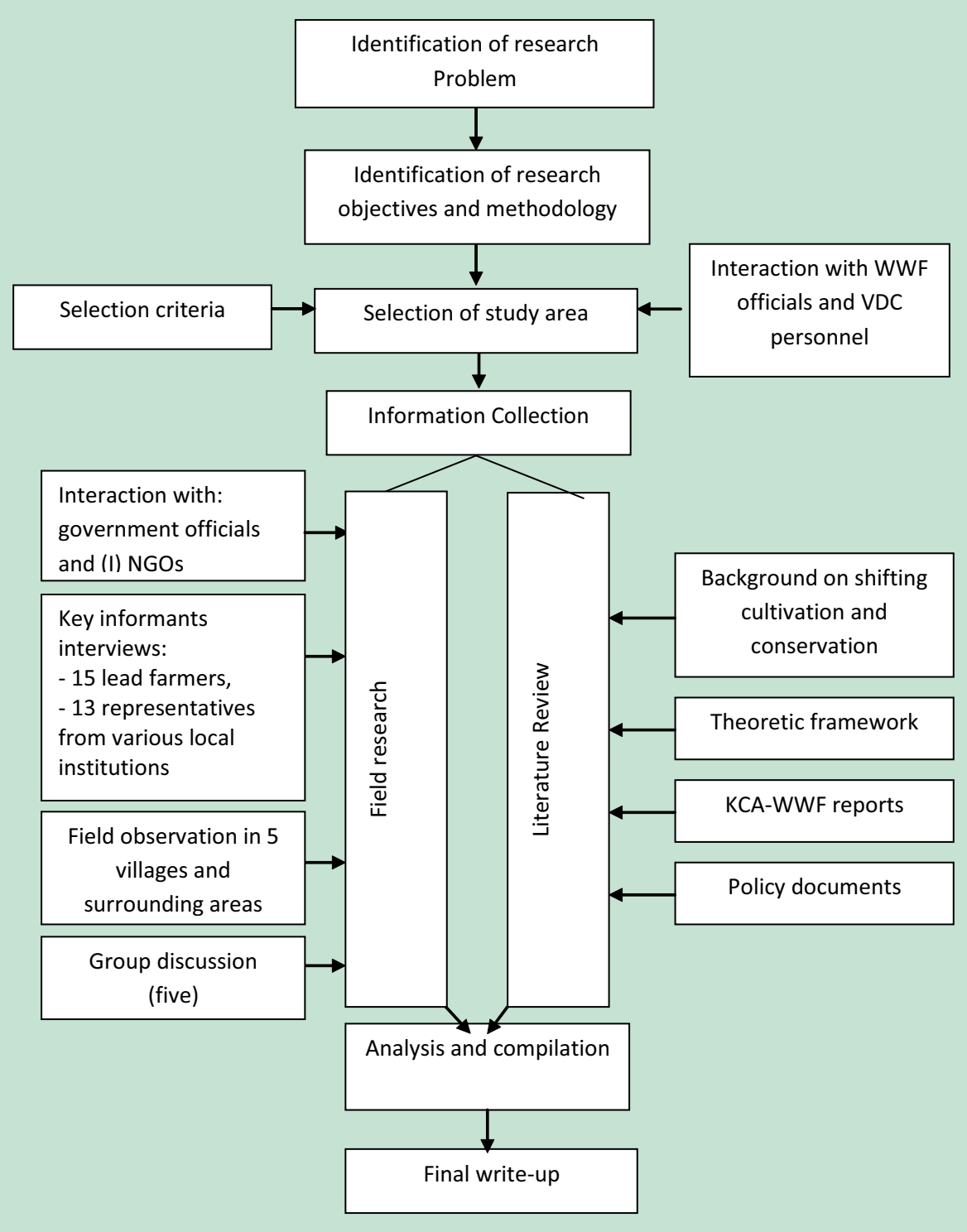
These farmers' innovations exist in pockets, including the shifting cultivation areas of KCA. They can be identified, analysed and developed further to improve the farming system across wider areas. In other parts of the eastern Himalayas, improving shifting cultivation based on these farmers' innovations has shown to be a viable approach. Improving shifting cultivation means building on farmers' existing good practices and technological, economic, social and environmental innovations, and is counter to replacing shifting cultivation with alternative types of land use. A number of innovations with good potential have been documented by Kerkhoff and Sharma (2006), and many in NEPED and IIRR (1999), IFAD et al. (2001), ICRAF (1997) and Cairns (2007). These publications have further promoted the idea of looking at shifting cultivation from within and trying to understand it from the perspective of the farmers themselves. Prof. P.S. Ramakrishnan was one of the first to actually scientifically test farmers' practices, and found out that indigenous weeding practices made perfect ecological sense (Ramakrishnan 1992). Community-based fire management practices were found to be very effective until the government started to take over fire control, resulting in the breakdown of the social fabric of these communities (Darlong 2002).

Objectives

- To document the main characteristics of shifting cultivation as traditionally practiced in the conservation area;
- To describe the natural resources (including land, forest, crop and animal biodiversity, and water) on which shifting cultivators depend for their livelihoods, as well as a brief history of tenure;
- To review and document the farmers' local innovations and other recent developments in the shifting cultivation system;
- To assess various stakeholders' priorities for development and prospects for their implementation, including shifting cultivators (men and women), other farmers, government officials and WWF, and
- To recommend appropriate development actions for the shifting cultivation areas for both conservation and livelihoods improvement.

3. Methodology

Research Process



Methods

The study consisted of a literature review, field visits to interact with the shifting cultivators and consults with Kangchenjunga Conservation Area staff, government representatives, and other concerned stakeholders and relevant institutions. A participatory approach was used in order to make sure that the indigenous communities themselves also benefit to some extent from the results of the study. The researchers undertook the following activities :-

- Literature review: Relevant published and unpublished reports and papers were collected, reviewed and analyses, as well as the main policy and legal instruments.
- Key informant interviews and focus group discussions based on a question checklist (Annex 1): Key informants were lead farmers, (15 in total, including women), as well as representatives from local organisations, such as Village Development Committees (VDCs), NGOs, and conservation users groups. The communities identified the lead farmers; KCA staff and the surveyor identified the most important local organisations (13 interviews). In each village a group discussion was held (five in total). In all, a wide range of stakeholders were covered who shared their views on shifting cultivation and conservation - sharing their knowledge and expertise on the practice itself, its benefits and constraints, and its implications on livelihood security, and on the conservation and management of biological diversity of the area.
- Field observations to verify the information from the interviews: There were transect walks to the areas mentioned, including crop fields, fallows of various stages as well as cardamom and *chiraito* fields to collect additional information through photography and GPS referencing.

4. Study Areas

The four villages where the study was conducted are: Yasang (Tapethok VDC, Ward No. 9), Lawajin and Langluwa (Lelep VDC, Ward Nos. 3 and 6) and Sherpagaun (Yamphudin VDC, Ward No. 2). These villages lie one and a half to three days[5] walk from Phungling Bazaar, the District Headquarter, in a north eastern direction. The study sites have an altitude range of 1,680 – 3,450m, a slope range of 30-70 degrees and a temperate to alpine climate. In the sites *bhasme* is practiced up to 2,417m.

Looking at the VDCs, shifting cultivation is most prominent in Tapethok VDC, followed by Lelep. In Yamphudin VDC, the practice was prominent in the past, but has drastically reduced, because farmers are now more interested in livestock rearing and tourism. Shifting cultivation used to be the main source of livelihood in all four villages, but land use and livelihood strategies have changed in recent times. Nowadays, shifting cultivation is most prevalent in Yasang Village, where it is practiced by all farmers, most of whom have very small patches of *bari*[6] land. In Lawajing too, the land cultivated each year under shifting cultivation is greater than the *bari* land. In Langluwa, the farmers have more land under *bari* than in shifting cultivation. To a large extent this is because much of the shifting cultivation land is owned by someone from another village. In Sherpagaun, only two or three Rai households, who had migrated from Yamphuddin, are involved in shifting cultivation.

Environmental Conditions

The study villages of Yasang and Sherpagaun are situated at an altitude of around 2,000m. Because of the steepness of the terrain, altitudes can vary hundreds of metres within the same village. Accordingly, the micro-climate varies from warm to mild summers, and mild to cold winters with frost and snow at the elevations above 2,100m. The annual

[5] One day = 12 hours

[6] Rain fed agricultural land, usually with terraces

precipitation is generally higher on the southern slopes, and at lower and middle rather than higher elevations. During the field survey (December), heavy frost appeared in Lawajin and Yasang and the highest point reached during the study (Deurali, 3,455m) was covered in snow.

The topography of the site is diverse in terms of the landscape, and characterised by rocky surfaces. The soil type of the study villages is clay, silt, loam and sandy loam. Sandy loam soil is very common in the area. The colours of the soil are black, yellow, brown and red, and white. The vegetation of the study sites is dominated by semi-temperate forest with diverse plant species, including (*Prunus cerasoide; Alnus Nepalensis; Juglans regia; Arundinaria Malinga; Daphne bholua; Castonopsis indica; Arundinaria intermedia; Rhododendron arboretum; Lantana camera; Swertia chirayita, and Ammomum subulatum.)*

Inhabitants

There are number of ethnic groups in the study villages namely Limbu, Sherpa, and Rai. The majority of the people in Yasang Village of Tapethok VDC belong to the Limbu and Rai communities, whereas the majority of people are Rai in Langluwa and Lawajin villages of Lelep VDC. Sherpagaun of Yamphudin VDC is dominated by Sherpas. Limbu and Rai are the indigenous inhabitants of the area, with the Sherpas in this area being said to have come from Solukhumbu District, having migrated to the Solukhumbu area of Nepal from Tibet two or three hundred years ago.

In the study villages, the households are highly scattered, with only a few households in close clusters. Yasang Village consists of six households in a cluster, the remaining 12 being scattered. Eight households are Rai and the remaining Limbu. In Langluwa only five of 56 households are found in a cluster. In Lawajin (predominantly Rai) and Sherpagaun (all Sherpa) the households are in closer clusters than in the other two villages with 29 and 19 households respectively.

Education and Literacy

The literacy rate in the study villages is very low. Mostly middle aged and elderly people are illiterate, but young children go to primary school and a very few to high school. This is less than the average of the whole Kangchenjunga Conservation Area, as shown in the WWF survey. The survey indicates that in the entire KCA, 50% of the male adult population attended school, while only 20% of the women stated they had gone to school (WWF, 2002). There is no primary school in Yasang and Langluwa villages, so the students have to walk one to two hours to reach the nearest primary school. Lawajin has a primary school, and near Sherpagaun there is a secondary school, which teaches up to grade nine. The high school is in Lelep, which is at least two to four hours walking distance from Lawajin Village. According to the school teacher and focus group discussions, most of the children have received primary education (up to Grade 5), but after that the level of education drops significantly. The school dropout rate is higher for girls than for boys, especially at the higher levels. This is due to the distance to the school and pressure for girls to work in the house and marry at an early age.

Gender Roles and Responsibilities

According to the WWF survey, gender relations vary partly with ethnic affiliation, but can be considered unequal in all groups. KCAP is cited as a “remarkable example of a gender-sensitive nature conservation project” (Locher 2006), and tries to address this. One of the main challenges is the strict gender division of labour, resulting in a greater workload for women who work two to three hours more per day than their male partners. Moreover, men significantly under-value women’s voluntary community labour and women are largely under-represented in political institutions and local community leadership (WWF 2002).

This is confirmed in the study villages, where the women are involved in planting, weeding, harvesting, and manure transportation, while men do the ploughing and threshing. Women still receive lower pay for the same work,

as their work is thought to be lighter. Other women's tasks include, gathering fuel wood, cooking food, fetching water and grass, preparing alcohol, childcare, and care of the elderly.

The decision making process is dominated by men, although they often take suggestions from the women. However, in critical situations the final decision is still made by them. There have been some interventions by the Himali Conservation Forum with support from KCAP towards empowering women. According to the discussion, women are more active nowadays and they are given opportunity to speak in the community meetings and gatherings.

5. Findings

Main Characteristics of Traditional Shifting Cultivation in KCA Livelihoods and Food Security

Agriculture is the main source of livelihood for the majority of the households in the study villages, and it is largely subsistence-oriented. The people in the study areas are traditionally dependent upon shifting cultivation for their food production as well as cash generation. In Yasang and Lawajin, it is still the major source of livelihood support, as it contributes more than 60% of their food production. In Langluwa, the practice is relatively less important, as compared to these two villages, and in Sherpagaun hardly anyone practices shifting cultivation any more. The main staple foods in this area are maize, wheat, barley, and for the Sherpa communities, potatoes. People from Langluwa, Lawajin and Yasang normally exchange their surplus production of food grains (e.g. maize and finger millet) for potatoes, and seed potatoes from the higher parts of Walangchung Gola and Lelep VDCs.

The majority of the households in the study villages experience food deficits, with the poorest families producing only enough for three months of the year. In Yasang and Langluwa, the average level of food sufficiency was four months per year, while it was up to six month in Lawajin and Sherpagaun. The study carried out by WWF (2002) revealed that less than 10% of the household in the Kangchenjunga Conservation Area produce enough food grains for household consumption for the entire year. For the rest, the average food self sufficiency is 5.5 months a year (WWF 2002).

People have adopted various coping strategies to supplement their food deficit periods, and have diversified from wage and seasonal labour to other options, with the main sources of income differing per village, depending on the location and ethnicity. In Sherpagaun, for example, livestock products like *churpi* (dried cheese) and *ghee* (clarified butter) are the major source of cash income, besides cardamom. The average price for *churpi* and *ghee* is around Nrs 150-200 per kg. The *churpi* from Sherpagaun is marketed at the district headquarters, and reaches the national market. A few households add to their income by doing seasonal work for others in the village, for example as porters. However, a very few households report to have incomes from employment opportunities in other parts of the country or overseas. In Yasang and Langluwa, both cardamom and *chiraito* are grown. But in Lawajin, *chiraito* is the only source of cash, because their land is not suitable for cardamom. These cash crops, with *chiraito* fetching around Rs240 per kg, have helped to considerably reduce the food deficiency problem especially in Lawajin and Yasang.

Some households collect uncultivated food items to supplement their food requirement, especially in Yasang and Langluwa. They include sisnu *(Urtica dioca)*, which is a kind of nettle, niuro *(Thelopteris spp.)* which is an edible fern shoot, and wild mushrooms. They are mostly collected from fallow fields and nearby forests. This practice is decreasing with the emergence of alternatives. Other important species for farmers' livelihoods are described in Annex 3. They are phool tarul (crop), *malingo* (bamboo), alder and blue pine (trees), argeli and *lokta* (fibres for paper-making) and medicinal plants (See table 1).

Livelihood options depend on people's ethnic background as well as their wealth status. Compared to other study villages, Sherpagaun has the highest number of people working and/ or doing business outside the village. People in Lawajin and Yasang work as porters and wage labourers, while in Langluwa and Sherpagaun there are a few who have government jobs or are involved in business services. Occupational enterprises include house constructing, carpentry, and masonry. From these few villages several people, mostly men, have migrated abroad to work. Government service and foreign employment is mostly male-dominated, while household work is female-dominated. In general, the majority of the people who depend on agriculture are from low income groups, whereas high income households are more involved in business, foreign employment and livestock rearing.

Shifting Cultivation Farming System and its Components

Shifting cultivation cycle in the KCA, as elsewhere, has a cropping and a fallow phase. The main stages include land clearing (through slashing and controlled burning), cropping, and fallow management. In this process, the clearing takes one to two months, the burning one day, the cropping phase one to two years (recently extended by an additional three to five years because of cash crop farming), and the fallow is eight to ten years. This makes a complete cycle of around 10-12 years, before the farmers clear the same field again. Other important components of the shifting cultivation system, which are elaborated below, are soil conservation, labour exchange, and local innovations to the traditional system.

Land Clearing

The cropping phase starts with the selection of land for cultivation. People prefer to use the land which has been under fallow longest, and which is likely to be the most fertile and least weedy. Generally, land clearing is done during the months of February and March *(Figure 3)*. These communities cut all the bushes and trees during the slashing, whereas elsewhere it is common to leave selected trees in place to serve as mother trees and to prevent landslides. When asked why, the farmers replied that almost all the trees grown in fallow field are alders *(Alnus nepalensis)*, which are highly sensitive to fire. Even if they leave the trees standing, they will die during the burning. The slashed materials are left to dry in the field for 10-20 days, depending upon the amount of sun. The main purpose of drying is to make burning easier. Cutting the trees and slashing the undergrowth of an eight to ten year old fallow forest is a laborious activity. It is mostly done by households individually, but sometimes they make use of a labour sharing/ bartering system called '*parma*'. Both men and women are involved in this activity, but the heavy activities such as tree cutting are mostly done by men.

Burning generally takes place in March, immediately after confirmation that the biomass is fully dried. Burning is an essential part of the system; the ash provides manure and is essential for pest and weed control. Without burning leaving the biomass to decompose by itself would take a very long time. Farmers mentioned is it is very difficult to clean the field as there is thick biomass due to the long fallow period, thus burning is the only way. People ensure that sufficient manpower is available during the firing period, so they can prevent the

Table 1 : Commonly used species having medicinal value for people in the study area

Species name (nepali)	Scientific name	Medicinal Use
Timur	*Zanthoxylum armatum*	Fever, stomach disorders
Chiraito	*Swertia chirayita*	Malarial fever, cough, headache, cold, throat problems, cuts and wounds
Kutki	*Neopicrorhiza scrophulariiflora*	Bile disorders, blood and lung fevers, high blood pressure, sore throat, cough, intestinal pain
Jatamansi	*Nardostachys grandiflora*	Conjunctivitis, gastritis, piles, diabetes
Nirmasi	*Aconitum bisma*	Anti-dote in food poisoning

Source: Non-timber forest products of Nepal Himalayas, WWF Nepal 2008.

fire from breaking out into neighbouring land and forest areas. In the areas where a number of people have *bhasme* land in adjoining areas, such as in Yasang, they often burn their fields at one time to prevent fire damage. This requires some planning, but the benefit is that the fire can be better managed and there is less danger of unplanned outbreaks. The decision to fire is made some days before the actual burning, based on weather conditions, wind direction and whether the slash is dry enough. This shows that people really know what they are doing and are extremely cautious. This caution has increased since the emergence of cardamom. Since its establishment, the KCA has made the rule that if a fire destroys a neighbouring area, the farmer has to pay the equivalent of the resources destroyed. There have been some cases already where farmers were called and given verbal warning.

Cropping

Maize is sown around the middle of March to mid May, and a number of other crops are intercropped with the maize on the same plot at the same time, such as radish, beans, soybeans, and amaranth (leafy vegetable). Dibbling is the preferred sowing method as ploughing is not possible on the steep and rocky soils. Dibbling involves poking holes in the ground with a long stick after which the seeds are thrown in *(Figure 4)*. Among soil conservationists it is recognised as an appropriate no tillage method that helps to prevent erosion. Weeding is done in the months of July and August, when the uprooted weeds are deposited at the bottom of the maize stumps. This mulch provides manure and nutrients to the maize and increases the yield. After the maize and other crops are harvested in October to December, some may plant barley and wheat later in the same year, which is harvested before the next year's planting season of maize. Potatoes used to be a common as part of this cycle, but in recent years potatoes have moved to the rainfed land.

The cropping phase is usually one year in these villages, after which the land is left fallow. If there is a second year of cropping, there may be a light burn of the crop residues from the first year. In recent years, farmers have started to grow *chiraito* [7] from the second to third year onwards for three to five years, rather than leaving the land to fallow. It is sown between mid May and mid July, taking at least three years till its first harvest. A disadvantage of the *chiraito* is that if it is sown before the last maize harvest, it may inhibit the maize weeding, as

Figure 3 : Burning of slashed materials during land clearing

the newly germinated *chiraito* seedlings are very susceptible while weeding. Poorer people generally prefer to grow food crops, while better off people prefer to grow *chiraito*. The latter have much more land, which they can give in share cropping for this purpose.

Local-level seed exchange is very important in shifting cultivation. This maintains the availability of quality seeds of locally appropriate crop varieties, as well as improving them. Exchange of seed is an important means by which seed is retained within communities, and information and experiences of the seed and other associated production technology are part of this exchange.

Fallow Management

The forest fallows are the main soil conservation measure in the study villages. The relative length of the fallow phase as compared to the cropping phase is taken as a measure of the sustainability of the system. Fallowing has both a productive as well as a protective function,

[7] See "*Chiraito* Cultivation" section

to improve the soil's structure and fertility, and control soil erosion, land degradation and the prevalence of invasive weed species. A fallow length of eight to ten years can usually be considered ecologically sustainable, although it depends on local agro-ecological conditions. In the study villages, the length of the fallow phase depends upon the family's land holding size and food security. Poorer households leave their land fallow for around eight years, whereas richer families have fallow forests of 12-15 years. The traditional average fallow length in the Kangchenjunga Conservation Area is much longer than in most other shifting cultivation areas in Nepal, and includes fallows of over 12 years *(Figure 5)*. The main reasons for the more recent shortening of the fallow phase are :

(a) The shrinkage in land size per family and land fragmentation, due to population growth;
(b) The intensification of the cropping pattern and lengthening of the cropping phase, and (c) the use of land for cardamom cultivation and permanent agriculture.

As discussed earlier, fallow land is not 'abandoned,' as is often thought. Fallows are a major source of fodder, forage, fuel-wood, timber, and bedding material for livestock. People use it to graze their livestock, and collect wild food items. Furthermore, land for cropping is not cleared at random, but managed in a pattern. The plots belonging to one family may be scattered across a vast area, but farmers do count the number of years a certain plot has been under fallow. They also use indicators in the vegetation to estimate its maturity.

Soil Management

Soil erosion and land degradation were reported to be a problem, especially in Langluwa and some parts of Yasang, but the farmers had not yet found adequate conservation measures. Studying the amount of soil loss was not possible within the scope of this study, so it is unclear whether it is within or beyond acceptable levels. Normally, the soil loss is very high right after slashing and burning, due to the thick forest soil being exposed to the rain and wind. However, a vegetation cover is re-established and maintained soon after, migrating this hazard. After the cropping phase, there is hardly any erosion for the duration of the fallow phase. In fact, in the villages studied,

Figure 4 : Sowing of maize by dibbling

only one landslide had occurred in recent times after the crop harvest, and the main reason was that the plot was situated too close to a stream. Some people thought that planting alders on degraded and marginal lands was effective for soil and water management, but others say the alders regenerate naturally and profusely, so there is no need for active planting.

Traditional local practices such as terracing, water channelling, fire management, and stone walling are still being practiced in the area, but they are not applied everywhere. Leaving trees on the crop field during the cropping phase is a common practice in other shifting cultivation areas across the eastern Himalayas, but only a very few households (less than 10%) in Lawajin were found using this technique.

Soil Fertility Management

Soil fertility is a major concern for the shifting cultivators of the KCA. The main source of soil nutrients are the fallows and the controlled burning *(Figure 6)* and natural decomposition of its leaf litter. None of the people in the study villages use farm yard manure or other fertilizers on their shifting cultivation plots. During the group discussion, they reported that their manure production is not sufficient for all of their fields, and when applied is easily washed away by the rain. The production and distribution of farm yard manure is very laboured intensive and not worthwhile. People do practice some other methods to conserve soil nutrients during the cropping phase. These include, leaving the weeds at the base of the maize stalk after uprooting; intercropping of legumes (mostly beans) in between the other crops; mulching, and plot rotation.

Farmers use their own indicators to determine the soil fertility status of their farm, the main one being crop growth and yield. Furthermore, they check the colour and texture. Fertile soils are black and loose. If the soil becomes dry and hard, it is an indicator of soil fertility loss.

Labour Management and Other Customary Institutions

There are mainly three types of labour management systems found in the study area. The first one is *parma* (exchange of labour) found in all study communities. The second one is wage labour (not common for agricultural work) and the third is one sharing of labour (working together in a group). This third system was not common in all the study villages. The labour management system depends on the crop. For example, in the case of sharecroppers, they normally manage the labour individually, but for the *chiraito* harvesting the land owner has to provide half of the required labour.

In shifting cultivation areas, customary institutions, or rules, play an important role in the management of natural resources. It was noted that the village institutions are still very strong, for example, for coordination between communities. There is also a system of social penalties for people who destroy someone else's land while setting fire. Such community rules are more effective than the ban on the use of fire that the KCAMC has set, which is not followed and hardly monitored.

Farmers' Local Innovations

Over the centuries, farmers have developed their own, location specific, holistic and harmonious knowledge and practices. There are number of innovations which are based on farmer's knowledge and practices. Table 2 shows some of these innovations:-

Figure 5 : Twelve year fallow field in Lawajin area of KCA

Land Tenure

The majority of the people in the study areas have registered as well as unregistered *bhasme* land, which is normally situated further away from the homestead. The average registered land holding size per family is around 2 ha, with a minimum of 0.5 and a maximum is 75 ha (in Lungthung), but this is a single exceptional case. Land holding size is highest among the Sherpa, followed by Limbu and Rai.

Farmers facing land shortage, can opt for *kut* (land renting), *adhiya* (sharecropping), or to work as farm labourers. There is a culture of supporting one another, so in special cases a farmer with less *bhasme* can borrow land informally from those who have more. *Kut* is a customary system for land renting which is practiced in almost all the study villages and applies to *bhasme* land only. The *kut* or rent is fixed regardless of the size of the harvest, and depends on what the land will be used for (maize is a subsistence crop, whereas *chiraito* is commercial), which is agreed as part of the transaction. The contract is usually made for three to five years, so the tenant can grow food crops in the first year and still have enough time to harvest the *chiraito* in the fifth year. Sometimes, people can also lend out their land without taking rent, especially to economically poor relatives and households. In such cases it is customary for the one who borrows the land to bring locally made rice wine for the landlord as a gift. In the case of sharecropping or *adhiya* the harvest is divided equally between the farmer and the landlord. The disadvantage of the *kut* system is the risk of harvest failure as the landlord gets his rent regardless. The *adhiya* system, however, can create a disincentive to seek high yields, since half of the produce always goes to the landlord.

In the past, all shifting cultivation and other land was managed under a common property system called *kipat*, which was regulated by the traditional village headman. The village headman would give some parcel of *bhasme* land to individuals who worked for them but with understanding that the arrangements be kept secret from government officials. This system gradually changed during the Rana period when land tenure became individualised. Nowadays the communities have allocated most of their land to individuals, using trees, stones etc to demarcate the boundaries. Many areas have not been officially registered by the government, yet people adhere to the customary boundaries without conflict.

This lack of registration is partly due to complications in the process. The land registration process is only possible for *bari* land as officials are reluctant to register land which during its long fallow period looks like forest. In fact, national forests and fallow land with a large amount of forest cover have been handed over to the communities under community forest programmes.

Figure 6 : Mixing the ash into the soil to conserve nutrients

Figure 7 : Threshing finger millet by using multiple stick threshers

Table 2 : Local innovations developed by farmers

Use of scarecrow for scaring birds, monkeys and other animals in the field	To avoid crop damage by animals, especially birds, farmers create scarecrows to frighten them away from the crop fields. A scarecrow is a body made of maize or millet straw and a head made from an earthen pot or similar rounded structure. It is generally placed on a bamboo pole in the middle of field. This is an age-old practice and a relatively effective strategy to frighten the birds, monkeys and other animals.
Traditional multiple stick thresher	People use a 'biting stick' (having one main stem with hanging three to four small sticks tied and hanging on the top) to separate grain such as millet seed from the plant. The technology is simple and uses only sticks and some rope. When the stick hits the floor the small sticks thresh the grain 3-5 times faster than a single stick used in other areas. See *Figure 7*.
Storing maize cobs before they are fully mature	Farmers in the area stored maize before they are mature. The immature cobs are boiled and hung in the kitchen to dry. Boiling is required to avoid the cobs drying out. This is a local innovations recently developed to avoid possible loss of maize to wildlife. See the *Figure 8*.
Storage of dry maize and millet stalks	Farmers in the area store dry maize and millet stalks as feed for livestock during the time when fodder and forage is scarce. Generally, stalks are tied around a tree trunk 8-10 feet above the ground, out of the livestock's reach until required.
Fencing of *malingo* mats to protect from wildlife	People fence their crop fields with *malingo* mats. This works well for keeping smaller animals out of the fields. See *Figure 9*.
Fire lines	Firelines are cut and dug around the cleared field before burning, to avoid possible outbreaks of fire in other areas.

Figure 8 : Prematurely harvested maize needs to be boiled and smoked to preserve it for future use

Figure 9 : *Malingo* bamboo mat fencing used to protect against wildlife

Land Registration Issue

Land tenure insecurity is the most important livelihood issue for shifting cultivators in the study area, negatively affecting the way they use the land and the investments they are willing to make. Most of the unregistered land was found in Yasang and Lawajin, where low income families face food shortage as a result, and where land poor households tend to be either Rai or Limbu. The general feeling is that the government might take their land anytime.

Many registration problems arose because of complications during the cadastral survey. Such as the case like of Birkha Sing Limbu (66) of Yasang. He has 40 ropani of unregistered land which his family has been using for generations. At the time of the cadastral survey the land happened to be under fallow forest. This made it difficult to convince the survey official that it was his land as they look for crop residues or other indicators of cultivation. People like Mr Limbu were further disappointed by the fact that those who paid bribes to the survey officials had no problems registering any land they claimed.

The cadastral survey has negatively impacted the sustainability of natural resources in shifting cultivation areas. *Bhasme* lands were registered as the lowest quality of *bari* land and prohibited from further expansion of cultivation. While this has effectively halted the expansion of shifting cultivation, the fallow period between crops for registered shifting cultivation lands has decreased from around 10 years before the survey to around two to four years (Brown 1994). Shifting cultivation can produce a decent yield if it is allowed to remain fallow for a sufficient period of time, but obviously if the cycle is truncated in this way yields invariably drop. As a result, people have started thinking of the short-term benefits only, and interest to invest in agricultural inputs has decreased.

The tenure situation considerably affects the type of land use system. In the past, all rain-fed land was under shifting cultivation (*Bhasme*). Later the moderately sloping land was terraced and came under annual production. The remainder was still used for shifting cultivation, although forest officials often stopped people from clearing *bhasme*. The land used for shifting cultivation can be both registered and unregistered; and even if not registered with the government among the community it is clear who the customary owner is. For around the past 15 years, certain patches have been converted to cardamom farming and others for 'permanent' *chiraito* farming without a fallow cycle, depending also on the land quality. For cardamom, farmers prefer to use registered land, but *chiraito* is cultivated on both registered as well as unregistered land.

People strongly feel that their land should be registered; if they use unregistered land the Kanchenjunga Conservation Area Management Council (KCAC) will take action against them. But not to cultivate means to go hungry. Some people are more defiant, saying that they will not leave their land until and unless KCAMC provides alternative sources of income.

Communities expressed the following points regarding registration of land : -

- *Bhasme* land is not registered, but people have full rights to use it.
- Proof of ownership exists but there are difficulties in registering land.
- Should bribes not be given to land officials, the land does not get registered.
- The registration process is very slow and hard for people to understand.
- During the cadastral survey, people found the process hard to understand and thus didn't to register their land.
- Lack of awareness is felt to be the main obstacle in registering land.

6. Other Land Use Systems and Change Patterns

The livelihoods of the shifting cultivators in the KCA primarily depend on an integration of forest, livestock and agricultural component and could not be sustained without them. Any changes in any one of the components may have a significant effect on the others. Forest recourses are important for food, fodder and shelter as well as medicines and income for all people in general and those living near to the forest in particular (Aryal 2007). Most local people in the KCA depend heavily on forest resources for their subsistence needs, for traditionally people have considered forest resources as a source of life and a symbol of creation (Manandhar 2002). Agriculture and forest biodiversity including wild relatives of crops maintained by indigenous communities are linked to the rich cultural diversity (Chaudhary 1999).

The shifting cultivation farming system described above is how it was practiced until recently in all the study villages. Land use change and the adoption of alternative livelihood strategies can be observed today. What is remarkable is that most farmers maintain their shifting cultivation, while adopting other options as secondary. Only the most well off farmers, with the best access to land resources, labour and markets will completely convert to other systems.

Key negative factors from within the communities are the pressure of increasing population, the increasing need for cash income to pay for school fees, health care, and to enter the local and national economy. There is also the increasing difficulty to access land and natural resources due to policy restraints and population growth, the establishment of the KCA, and the unstable political situation and conflict. In addition this labour-intensive and low-status form of agriculture is unattractive to the younger generation. From outside of the community there are factors which appear attractive, especially to youths, such as new market opportunities, especially for local niche products, and new livelihood opportunities in tourism and the attraction of high earnings overseas.

The establishment of the KCAP itself, with its focus on conservation, has had a clear impact on the availability of land and forest resources for farmers and has made changes in the rules. On the positive side there has been an emergence of new opportunities. For example, it was found that KCAP awareness programmes and some of its community development activities have had an influence as well.

People are increasingly integrating high value cash crops like cardamom and *chiraito* into their existing farming system, transforming it into a semi-commercial production system. What makes *chiraito* attractive is that it can be integrated within the shifting cultivation farming system, so the benefits of both can be maintained. Cardamom, on the other hand, is not suitable as a fallow crop because it requires moist soils and after its establishment farmers will not remove it again to grow food crops.

Aside from shifting cultivation and protected forest, five other land uses are prevalent in the study villages, namely, livestock grazing; rain-fed terrace system with annual crops; cardamom-based production system; *chiraito*-based production system, and community forestry.

Livestock Management System

Two livestock management systems can be distinguished in the study areas, both of which are as traditional as shifting cultivation, and which are strongly linked to the ethnicity of the communities. The Limbus and Rais in Yasang, Lawajin and Langluwa hold at least one or two cows, goats, sheep or pigs for subsistence purposes, and which form an integrated part of their farming system. The Sherpas of Sherpagaun village, however, have chauris (crossbreed of yak and cattle) in larger herds, and their dairy production (milk, *churpi* and *ghee*) are a major source of cash income.

Communities have a tradition of keeping their livestock in what are traditionally called *kharkas*, which are common grazing areas, with clearly defined boundaries. Livestock and crop production in shifting cultivation are strongly linked - fallows are important grazing areas and a major source of grass and fodder. At the same time, animal manure is brought back into the crop production system. Traditionally most pastures in Yamphudin VDCs were under a land tenure system called *Kipat*, a type of communal land ownership historically prevalent among the Limbus and Rais (Uprety 1994). In the past the people in the area developed this system of herding cattle during the crop grown season. There are a number of such grazing fields in the area, managed by a *Subba* (traditionally leader in Limbu villages). Each family who has number of cattle brings the cattle to the *kharka* and leaves them for entire season. There can be more than 100 cattle in one *kharka*. As a rule there is no fee for the use of summer *kharkas* if the herder is from the local community but if the user is from outside the community a fee is collected on either per head or per herd basis (Brown 1994). The residents of Sherpagaun of Yamphudin reported that they pay an average of NRs 55 to the land owner per head of cattle for right to graze in the summer months. However, people in Yamphudin VDC reported that they are doubly charged as they have to give the money to the KCAP Committee as well.

Nowadays, the grazing land in the area is much reduced, because the *kharkas* are no longer legally recognised, and are converted to community forestry or used for *chiraito* or cardamom production. Therefore, people generally send their cattle there during spring and early rainy season Feb-July. They will come once or twice a week to see their livestock, sometimes rotating who carries out this task. If cattle are producing milk this is collected more regularly.

Rain-fed Terrace System with Annual Crops

Wherever the land is suitable and if land registration is obtained, farmers are likely to make terraces and use the land for annual crop production. Such rain-fed terraces are used for two crops a year of maize, barley, finger millet, wheat or potato. All these are mostly for subsistence or bartering purposes, while cash crops and vegetables are grown in kitchen garden areas. These cash crops and vegetables are increasingly an important part of the food security. The most important preferred crops and their reason of preferences are presented in table below.

Table 3 : Crops most preferred by local people in the study area

Preferred crops	Reason for preference
Maize	Main staple food and used in making local alcohol
Wheat	Staple
Barley	Staple
Finger millet	Food crop and preferred for a local alcoholic brew
Buckwheat	Used for making bread and porridge
Potatoes	Vegetable. Staple food for Sherpa's especially in winter, and a possible cash crop
Beans	Vegetable for home consumption, used usually as dal
Soyabean	Food item
Radish	Vegetable
Amaranth (green leafy vegetable)	Bread is made from the seeds
Colocasia	Vegetable

Large Cardamom and Alder Agroforestry

Agroforestry with large cardamom *(Amomum subulatum) (Figure 10)* and alder is a traditional farming system developed by farmers in neighbouring Sikkim, India (Sharma et al 2000), which has gained increased popularity in eastern Nepal during the last 10-15 years. Farmers convert the best shifting cultivation land to cardamom-with-alder plantations, as it requires shade and moist soils. According to Sharma et al (2000), the main advantages of cardamom are that it can grow on relatively steep slopes and that it requires very little labour. After its first establishment, farmers only need to harvest the crop every year from the third year onwards. The most common shade provider is the alder *(Alnus nepalensis),* which is a nitrogen-fixing tree species. This system is now practiced in all the study villages, except Lawajin, and is common between the altitudes of 1,700-2,100m. It is a fast-growing economic enterprise for people in the study area, and more and more people are showing interest. The cultivation area of individual farmer ranges up to 0.26 square kilometres. Farmers reported that they will start to get returns three years after planting for about 20 years without much investment. According to them, this production is feeding them for three to four months a year.

Figure 10 : Cardamom field under alder trees

Farmer's know about the beneficial effects of alder, and prefer it to other crop species, particularly for cardamom cultivation, but also to enhance their fallows. They recognise the following characteristics :-

a. It grows very fast and germinates easily even in marginal land;
b. It regenerates naturally in the areas with soil erosion and landslides;
c. Its open crown and medium height provide a good medium shade throughout the year;
d. The leaf decomposes easily and can be used for compost manure;
e. It fixes nitrogen in the soil and as a forest prevents soil erosion;
f. It has other economic importance as supplier of timber and fuel wood, and is easy to split, and
g. It is a local indigenous and well established species, so cardamom can just be planted underneath existing trees.

The people in the study areas mentioned that they have had to learn to grow cardamom as there was no traditional knowledge regarding this crop. Local farmers who went to work as labourers in Sikkim were the main source of knowledge of this practice, and farmers were eager to learn because it is a locally suitable crop with high economic potential. In fact, it is a niche product from the economic point of view, because it only grows in the Eastern Himalayas.

Cardamom sets are separated from the rhizomes after harvest and planted. Farmer in the study area reported that they usually prefer vegetative propagation method than seed sowing because the seed sowing method is too complicated and needs a lot of time and care. The planting time for cardamom is from April to October, but it is generally planted before the rainy season, the best time being from April - June. According to farmers, the alder trees should be at least 2-3 years old before cardamom is planted otherwise there will not be enough shade required for its growth and development.

Weeding is only required in the first few years, until the crop cover is closed and weeds are naturally suppressed. Normally, the first weeding is done in September - October after the harvest of cardamom. The second time is in January - February during the flowering season, and the third during March and April. The fourth weeding is done before harvesting. Cardamom needs lots of water to maintain the growth and production, so some watering is done during the dry seasons. Observation in the field showed that some farmers have used water sprinklers for the purpose.

Farmers have recently experienced two types of disease in cardamom plantations. Many of their crops suffer from chirke and furke (local terminologies). Chirke produces brownish spots on the leaf and latter make the whole leaf brown and dry. In the furke disease, the leaf becomes smaller and it will stop the plant bearing fruit. As yet, no remedies have been found for these diseases. There is a problem with wildlife damaging their crops. Monkeys and a bird called kala are the ones that most heavily damage the crops. Monkeys normally feed on the fleshy and juicy part of the stem (at an early stage), while the kala eats the cardamom fruit.

The harvest takes place in May - June, right after the fruit is ready and a special knife is used for the purpose. Farmers in Langluwa reported that last year they harvested less than 25% of their cardamom production due to attacks from birds. Cardamom is not frost hardy, so it cannot be grown in Lawajin and many other shifting cultivation areas in the KCA.

Curing is a local processing method that involves smoking, to make it easier to separate the fruit. After the fruit is separated, it is washed and cleaned it is dried in the sun for 10 days or put in to the smoking chamber. People use a little bit water and gently massage the dried fruit to make the fruit shine before selling to the trader. *(Figure 11)* Normally, the dried fruit is sold to the local traders in the village. Sometimes, people from district headquarters will come to buy in bulk and traded in the other areas. The price of the product varies; normally people sell it by the mon (40 kg), which would raise around Nrs 8,000-9,400. The cardamom

Figure 11: Local method of curing and shining cardamom

is sold to local traders and then to middleman at Phungling Bazaar. India is the biggest market for cardamom, from where it is exported mainly to the Arab countries.

Drawbacks of Cardamom Farming

There are some disadvantages and constraints of cardamom cultivation that need to be mentioned. Although cardamom cultivation has contributed significantly to the cash income of the local people, and therefore contributed in their livelihood condition, there are some environmental and marketing problems. First of all, it is a monoculture system which expands at the cost of natural forests including community and government forests. This is a concern for the conservation and management of biological diversity in the area. On the other hand, land degradation is prevented and controlled in the cardamom growing areas. The emergence of cardamom plantations has implications for the shifting cultivation practice, as many shifting cultivation plots are surrounded by cardamom plots. The main problems faced by the farmers are related to the market, and that they lack technical know-how and support from the District Agriculture Office. Price fluctuations and the relatively large benefit that goes to the middlemen greatly discourage farmers.

Chiraito Cultivation

Chiraito (Swertia chirayita) is economically one of the most important medicinal plants Nepal and, in this study area, one of the most collected non-timber forest products (NTFP).

Chiraito grows best on recently burned sloping land which has enough rainfall and moderate sunlight. It is said to be best in black sandy loam soil. Silty soil is also regarded as best for its growth, and farmers say it prefers north-facing slopes. In the KCA it can be grown as part of the shifting cultivation cycle, but land owners with large holdings prefer to grow *chiraito* under a non-shifting cultivation scheme as the high market price makes it attractive. They clear the land through slash-and-burn and grow *chiraito*, after which there is another cycle of slashing and burning. There is no rotation of plots and no fallow phase. Wild *chiraito* is collected from the forest, sometimes damaging the plant through harvesting before the seeds are ripe or by uprooting the whole plant to sell it to the local traders. Recently, *chiraito* cultivation is also being promoted as an income generation activity for community forest user groups.

Figure 12 : *Chiraito* cultivation in fallow field

KCAP has provided training to the local people about the commercial cultivation of *chiraito* on their farm land using nurseries and without burning the field. Farmer's representatives from all the study villages participated in the training, but they reported that no one has adopted these methods. A few people have started to grow *chiraito* on their terrace risers, which suggests that is for private use rather than for economic purposes. The farmers say that the modern technologies require high investment and time, especially raising seedlings in a nursery bed. They perceive this as an unnecessary investment, since *chiraito* also grows naturally in their shifting cultivation fallows.

Cultivation Methods

Land clearing and burning takes place mid March – May, which is the same as in the normal shifting cultivation cycle. Those who grow *chiraito* as part of the cycle will sow maize when the first rains come, and sown the *chiraito* between the rows of maize later. Others sow *chiraito* as a mono crop *(Figure 12)*

People have started to collect the *chiraito* seeds from their own fields instead as from the forests as previously. Seed sowing has been quite difficult as it has very small seeds, so the seed is usually broadcasted rather than grown in a nursery. It takes around 130 days for the seedlings to be ready for planting. According to farmers, there is no need to water the *chiraito* since the land contains enough water to sustain the plant.

Farmers reported that the *chiraito* is ready to harvest in three years, in November or December. The collected part is taken home and sun dried. After it is dried it is tie with a rope and taken to market.

In case the land for *chiraito* farming is share-cropped, the common tendency in the study villages is that the landowner also has to provide half of the labour cost, either in man hours or cash, to the sharecropper during the collection and harvesting time. This system is only applied for *chiraito* farming due to its high cash value and general distrust among landlords and sharecroppers.

Monitoring and Inspection by KCAP

There are rules in place by the KCAMC to prevent harvesting of wild *chiraito*, and to avoid harmful harvesting practices. Farmers are obliged to invite KCA officials to monitor their *chiraito* fields to certify they are growing it themselves rather than collecting from the wild. As a land registration certificate is required to be produced, it is felt an impractical system and no one informs KCAMC before harvesting.

Figure 13 : Bundling *chiraito* for transportation to market

After the management system was handed over to the community people, the local committee in each VDC became responsible for the monitoring. This seems to be more practical and people do complete the required process which involves the VDC office informing KCAMC that the marketing is legal. Farmers have to pay NRs 2.50 per kg of *chiraito* to the KCAMC which is deposited in the community committee fund. If *chiraito* is collected from a national forest, the collector is required to pay NRs 15 per kg as a tax which will be deposited in the national tax revenue office and half of the price collected later comes back to the community fund. However, neither of these two systems of collecting funds is very practical in the case of the Kangchenjunga Conservation Area.

Marketing of *Chiraito*

Locally, there are four systems for marketing *chiraito*. Some of the collectors sell their product themselves in the local market, while other local traders buy the *chiraito* and trade it to the wholesale market. *Chiraito* can also be sold to business men by individual farmers or local middle men. This is then sold wholesale at Birtamod. Finally, there are wholesalers who collect *chiraito* in bulk and trade in the big markets within Nepal as well as exporting to India. In some cases, such as in Yasang Village, farmers sell their *chiraito* to local business men from whom they have already taken an advance payment.

Despite its high value the marketing system for *chiraito* is not well established, relying on a few business men with the necessary financial resources. Prices heavily fluctuate with local people often feeling they are not getting a fair price.

Benefits and Drawbacks of *Chiraito* Farming

Chiraito cultivation is seen as an important income generating source in the study area. Farmers perceived that the crop is important for fallow management – harvest can take place twice during a five year period of fallow.

Traditionally used for medicinal purposes, *chiraito* was already an important species locally. With growing demand from elsewhere, farmers have been encouraged to cultivate it on private *Bhasme* land as well as to collect it from the forest.

On the negative side, people reported that grazing livestock often damage the *chiraito* seedlings in their early stages. Lack of knowledge on production technologies and raising seedlings is a problem with local farmers reporting the cultivation of *chiraito* being quite technical. Illegal harvesting, unsustainable harvesting and theft of privately grown seedlings is a growing problem due to the high value of the plant. In addition, the aforementioned fluctuating prices and lack of organized market systems is another disadvantage.

Figure 14 : Community forest in KCA

Community Forestry and NTFP Cultivation

Community Forest User Groups (CFUGs) are relatively new institutions, with strict rules and regulations. They are formally recognised by the government to allow communities secured access to forest resources, partly based on their customary use rights *(Figure 14)*. Before the establishment of these CFUGs by the KCA authorities, communities used to have free access to the forests surrounding their villages for the purpose of collecting forest products and hunting. These days, they have to inform the users group and pay certain fees to use resources such as timber etc.

Farmers in all the study areas are members of forest users groups. These groups are supported by the KCAMC and the WWF Nepal Programme through various income generation opportunities. Use of forest resources and management of these resources by the users group is an important source of food, income, medicines, building materials and fuel wood. Farmers have been collecting high value NTFPs from the community forests, fallows, and national forests, but the technical as well as managerial aspects of harvesting and marketing is still a prime concern.

To achieve sustainable use of non-timber forest products, there are still many questions left to answer. What is the value added chain for NTFPs? Are resources being managed so they will be available for future generations? How do local farmers obtain and process enterprise management and marketing information? Or, more importantly to local economic developers, what market information is needed and how can it be best provided to local producers? What new value added and product market opportunities exist? Should market access and processing increase, what issues arise from this increase? It is obvious that these products though they are significant to the contribution of the national income have been overlooked by KCAMC and other government programmes and policies.

Regarding *chiraito*, *lokta* and other high value species, very little is known about the extent of harvesting or the long-term effects of extraction. Ghimire and Nepal (2007) report that people used to collect *malingo* from the community forests, but by harvesting and transporting it in an unorganised manner; they destroyed the habitat of other important species such as *lokta*. Much less is known about the multitude of products found in the forests but not widely marketed. Information is needed that draws attention to critical issues relating to conservation and management of such high value crops. High demand for such species may have serious long-term effects on conservation and management and will slow efforts to ensure sustainable management of KCA. On the positive side, the collection and processing of such products at the local level can help under-employed and displaced workers.

7. Stakeholders and Perspectives

Institutions Working in the Area

There are few organisations working in the study villages, and some activities are organised on an event basis. The Department of National Parks and Wildlife Conservation (DNPWC), with the financial support from WWF is working in the study area through the Kangchenjunga Conservation Area Programme (KCAP). In addition, people have their own local institution, namely the Kanchenjunga Conservation Area Management Council. Also active in the area are the Himali Conservation Forum, Kadoorie Agricultural Aid Association (KAAA), the respective VDC offices and a number of Community Forest User Groups. Some people mentioned that because of the KCAP other national and international organisations are not present in area as the process to get permits is very complicated. An overview of the activities of the organisations that are present is given in Table 4.

Table 4 : Local organisations and their working areas

Organisations	Working areas
Kanchenjunga Conservation Area Programme (KCAP)	• Major objective - conservation and management of biological diversity (floral and fauna) in the area; • Women's empowerment; • Conservation education (eco-club, conservation awareness); • Income generation (eco-tourism, NTFP enterprises); • Health and sanitation; • Forestry and alternative energy, and • Physical infrastructure.
Himali Conservation Forum	• Conservation awareness programme; • Social mobilization and community empowerment; • Tourism training; • Vegetable production training such as plastic coverings for vegetables at high altitude; • Women's empowerment training; • Awareness programme ie street drama; • Coordination and networking with different stakeholders; • Group formation, and • Green energy.
Village Development Committee (VDC)	• Support for local road maintenance; • Drinking water programme, and • Monastery construction and other social activities.
Kadoorie Agricultural Aid Association (KAAA)	• Suspension bridge construction, and • Solar light distribution.
Community Forest Users Group (CFUG)	• Conservation and management of community forest, and • Managing of resources.
WWF	• Financial and technical support to KCAP.

Stakeholders' Perspectives on Shifting Cultivation in the KCA

It is unclear to what extent the area under shifting cultivation has been reduced in recent times and for what reasons. KCAP officials believe it reduced significantly after the establishment of the conservation office in the area and the implementation of certain restrictions and awareness programmes. However, local people say that it has only declined slightly in the nearby areas, but beyond that there is no change.

Mr. Gyajo Bhutia, Lelep VDC Chairman reported that there is certainly a decrease in the clearing of land under the shifting cultivation system (*bhasme*), which he attributes to the out-migration of people during the Maoist insurgency period and the resulting labour shortage. Around 40 households have migrated from Lelep VDC alone.

Local Communities

Local people are well aware of the positive as well as negative impacts of *Bhasme* in biodiversity conservation, and this is part of their management decisions. Positive aspects are that it provides production benefits; a favourable environment for *chiraito* cultivation; fertility management; relatively easy and suitable land preparation, and fodder and forage. Some negative aspects of *bhasme* they mentioned are soil erosion and degradation, forest degradation, and loss of species diversity. These problems are exacerbated when the fallow phase is reduced. Although reducing, the fallow phase in these areas is still 8-15 years, so farmers say that the impact on biodiversity is still relatively low.

Possible threats to the biodiversity in shifting cultivation fallows are :-

- Over extraction;
- Over grazing;
- Monoculture cash crop plantations;
- Shortening of fallow periods, and
- Privatization of community and national lands.

The people in the study villages highly value nature and its diversity, as livelihood resources as well as an important part of their general well-being. Having multiple species of crops gives them flexibility and enables them to handle changing local conditions, making their lives easier. Farmers are therefore very positive towards the goals and objectives of the KCAMC. They perceive that species richness in the area is currently increasing due to the positive role KCAMC is playing. Locals are skilled at conserving and managing their local biodiversity and are aware of the benefits of having a wide variety of species and are thus willing to conserve them for future generations. Priority is given to species with a high socio-cultural and economic value, such as *malingo (Arundinaria malinga)* and chilaune *(Schima wallichii)* and to those which can be used for food; fibre; medicine; fuel wood and fodder; basic household utilities; house and animal shed construction; income generation; religion and culture, and for pest management and soil conservation in agriculture.

Government and Organisations

Representatives from various government and other important organisations were asked to give their opinion on *Bhasme* in the Kangchenjunga Conservation Area (KCA). The district level forest officials said that many people blame economically poor shifting cultivators for destroying the forest due to the method of slashing and burning. However, in the study area it is the rich and elite (from within and outside the village) who have more *bhasme* land. Officials and farmers agree that these economically well-off people are the main promoters of slash and burn farming, because of the potential for commercial *chiraito* farming.

According to the Regional Forest Directorate (RFD), Biratnagar, *bhasme* is an illegal and destructive practice so it should be discouraged. Again, the major reason is that it involves clearing and burning forest areas which leads to an increase in soil loss and overall loss in species levels. They feel this is not a sustainable practice, and a representative of Regional Agriculture Directorate (RAD) mentioned that they are not very knowledgeable about *Bhasme*, other than knowing it is a tradition carried out in the eastern hilly areas.

In Lelep, the WWF representative said that although *bhasme* is a traditional practice in the area people burn and clear the area haphazardly, which adversely affects biodiversity. It was felt it would be useful to carry out an in-depth study of shifting cultivation systems and dependent communities to look for options and opportunities to improve the system.

The official from the DNPWC field office expressed 'We know that it is the traditional farming system in this area, and the people heavily depend on it for their livelihood. However, communities have not asked for any support to managing this system, so it is not our priority. At the same time, it causes soil erosion, land degradation and loss of biodiversity, so we have started an awareness programme about this and to promote alternatives."

The KCAMC is looking towards the control of *bhasme*. They have already initiated an awareness programme, using street drama, on biodiversity conservation and the negative impact of slash and burn farming. They believe that the farmers will stop the practice if KCAP provides them with alternative livelihood options.

According to the Himali Conservation Forum, Lelep, farmers have been practicing shifting cultivation as a part of their livelihood strategy knowingly and unknowingly, especially before the establishment of KCAP. In their opinion rather than banning the system, it is better to explore better options. Himali have recently started raising awareness on some of the negative aspects of *bhasme*, but feel they should also explore good practices of the system and thus build a programme based on local knowledge and practices.

At the Lelep Village Development Council (VDC) meeting, people said that *bhasme* is a traditional, generations old practice for a number of farmers in the area. Most of the land under *bhasme* is registered; other *bhasme* land is use under traditional rights. In their opinion, it might have negative impacts on biodiversity, but it contributes to people's livelihood. However, with the long fallow phase the VDC feel there is not much loss to biodiversity in the long run. They also felt KCAP should launch people-focused, integrated income generation activities which might go some way to change people's attitudes towards the highly labour intensive shifting cultivation.

The farmers' own views are that *bhasme* has been their traditional agricultural system for generations. 'It is attached with our culture and traditions, and we have full rights to practice our traditional system. Those people who blamed us for destroying forests and biodiversity should come and see our fallow fields, and how we are managing our resources! We strongly suggest KCAP and other government officials to try and look for options and opportunities to conserve biodiversity and also improve our livelihoods in a sustainable way.'

Shifting Cultivators' Perception on Conservation Programme

The people agree that the KCA has benefitted the area and its people in many ways. However, the communities feel that the emphasis is on the conservation of birds, wildlife and other biodiversity, and their livelihoods are given less priority. More attention on this would be fair, considering that in 1997 under the KCA rules they have lost control over and access to their forests, pastures, land and water.

With the implementation of the conservation programme, wildlife damage to crops has become an increasingly important issue. Farmers in the all the study villages show their dissatisfaction and anger regarding crop loss to wildlife, including monkeys, *gorals*[8] *(Naemorhedus goral)*, deer, bears, porcupines and birds, especially the kitkite (a local yellow small bird). Maize is eaten by *gorals*, bears, monkeys and a bird called kokale. In the tussling stage, ghorals pull out the tassel, thereby diminishing the seed formation. Bears, monkeys and kokale birds eat the unripe maize cobs; a group of monkeys can finish the entire crop in one visit. The people in Langluwa reported that cardamom needs to be protected from a rodent-type animal called kala, which attacks in the night, and from monkeys that attack the young stem. (Khatiwada 2008)

[8] Mountain goats

KCAP's initiatives to reduce loss from wildlife damage include the community-based livestock insurance scheme, and support for stone walling and scarecrows. In the Community-Based Livestock Insurance Scheme (CBLIS), farmers have to register their livestock and pay a premium per livestock to the Snow Leopard Conservation Committee (SLCC). In case that livestock is depredated, the SLCC will investigate and compensate the farmer up to NRs 2,500 per head. The Conservation Area User Committee in Yamphudin is constructing a three kilometre long stone wall as a means to reduce wildlife intrusion in crop fields, especially barking deer. People say it will reduce the crop damage, but doubt that it will halt the largest mammals.

Farmers' perception on the role of KCA on this issue is mixed. They feel KCA could do more to support them in case of crop failure, and officials should refrain from blaming and punishing them for damage to wildlife that they did not cause. If wildlife and birds die in the area, the officials suspect the villagers and the KCAMC may threaten, harass or detain them. In the farmers' perception none of the above mentioned approaches are sustainable except for the CBLIS for livestock, yet despite the lengthy verification process not all losses are compensated. Farmers would like to have some compensation system for crop loss too. Farmers in Lawajin reported a number of cases where wildlife heavily damaged the nearly harvested crop, severely affecting food security. Several reports and requests were filed in KCAP office, but there is no concrete solution as yet.

8. Current Policy Environment and Debate

In Nepal there is no specific policy to deal with shifting cultivation, but the practice is affected by a diverse range of policies in the areas of conservation, forest and agriculture, and rural development. While there are examples of favourable policies, in general the thrust is against the practice either in the policies themselves, in the legislation or in their implementation. The policies that affect shifting cultivation were documented by Regmi et al (2005). The farmers in the KCA are most affected by the policies regarding land tenure, conservation area and community forestry. Recently, (August 2007), Nepal ratified the ILO Convention No. 169 on Indigenous and Tribal Peoples, which will recognize the customary rights ethnic caste people. The main policies and instruments are described below.

Land Rights and Tenure

Land tenure laws constitute a major constraint upon environmentally sound agricultural/ land management practices in Nepal. The initial land survey and mapping process did not allow the registration of shifting cultivation land. The Land Act and Land Management Act have made the provisions for land registration for permanent farming, but complexities in the bureaucratic process make it difficult for farmers to do so (Bajracharya et al. 1993). Presently there are no provisions to accommodate traditional land rights, including the option to hold agricultural land under common property. The government identifies all non-registered land as government forest. This includes large tracts of land that has been occupied by indigenous people for generations, but for which they have no registration certificate. Land and resource tenure regimes have changed a number of times in the history of Nepal, which have affected the management of the shifting cultivation farming system, and led to some of the issues that have arisen today. This is described in Aryal and Kerkhoff (2008).

The status of the *kipat* (customary land tenure system) rights is still debated in this region, because although the tenure regime has changed, indigenous people feel their rights and access to their traditional land should be protected. The term *kipat* refers both to the way the common property was customarily arranged and to the type of land right given by the King and implemented from the second half of the 19th century until 1990. Plots of land were fixed by boundaries that are still adhered today. These boundaries are based on the rotation of fields and fallows and based on long term experience with land quality and characteristics.

Protected Area Network

The National Parks and Wildlife Conservation (NPWC) Act 1973, is the key instrument in protecting biodiversity within the protected areas in Nepal, which is administered by the Department of National Parks and Wildlife Conservation. It recognizes six categories of protected area, including national parks, wildlife reserves, conservation areas, and buffer zones. Section 3 of the NPWC Act prohibits hunting any animal or bird, building any house, hut or other structure, clearing or cultivating any part of the land, harvesting, cutting, burning or damaging any tree, bush or other forest product, and mining within national parks or protected areas (HMGN/MFSC 2002). The Himalayan National Parks Regulations, 1979 (HNPR) provides for people living within national parks to collect natural resources for their daily requirements, and allows people to graze their domestic animals on park rangelands. No provision has been made for handing over parcels of park land to communities, however, communities "can organise harvests and grazing plans so long as they are consistent with the parks' objectives." (HMGN/MFSC 2002: 67)

Community Forestry

The policy for government forests in the hills is that they have to be handed over to the communities as a community forest. Even inside the KCA this policy is applicable, and community forests have been formed. This community-based forest management policy was first manifested in the Master Plan for the Forestry Sector 1988, and legally backed by the Forest Act 2049 (1993) and Forest Regulation 2051 (1995) (Regmi et al 2005). As a result of this policy, across Nepal much of the unregistered shifting cultivation land has now come under the community forestry programme, but inside the KCA there are only very few such cases. Even if a farmer who has lost his land becomes a member of the Forest User Group, the benefit he gains from the land and forest are greatly reduced. For example, because community forestry is practiced under strict rules there is a ban on annual crops, the use of fire, hunting and extraction of stone and sand.

ILO Convention No. 169

ILO Convention No 169 has several relevant articles, the most important of which are Articles 6.1 and 14.1. Article 6.1 gives indigenous people's right to be consulted, and to express their views. It offers them the opportunity to participate in all the processes of conservation and management as well as to be actively involved in the decision making process and to influence the outcome. It provides the space for indigenous peoples to negotiate to protect their rights. The article clearly mentions that government shall consult the peoples concerned, through appropriate procedures and in particular through their representatives. However, in the case of the KCA, people mentioned that they are rarely consulted. Article 14.1 states that the rights of ownership and possession of the lands which they traditionally occupy shall be recognised. In addition, measures shall be taken in appropriate cases to safeguard the right of the peoples concerned to use lands not exclusively occupied by them, but to which they have traditionally had access for their subsistence and traditional activities. Particular attention shall be paid to the situation of shifting cultivators in this respect (ILO 2003).

9. Discussion

Does Shifting Cultivation Need Attention in KCA?

In the literature so far published on the Kangchenjunga Conservation Area (KCA) and its inhabitants, the existence of shifting cultivation as a land use practice is barely recognised. In the current KCA Management Plan (2063-64 to 2067-68[9]), there is no mention of any specific activities for shifting cultivators. Moreover, it is difficult to distinguish shifting cultivation plots from rain-fed permanent plots and fallow forests from the protected forests on remotely sensed maps. Even the tenure status (whether the land is registered as private or government land) does not tell the true story, because many of the traditional shifting cultivation lands have not been registered,

Figure 15 : Terracing may not be suitable on these extremely steep slopes

but are still in use. Schubiger (2007)'s GIS analysis distinguishes dense forest, open forest and shrubs, grass and meadow land, and cultivated land among other categories. However, all these categories could include shifting cultivation land or not.

[9] Nepali calendar

From the above it is clear that shifting cultivation is prevalent in the KCA, and will continue to be practiced in the foreseeable future. Despite the various alternative livelihood options available, they are not applicable everywhere or appropriate for all farmers, because of biophysical as well as socio-economic constraints (Figure 15). There is a considerable number of households who are still dependent on shifting cultivation to a large extent for their food security and livelihood needs. To those who practice it, shifting cultivation obviously makes sense and is the best option for them in their current situation. Experience across several countries in the eastern Himalayas shows that forcing farmers to stop or 'weaning them away' towards other livelihood options is often counterproductive, resulting in more resource degradation and poverty (see Kerkhoff and Sharma 2006).

Those farmers who do depend most heavily on shifting cultivation for their livelihood belong to the poorest inhabitants of the KCA. On top of that, it is likely that they have benefited least from the many development efforts that have taken place in the area. As shifting cultivators they have been largely misunderstood, their practices have been discouraged while appropriate alternatives were not always available, and most of their villages are not along the trekking routes. Based on the poverty incidence of the Small Area Estimation of the World Bank/CBS in 2006, higher poverty incidence was found in Taplejung District (58.1 percent) of KCA, within the Sacred Himalayan Landscape.

Based on the findings of this research, it is clear that in the case of the KCA, there is no need to point the finger at shifting cultivation for causing deforestation and environmental degradation. Most farmers who have been practicing shifting cultivation for generations say they are still using the same lands they always have. The fact that some of that land is unregistered is because the government has never acknowledged their traditional land rights. As Schubiger (2007:121) points out, "only moderate losses in forested areas are reported resulting from the application of slash and burn techniques." Furthermore, as he cannot distinguish shifting cultivation from

other forms of agriculture, it remains unclear whether the loss of forest is caused by the shifting cultivators or by the general expansion of the area under agriculture, which is much more likely.

There are many opportunities to actually work with these farmers in a constructive and positive way, once the unfounded bias against shifting cultivation is abandoned. The assessment of the specific shifting cultivation practices in the KCA shows :-

(1) that there are several existing good practices and recent innovations to build on for further development, and

(2) that in those areas where the practice is causing degradation there is room for improvement in productivity, market orientation, soil and water conservation and biodiversity conservation. This is further elaborated under the section, "Can shifting cultivation be improved and how?"

Lastly, while the general tendency of policies in Nepal is against shifting cultivation, within the policies, rules and regulations there are opportunities for those authorities operating at decentralised levels to make decisions based on their own best judgement. For the KCA authorities, such an opportunity is given in the HNPR 1979, for example, it states that communities "can organise harvests and grazing plans so long as they are consistent with the parks' objectives." Furthermore, policies on different topics from different departments often contradict each other, although they apply to the same people. Those policies focused on poverty eradication and economic growth will almost certainly be at odds with each other and again, the best judgement is left to the local authorities.

A recent study by Aryal and Kerkhoff (2008) shows that two important ILO Conventions, namely No. 111 on Employment and Occupation, and No. 169 on Indigenous and Tribal Peoples (both ratified by Nepal) are an important tool to protect the rights of indigenous peoples to maintain their traditional occupations, including shifting cultivation. However, the reality for the people concerned is still very far from what has been stipulated in these conventions. The WWF KCAP Programme is a key player in the discussion on the access and control of communities over biodiversity resources, and they could use this tool to help find a balance between communities' rights and the need for conservation.

Can Shifting Cultivation be Combined with Conservation Objectives?

The main concern for WWF regarding whether to work with shifting cultivators or not is whether the practice can be combined with conservation objectives. So what is the benefit of maintaining shifting cultivation as a land use? In fact, based on the findings of this study as well as past research, there are several arguments to show that maintaining and improving shifting cultivation has considerable benefits to offer for its practitioners, but also certainly for a programme that promotes nature conservation through community development.

Shifting cultivation is a distinct type of land use that is very different from rain-fed terrace cultivation, community forestry and other land uses, and accordingly it has its specific benefits and constraints. One of the benefits is that several of plant and animal species that occur in the shifting cultivation landscape are not common elsewhere, including agricultural and wild biodiversity. A case in point is *chiraito*, which was already commonly found on the young fallows way before it was domesticated and cultivated. In general, shifting cultivation landscapes with their rotating crop fields and fallows are patchy and dynamic, and as such much more diverse than permanent primary or the secondary forests that are a common alternative. Primary forests are not the only alternative to shifting cultivation. Often when shifting cultivation is discouraged, what comes instead is permanent agriculture, such as rain-fed terraces, or forest plantations (like in the community forests and the cardamom plantations). In these systems the total number of crop and wild biodiversity species is much less than even the average shifting cultivation crop field, let alone the fallows.

Whether shifting cultivation is beneficial or not to conservation depends on the specific conservation objective (Kerkhoff and Erni 2005). If the main species in focus is strongly affected by disturbance, ie the red panda (Ailurus fulgens), undisturbed forest is the only option. However, there are many, especially migratory, species that prefer diverse open landscapes. Unfortunately, the status of biological diversity found in *bhasme*, their abundance and their relationship with other species have not yet been studied systematically.

Communities in the KCA collect a number of uncultivated food items from the fallow fields and forests, however, they are yet to be explored. No systematic effort has yet been made concerning conservation and promotion of uncultivated food crops (Kerkhoff and Sharma 2006). To accurately estimate the amount of food obtained from uncultivated species is difficult because information is scarce, inadequate and concentrated to a few species. The number of plant and animal species and their importance in food security and environmental conservation and management is neglected in the research and development programmes. The governmental programmes on research and development of agriculture and forest sectors concentrate on a few cultivated crops. Farmers have extensive knowledge about the use and conservation of these valuable indigenous species, however, without systematically recording and developing databases, this knowledge will be lost for future generations (Herzog et al 1996). Traditional knowledge on conservation and the utilization of natural resources without destroying the environments is important data indeed.

There are several examples where people have brought wild species into their home garden for cultivation. For some of the root crop such as taro (Colocasia spp.) and yams (Dioscorea spp.), material from the wild is continuously brought under cultivation in home gardens to renew the vigour of the germplasm when planting in larger fields. Therefore, there is a need to conserve the uncultivated resources, not only for its intrinsic value, but also because of the importance that these resources have on a day to day basis for the survival of rural people. Furthermore, they are important in the maintenance and development of domesticated crop varieties as well as in the maintenance of the biological diversity in the area (Watson & Hinchcliffe 1996).

An approach to conservation through utilization would be the best options for KCA - and farmers are looking forward in that direction. Hence maximum efforts should be made to document and integrate local knowledge on conservation and utilization of biodiversity by establishing close linkage with the local people. The KCAMC should understand the needs of the stakeholders; those involved in managing and marketing of NTFPs and try to facilitate to solve the problem. *Chiraito* and cardamom are two highly demanded and traded marketable products from the KCA, so potential market outlets need to be explored and sustainable harvest and marketing with should be properly facilitated, ensuring benefits are retained locally and farmers get a premium price.

How can Shifting Cultivation in the KCA be Improved?

There are several issues that the Kangchenjunga Conservation Area can take up to address the specific interests of the shifting cultivators and thereby promote conservation as well. Firstly, farmers lack technical support to improve their farming and resource management, which would be more effective than the current activities to discourage *bhasme*. Second is the land ownership issue, which has a direct implication on the sustainability of the land use, long-term tenure security would motivate them to invest in improvements. Part of this issue is the recognition of the *kipat* system of customary common property tenure. And thirdly, there is the human-wildlife conflict. Crop damage and livestock depredation by wildlife is gradually increasing, and may cause tensions between the KCA management and local people to escalate. Although there are initiatives all across the KCA, they are still inadequate, and local people would like to be more strongly involved in the decision-making on this topic.
Farmers in the study sites would benefit from practical knowledge on soil and water

conservation and other technologies to enhance production and sustainable management of resources. Such training should build on the useful and rich indigenous knowledge and customs, and could bring in experiences from shifting cultivators in other places and countries. For example, traditionally farmers in some areas make contour bunds from logs and rocks to prevent soil erosion. Furthermore, they have long fallow of up to 15 years to enhance the re-growth of fallow vegetation for soil and fertility management. Other potentially useful measures from other shifting cultivation areas are contour hedgerows, laying tree stems along contours, using leguminous cover crops, and terracing of moderate slopes. The emergence of commercial non-timber forest products (NTFPs) could be further encouraged, including area-specific medicinal and aromatic plants (MAPs), large cardamom and *chiraito*. Agricultural development could further be encouraged through economic incentives such as credit, subsidies, market infrastructure and support, which are currently unavailable. A good example of this is the community-based livestock insurance scheme (CBLIS) which needs to be scaled-up to cover other affected areas.

Participatory action research, together with local people, could be one of the important strategies to find out what works and what does not. Participatory technology development (PTD) is one of the best approaches for this. The approach is based on the notion that farmers, including shifting cultivators, constantly modify and improve their farm in a process of trial-and-error and that researchers can support this experimentation with scientific knowledge. It is a process-led approach of joint experimentation and research by farmers and development agents in identifying the ways of improving farmers' livelihoods. Vital is that researchers respect and show a keen interest in farmers' knowledge and concerns. The documentation of farmers' traditional knowledge not only ensures incorporation of farmers' knowledge and perspectives in the technology development process, but also enhances farmers' empowerment and participation in the process (Aryal et.al 2007).

The positive attitude of the shifting cultivators towards conservation should be encouraged and stimulated, and the representation and active involvement of shifting cultivators in decision-making bodies like the KCAMC, would enable them to voice their specific interests and concerns. It was observed during this study that the people in KCA are committed to making a favourable environment, and that they have traditional customs, rituals and celebrations where agricultural and wild biodiversity play an important role. These could form an important entry point for joint conservation and development activities.

The Kangchenjunga Conservation Area could help improve land tenure security by facilitating the registration process of the land where farmers have proof that it belongs to them, and by finding ways to address *kipat*-related rights. Enhancing tenure security does not just mean registering land as private property. It can also mean, for example, recognising and strengthening the common property regimes still in practice. Much of the land in the KCA is the traditional territory of several indigenous peoples, therefore, it means more to them than property. It forms an essential element of their culture and lifestyle, and tenure security is essential for long-term and short-term planning and development.

10. Conclusions and Recommendations

It is obvious that this traditional farming system is in need of in-depth research and development support to help farmers deal with changing frame conditions and new challenges. Like every other farming system in the world, it deserves to be taken seriously by researchers and development workers in agriculture, forestry, conservation etc.

Development efforts should be aimed towards modifying and improving the existing shifting cultivation system, rather than trying to convince farmers to replace it. The existing bias against shifting cultivation is not based on any knowledge of the realities on the ground and is unfounded. As a result, they are counterproductive to the conservation and development programme.

Farmers' traditional knowledge and views should be taken more seriously in conservation and development efforts. In situations where conventional agriculture and forestry options are not suitable, participatory action research is a good method to develop new, more appropriate, technologies and test local innovations for wider use. Such agricultural and other development efforts should be supported by providing farmers with tenure security. Too often, development efforts are undermined by farmers' fear of losing access and control over land and other natural resources once development projects are implemented and government control increases. Planning and working with farmers needs to happen rapidly and with commitment. Farmers must not feel that the programme is only talk and no action.

The most obvious way ahead would be for the WWF Programme to better address the specific needs of shifting cultivators, for example through a special programme. Such a programme can perfectly fit the KCA's objective of balancing conservation and livelihood goals, and relate to the aspirations of local people as well as the Government of Nepal and other stakeholders. As part of it, some of the following recommendations could be considered:

- Document traditional and indigenous knowledge and practices and their importance for biodiversity management, with due care for intellectual property rights and cultural sensitivity;
- Strengthen local people's capacity to innovate and provide support and options that are appropriate and locally acceptable, and
- Enhance security of access and tenure of land and other natural resources within the framework provided to the park authorities by national policies.

References

Aryal, K.P. and E.E. Kerkhoff (2008). The right to practice shifting cultivation as a traditional occupation in Nepal. A case study to apply ILO Conventions Nos. 111 (Employment and Occupation) and 169 (Indigenous and Tribal Peoples), Kathmandu, International Labour Office

Aryal, K.P.; Regmi, B.R.; Shrestha, P.K.; and Tamang, B.B. (2008). How can research and development help upland farmers to improve their farming system? Experiences in participatory technology development. Sustainable Slopping Land and Watershed Management Conference, Lao PDR, 297-302p

Aryal, K.P. (2007) Uncultivated Plants: Options for Livelihood Support of the People in the Mid-Hills of Nepal. CBM Masters Thesis Series. Masters Thesis No. 31 Uppsala, 2007. ISSN: 1653-834X. Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden

Bhatt, R.P. (2007). Study of slash and burn practices in Kan Kangchenjunga Conservation Area (KCA) in the Sacred Himalayan Landscape - Nepal. Report submitted to WWF Nepal

Bajracharya, K.M.; Bajracharya, M.K; Malla, K.B; and Thapa, P.B. (1993) Shifting cultivation in Southern Gorkha

Barakoti, T.P. (2007). Training interaction review, final report on *chiraito* cultivation training and priority cultivable NTFPs/MAPS in KCA

Borrini-Feyerabend, G.; Farvar, M.T.; Nguinguiri J.C.; and Ndangang, V.A. (2000) Co-management of natural resources: organising, negotiating and learning-by-doing, http://nrm.massey.ac.nz/changelinks/cmnr.html, GTZ, Kasparek Verlag (Germany)

Borrini-Feyerabend, Pimbert, G.M.; Farvar, M.T.; Kothari, A., and Renard, Y. (2004) Sharing Power. Learning by doing in co-management of natural resources throughout the world, IIED and IUCN/ CEESP/ CMWG, Cenesta, Tehran

Brown, T. (1994). Livelihood, land and local institutions: A report on the findings of the WWF Feasibility Study for the conservation of the Kanchenjunga Area (report series no.4).

Cairns, M. (ed) (2007) Voices from the forest: Integrating indigenous knowledge into sustainable upland farming. Resources for the Future. Washington, DC, USA

Chaudhary, R.P. (1999). Biodiversity prospecting in Nepal- constraints and opportunities. Proceedings of the 8th International Workshop on BIO-REFOR, Kathmandu, Nepal (Nov. 28-Dec. 2, 1999), pp. 256-260. BIO-REFOR, IUFRO/SPDC.

Darlong, V.T. (2002) Traditional community-based fire management among the Mizo shifting cultivators of Mizoram in North East India. In Moore, P.; Ganz, D.; Tan, L.C.; Enters, T.; Durst, P. B. (eds), Communities in flames, Proceedings of an International Conference on Community Involvement in Fire Management. FAO, Bangkok

Forest Act 1993 and Forest Regulation 1995

Fujisaka, S.; Hurtado, L.; Uribe, R. (1996) A working classification of slash-and-burn agricultural systems. In Agroforestry Systems, 34: 151-169

Ghimire, S.K and Nepal, B.K (2007). Developing a community based monitoring system and sustainable harvesting guidelines for non-timber forest products in KCA, East Nepal. Final report submitted to WWF Nepal

Gurung, G.S. (2006b) Beyond integrated conservation and development project: balancing conservation and livelihood needs in protected areas of Nepal - a case study from Kangchenjunga Conservation Area, Nepal. PhD Thesis, Department of Geography, University of Zurich, Switzerland.

Herzog, F., Gautier-Beguin, D. and Muller, K. (1996) Uncultivated plants for human nutrition in Côte d'Ivoire. In: Leakey, R.R.B.; Temu, A.B.; Melnyk, M., and Vantomme, P. (Eds.) Domestication and commercialization of non-timber forest products in agroforestry systems. Proceedings of an international conference held in Nairobi 19-23 February 1996, pp. 40-49. Rome: Food and Agriculture Organization of the United Nations (FAO)

Hemmati, M. (2002) Multi-stakeholder processes for governance and sustainability. Beyond deadlock and conflict, Earthscan, London

HMGN/ MFSC (2002) Nepal, Biodiversity Strategy

ICRAF (1997) Indigenous strategies for intensification of shifting cultivation in Asia-Pacific, CD-ROM with proceedings of a regional workshop. Bogor, Indonesia. World Agroforestry Centre

IFAD; IDRC; CIIFAD; ICRAF & IIRR. (2001). Shifting cultivation towards sustainability and resource conservation in Asia.

ILO Convention on indigenous and tribal peoples, (1989) (no.169): A manual, Geneva, International Labour Office, 2003

Khatiwada, A.P. (2008) People wildlife conflict in Lelep and Tapethok VDCs of Kangchenjunga Conservation Area. Tribhuvan University, Institute of Forestry, Pokhara Campus, Pokhara, Nepal

Kerkhoff, E. and Sharma, E. (2006) Debating shifting cultivation in the Eastern Himalayas: Farmers' innovations as lessons for policy. Kathmandu: ICIMOD, 92 p.

Kerkhoff, E., Erni, C. (eds) (2005) Shifting cultivation and wildlife conservation: A debate in indigenous affairs, 2/05: 22-29. (International Work Group for Indigenous Affairs), Copenhagen

Kerkhoff, E. (2007) Debating shifting cultivation in the Eastern Himalayas: farmers' innovations as lessons for policy. In: Gebbie, L.; Glendinning, A.; Lefroy-Braun, R. and Victor, M. (editors). 2007. Proceedings of the International Conference on Sustainable Sloping Lands and Watershed Management: linking research to strengthen upland policies and practices. Vientiane: NAFRI

Locher, M. (2006) "We could show the men that we are able to do it". A Women's-Development Approach in the Kanchenjunga Conservation Area Project, East Nepal. In: Premchander, S. and Mueller, C., editors (2006) Gender and Sustainable Development: Case Studies from NCCR North South. Perspectives of the Swiss National Centre of Competence in Research (NCCR) North-South, University of Bern, Vol. 2, p. 267-284

Manandhar, N.P. (2002). Plants and people of Nepal. Manandharm N.P. with the assistance of Manandhar S. PP 15-41, ISBN 0-88192-527-6, Timber Press, Portland, Oregon, USA

NEPED and IIRR (1999) Building upon traditional agriculture in Nagaland, India. NEPED and IIRR, Philippines

North, D. (1990) Institutions, institutional change and economic performance. New York: Cambridge University Press

Regmi, B.R.; Subedi A.; Aryal K.P., Tamang B.B., (2005, unpublished) Shifting cultivation systems and innovations in Nepal, LIBIRD, Pokhara

Ramakrishnan, P.S. (1992) Shifting Agriculture and Sustainable Development: An Interdisciplinary Study from Northeastern India, Man and the Biosphere Book Series 10. Paris: UNESCO, and Caernforth (UK): Parthenon Publishing (Republished by Oxford University Press, New Delhi, 1993)

Schubiger, W. A. (2007). Land cover changes in the Kangchenjunga Conservation Area. Diploma thesis. Conducted at the Geographical Institute of the University of Zurich, Switzerland.

Sharma, E., Sharma, R., Singh, K.K. and Sharma G. (2000) A boon for mountain populations: large cardamom farming in the Sikkim Himalaya. Mountain Research and Development Vol 20 No 2 May 2000: 108–111

Uprety, L.P. (1994). Social, cultural, and economic condition of the proposed Kanchenjunga Conservation Area (report series no.5)

Watson, N., and Hinchcliff, F. (1996). The importance of the hidden harvest to agricultural biological diversity. Global Biodiversity Forum, Buenos Aires,

Argentina, 1-3 November 1996

World Bank and CBS, (2006). Estimation of poverty incidence of small area. World Bank and Central Bureau of Statistics. Kathmandu, Nepal

WWF (2002) Socio-economic survey of Kangchenjunga Conservation Area. Taplejung, Nepal. Kathmandu, WWF Nepal.

WWF (2005) Management Plan (2063-64 to 2067-68) for the Kangchenjunga Conservation Area. Conservation Area Management Council 2061. Kathmandu, WWF Nepal

WWF (2007) Socio-economic baseline survey. Kangchenjunga Conservation Area Project (KCAP), Mountain Spirit, Kathmandu, Nepal.

Annex 1
Question checklist

1. **General background**
   Village characteristics
   Poverty and food security situation
   Livelihood opportunities
   Access to government services
   GPS-points
   Any information, PRA-results, etc. from WWF past work

2. **Main characteristics of the shifting cultivation farming system(s)**
   Characterisation of one or more distinct shifting cultivation farming systems
   Farming system components (crops, trees/ fallows, livestock, technology, etc)
   Farming practices incl. controlled burning
   Hunting and fishing
   Collection and use of forest products
   Labour organisation
   Customary institutions
   Market linkages

3. **Description of the natural resources**
   Landscape characteristics
   Climatic data
   Forest and vegetation types
   Biodiversity characteristics
   Water
   Soils and degradation

4. **Farmers' local innovations and other recent developments**
   Farmers' technological and institutional innovations
   Chiraito farming
   Developments in land and resource tenure and access (including common property)
   Economic opportunities

5. **Stakeholders' priorities and development prospects**
   Recent positive and/ or negative developments
   Agricultural extension services and other government involvement
   Experiences of and expectations from the communities with KCA, government offices, others
   General policies applicable to shifting cultivators in this area
   Conservation objectives and opportunities of this particular area (WWF, Government of Nepal (GoN))
   Past work of WWF/ GoN in KCA
   Overview of NGOs working in KCA and their work
   Conflicts and their management
   Decision making and stakeholders
   Indigenous peoples' issues

6. **To recommend appropriate development actions for the shifting cultivation areas for both conservation and poverty alleviation**
   Promising economic opportunities
   Needs for agricultural/ forest/ other extension
   Useful technologies and practices for farming system improvement
   Community-based conservation
   Coordination and linkages
   Access to and tenure of resources

Annex 2

Some of the commonly used species in the area and their importance

Malingo

Malingo (Arundinaria malinga) is a native species to this area found especially in higher elevation study villages. It is in high demand for its multi-purpose use. It is generally used to make baskets and matting for house roofs. Lasting for several years, the matting is also used as a fence around fields to protect crops from wildlife.

Alnus

Alnus nepalensis is one of the best used species having multiple uses such as for fuel. It is the dominated tree species found in the lower part of all the study villages, mainly in the cardamom fields. Cardamom has been found to grow well under these tress as the leaf decomposition provides a good additive to the soil. Another positive aspect of the tree is that it is not necessary to grow seedlings and plant out as this tree grows well without this, especially on degraded land.

Gobre Salla *(Pinus wallichiana)*

Although this pine grows at higher altitudes than the *bhasme* area, the timber is used in the study villages for roofing material, second only to the *malingo*.

Phool Tarul

This is a starchy food used like a boiled potato. The taste is sweeter than a potato yet not as sweet as a sweet potato. The yield is good and thus is stored for future use. Although grown in all the study villages, it is grown more extensively in Yasang and Lawajin.

Cardamom and *chiraito*

These two crops are the most important cash crops in the area. Almost all the farmers grow these crops, even on a small scale. However, due to introduction of these species in the farm fields the land use pattern has changed as people are attracted to the high economic returns these species bring. KCAMC is providing farmers with technical support to cultivate such cash crops.

Argeli and *Lokta*

These species are becoming popular due to the establishment of paper industry in the area. Farmers in Sherpagaun, in particular, collect the raw materials for the industry. It is felt it was a good initiative of the KCAMP to introduce these crops into the area.

WWF's Mission

To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature by:

- Conserving the world's biological diversity.
- Ensuring that the use of renewable natural resources is sustainable and
- Promoting the reduction of pollution and wasteful consumption

WWF is one of the world's largest and most experienced independent conservation organizations with almost 5 million supporters and a global network active in more than 100 countries.

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WWF, the Global Conservation Organization
Nepal Program Office
PO Box 7660, Baluwatar,
Kathmandu, Nepal
Tel : +977 1 , 4434970, 4410942
Fax : +1 4438458
E-mail : info@wwfnepal.org
Web : www.panda.org