Discussion Paper
Series No. MEI 97/5

Case Studies from Ghandruk

Impact of Alternative Energy Technology in Reducing Pressure on Forest Resources

Contribution of Tourist Expenditure to the Local Economy in the Annapurna Area

Kamal Banskota
Bikash Sharma

International Centre for Integrated Mountain Development
Kathmandu, Nepal
1997

ISSN 1024 - 7564

Published by

International Centre for Integrated Mountain Development
G.P.O. Box 3226
Kathmandu, Nepal

Typesetting at ICIMOD Publications' Unit

ISSN 1024 7564

Case Studies from Ghandruk

Impact of Alternative Energy Technology in Reducing Pressure on Forest Resources

Contribution of Tourist Expenditure to the Local Economy in the Annapurna Area

Kamal Banskota
Bikash Sharma

MEI Series No. 97/5

Kamal Banskota is a resource economist and Director of CREST and Bikash Sharma is an agricultural economist, also at CREST

International Centre for Integrated Mountain Development
Kathmandu, Nepal

August 1997

Preface

These case studies are part of a series of studies resulting from the NORAD-funded Project entitled 'Mountain Tourism for Local Community Development'. One of the major objectives of the Project is to develop training modules and materials on mountain tourism for local community development for policy-makers, programme managers, private sector agencies, and local community based entrepreneurs and impart training to these audiences on a pilot basis. As part of the Project a number of thematic studies and manuals have been prepared. The present Discussion Paper includes two thematic studies that were undertaken following the case studies on Mountain Tourism for Local Community Development in the Annapurna area. Based on available secondary and primary information, the first paper attempts to infer the impact of alternative energy technologies such as kerosene, micro-hydroelectricity, solar heaters, improved cooking stoves, etc in reducing the pressure of demand on forest resources in Ghandruk, a major tourist destination and transit area in the Annapurna region. The second paper attempts to examine the contribution of tourist expenditure to local economy in the same general area.

We would like to thank the Centre for Resource and Environmental Studies (CREST) our collaborating institution in the Mountain Tourism for Local Community Development Project in Nepal, and particularly Dr. Kamal Banskota and Bikash Sharma, for undertaking these studies.

On behalf of ICIMOD, Dr. Pitamber Sharma is the Project Coordinator as well as the technical editor of these papers.

Acknowledgements

We would like to thank ICIMOD for entrusting CREST with the two studies reported in this volume. We express our thanks to Dr. Pitamber Sharma and Dr. Kamal Rijal for their comments and suggestions, which have helped bring more clarity to both studies.

Abstract

The present volume deals with two separate studies related to mountain tourism and is a continuation of the Norad-funded project 'Mountain Tourism for Local Community Development' initiated by ICIMOD. Within the last two years, CREST has carried out two studies in this area which have already been published in the form of discussion papers by ICIMOD.

The first study in the present volume deals with the energy transformation taking place among the lodges in Ghorepani and Ghandruk as a result of tourism and other factors. Ghandruk has electricity and over time there has been a gradual shift in the use of electricity. From simple lighting, electricity is being used by lodges for cooking and, to a lesser extent, space and water heating. Kerosene is also being increasingly used in many areas, but extensive consumption of imported energy is constrained in remote mountain areas, which are not served by roads, by high transport costs. The main aim of the first study in the present volume is to investigate the impact of the use of alternative energy and end-use technology on fuelwood use and its consequent impact on forest conservation.

The second study makes an attempt to estimate the retention of tourism income in local areas (Ghorepani and Ghandruk). Although tourism is believed to contribute to the local areas visited by tourists, the extent of this contribution is not well known. It is, however, fairly well known that local areas are unable to retain all the income that accrues through tourism. Comparisons are also made between conservation expenditure and tourism income.

Contents

Case Study Two
Contribution of Tourist Expenditure to the Local Economy in the Annapurna Area

Case Study One

Impact of Alternative Energy Technology in Reducing Pressure on Forest Resources in Ghandruk

INTRODUCTION

A major problem in the mountain areas of Nepal, where tourism is popular or has potential, is the increasing pressure on forests as a result of the derived demand for firewood by tourists. Firewood is the only source of energy for cooking and heating in the remote areas of the mountains. With the rapid population growth that Nepal has been experiencing for nearly two decades, deforestation has also occurred on a large scale and the firewood demand in many places has exceeded the regenerative rate of biomass growth. Alternative sources of energy have not developed as people are poor and cannot afford them, even if they were to be made available. Furthermore, the main occupation is subsistence agriculture and there are no alternative employment opportunities, thus prohibiting scope for income generation. For a long time to come, fuelwood will most likely be the main source of energy in many areas in the mountains of Nepal. Therefore, the local people have no alternative other than to continue using firewood.

When an activity such as tourism is promoted in mountain areas, especially in the absence of alternative energy sources, pressure on forests for the supply of firewood continues unabated. Although, in many areas, firewood use by group tourists is not permitted and kerosene or other alternative energy has been made mandatory, yet the derived demand for firewood by tourism continues to remain high. Group tourists require a larger number of porters, who also depend on firewood to cook their meals and keep themselves warm (Banskota and Sharma 1995a). This demand for firewood by porters is a derived demand for firewood by tourism. The other group of trekkers to the mountain areas, generally called free independent trekkers (FITs), rely on local outlets (lodges or private homes) for food and accommodation. Some of these outlets are beginning to switch to alternative energy and firewood-saving technologies. Despite substitution of firewood with other forms of energy, firewood use nevertheless continues to be high with lodge owners finding other uses for firewood to attract visitors. Hot showers are provided, for example. Such facilities, although they tend to improve visitor satisfaction, also put pressure on the forests.

This pattern is, however, changing slowly in selected places where tourism has been complemented by community development and conservation education. For example, in Ghandruk in the Annapurna region, the development of a 50kW micro-hydro-electric plant and establishment of other conservation education programmes have enabled many lodges to appreciate the value of conservation. More and more lodges are beginning to use firewood-saving stoves, heating gadgets, solar panels, and electrical gadgets such as rice cookers and electric jugs, liquid petroleum gas (LPG), and so on. A great deal of substitution between energy types has been taking place among the lodges in Ghandruk, thereby resulting in saving firewood and, consequently, reducing pressure on the forests. This change is confined primarily to lodge-owners. Tourism has enabled the lodge community to improve their incomes and standards of living and to be able to afford alternative energy sources as well as new technologies. The cost of this transformation is passed on to tourists, who receive better services

and are willing to pay for the better services. There is (relative) benefit to all in this process — visitor satisfaction improves, lodge-owners earn better incomes, and forests are protected.

In spite of the increasing use of alternative energy and technology in the lodges, the costs and benefits of bringing about the changes are not known. There are costs associated with purchasing new gadgets as well as for using different types of energy in comparison to using fuelwood. How does this cost compare with firewood savings? In other words, what have been the resultant savings in firewood in the lodges now using the new technology? If alternative technology and energy had not been introduced, lodges would have continued to use firewood.

Information on the magnitude of firewood used by lodges in Ghandruk prior to the introduction of the new technology and energy was not available. Information is available on the magnitude of different forms of energy consumed by lodges in Ghandruk and Ghorepani. Ghorepani relies entirely on firewood and, apart from kerosene, no other forms of energy are used. The use of different firewood-saving technologies in Ghorepani is also significantly lower than in Ghandruk. Therefore, the main assumption from the study is that, firewood use in Ghandruk prior to the introduction of electricity and alternative technologies was similar to that in Ghorepani. On this basis, the study serves to derive an idea of the substitution among energy types, after which the direct net benefits of this adaptation can be addressed. This knowledge will be useful for tourism development planning in remote mountain areas.

OBJECTIVES AND SCOPE

The main objective of the study is to analyse the impact of alternative energy technology in reducing the pressure on the forest resources in the Ghandruk tourist area. The specific objectives of the current study are:

- to analyse the impact of alternative energy technologies in reducing the use of fuelwood in the lodges of the tourist area of Ghandruk and estimate the consequent reduction in pressure on forest resources;

- to compare the present energy-use pattern in tourist lodges in terms of primary, final, and useful energy and the related costs and savings with the energy-use regime before the introduction of alternative energy technology; and

- to discuss the technology-specific and institutional process in the adaptation of alternative energy technology in terms of energy flows from source to end use and draw lessons of relevance for promoting alternative energy technology in similar tourist areas in the mountains of Nepal.

ENERGY EFFICIENCY: METHODS AND ASSUMPTIONS

Technical efficiency, as defined by the first law of thermodynamics, measures the relationship between total energy input and useful energy output (i.e., the ratio of useful energy output to total energy input). The output energy is called 'useful energy' and differs from 'supplied energy' by the amount of energy losses incurred between input into the final user's equipment and the output from that equipment. While the first law of thermodynamics provides the conventional framework for estimating the potential for conserving the energy by reducing energy losses, it does not provide a framework for analysing the most efficient methods of providing energy services (Kodani et al). The second law of thermodynamics provides a framework for analysing efficient processes (minimum energy requirement). It is defined as the ratio between the minimum energy required to perform a particular task and the actual energy that is required by the system (i.e., minimum energy input/actual energy input). Therefore, while according to the first law, the reduction in energy losses can improve efficiency; according to the second law the use of relatively more efficient processes can improve efficiency.

There are two methods of analysing energy use data, namely, Energy Balance Table and Reference Energy System (RES). The RES emphasises the rate of efficiency at which different types of fuels are converted, transported, and consumed using various end-use devices. It involves fuel mix and end-use consumption, which are both prime concerns for energy demand analyses and planning. There are several possible structures of RES. Under the fuel-cycle approach, RES can be structured to trace energy flow from source to the service. For example, primary energy provided by energy sources is converted into secondary energy through process technology. Conversion technology converts the secondary energy into final energy. Similarly, end-use technology converts final energy into useful energy which is what really counts for the consumers. In this manner, energy lost at each stage of energy conversion has to be taken into account in deriving the total primary energy requirement. It is generally easier to obtain the loss in primary and secondary energy for conventional commercial sources of energy than in final and useful energy that is actually sought by the consumers.

Useful energy consumption in the present study has been deduced using the national level energy efficiency parameters reported in the Perspective Energy Plan of the National Planning Commission (NPC) for the commercial sector. The end-use efficiency matrix reported by NPC was adjusted to reflect the situation prevailing in the study area (which was based on survey information). More specifically, the procedures and underlying assumptions adopted for deriving useful energy consumption in the lodges of Ghandruk and Ghorepani are as follow.

- The physical quantity of all energy sources expressed in local/natural units are all converted into giga joules (GJ) using the standard energy conversion factors reported by the NPC.

- The primary/final energy requirements for five different end-use activities (e.g., cooking, boiling water, space heating, lighting, and motive/process heat) have been developed separately for both Ghandruk and Ghorepani lodges based on the use of different end-use technologies. The assumed end-use energy requirements for lodges in Ghandruk and Ghorepani are reported in Table 1. The primary/ final energy use by end-use activities and energy sources were then derived for lodges in Ghandruk and Ghorepani.

Table 1: **Assumed End-use Requirement of Energy by Lodges in Ghandruk and Ghorepani (proportion)**

	Cooking	Water Heating	Space Heating	Lighting	Motive	Total
Ghandruk						
Firewood	0.25	0.45	0.3	0	0	1
Kerosene	0.35	0.35	0.1	0.2	0	1
Electricity	0.36	0	0.1	0.44	0.1	1
Solar	0	1	0	0	0	1
Gas	0.8	0.2	0	0	0	1
Ghorepani						
Firewood	0.5	0.4	0.1	0	0	1
Kerosene	0.2	0.2	0	0.6	0	1
Electricity	0	0	0	0	0	0
Solar	0	0	0	0	0	0
LP Gas	0.9	0.1	0	0	0	1

Note: *The parameters for end-use requirement were obtained from NPC (1995) and were modified to reflect the situation in the study area based on discussions with energy experts at ICIMOD.*

Source: *National Planning Commission 1995*

- Given the large variations in end uses due to variations in the quality of energy devices among lodges in Ghandruk and Ghorepani, the end-use efficiency matrix has been prepared separately for these two areas. Ghandruk is adopting a variety of end-use devices such as rice cookers, space heaters, light bulbs, and so on. Similarly, improved stoves, brick stoves, LPG stoves, and back boiler stoves are some of the other end-use devices used in both areas. The efficiency of these end-use devices has been derived from several references (NPC 1995; Joshi et al. 1991; Rijal et al. 1990). Given the field information on the proportion of lodges using such devices, the variability in end-use efficiency has been captured by taking the weighted average efficiency of end-use devices. For example, the efficiency of an improved stove and that of a local stove have been adjusted according to the proportion of lodge owners who have used such devices to arrive at an average efficiency of firewood use for cooking. Similar procedures have been adopted to adjust the other end-use efficiencies. The end-use efficiency matrices used to derive useful energy in Ghandruk and Ghorepani appear in Table 2.

Table 2: **End-use Energy Efficiency Matrix for Lodges in Ghandruk and Ghorepani (in %)**

Ghandruk	Cooking	Water Heating	Space Heating	Lighting	Motive
Firewood	0.191	0.22	0.73	0	0
Kerosene	0.48	0.48	0.511	0.0006	0
Electricity	0.65	0.5	0.9	0.05	0.85
Solar	0	0.25	0	0	0
LP Gas	0.65	0.65	0	0	0
Ghorepani					
Firewood	0.157	0.21	0.65	0	0
Kerosene	0.45	0.45	0	0.0006	0
Electricity	0	0	0	0	0
Solar	0	0	0	0	0
LP Gas	0.65	0.65	0	0	0

Source: National Planning Commission 1995; Joshi et al. 1991; Rijal et al. 1990

- Finally, the estimated primary/final energy consumption for different end-use activities in each area are multiplied by their respective end-use matrix to arrive at the total useful energy which, when divided by the respective primary energy, gives the efficiency of the specific energy source.

The Study Area

Both Ghandruk and Ghorepani are two heavily impacted tourist areas. The Ghandruk-Ghorepani circuit is one of the most widely used trekking routes within the Annapurna Conservation Area (ACA). The mountains from Ghandruk to Ghorepani are covered with forests. However, with the growth in tourism the once dense Ghorepani forests have now been cleared and tourist lodges have been built all along the Ghorepani-Ghandruk route. There were altogether 27 lodges in Ghandruk and 19 in Ghorepani (KMTNC/ACAP 1994; Gurung and Arthur 1995). Information from a sample survey of 20 lodges from Ghandruk and 18 lodges from Ghorepani carried out in 1994 indicates that most of the lodges (78%) were of a permanent nature and were mostly owned by people from these villages. An average lodge, in both the areas, provides employment to about seven persons a year. Employment during the peak season is higher than during the slack season. However, most of the lodge employment is taken up by family members and local labour is hired to meet about 25 per cent of the labour demand during the peak season. The average number of rooms per lodge in Ghorepani (8.7) is a little higher than in Ghandruk (7.3). Likewise, the average number of beds per lodge in Ghorepani is 17.3 compared to 15.9 in Ghandruk.

Forest Resource Conditions

The forests around Ghandruk were degraded in the past due to lack of management and excessive firewood demands in the absence of alternative energy technologies.

Once the Ghandruk VDC was declared a pilot area of the Annapurna Conservation Area Project (ACAP) in 1987, a central forest management committee (FMC), consisting of 14 members representing all nine wards of the VDC, was constituted to manage the surrounding forests. For ease of operational effectiveness and control in management, forest management sub-committees were also constituted under the FMC. Two forest guards were appointed to patrol the forests and to report regularly to the committee. The main functions of the FMC and sub-FMC included:

- development of a plan of operation (timber, fuelwood, and grazing regulations) in the beginning of the year;
- regular monthly meetings to discuss issues on forest management; and
- supervise and monitor forest guards.

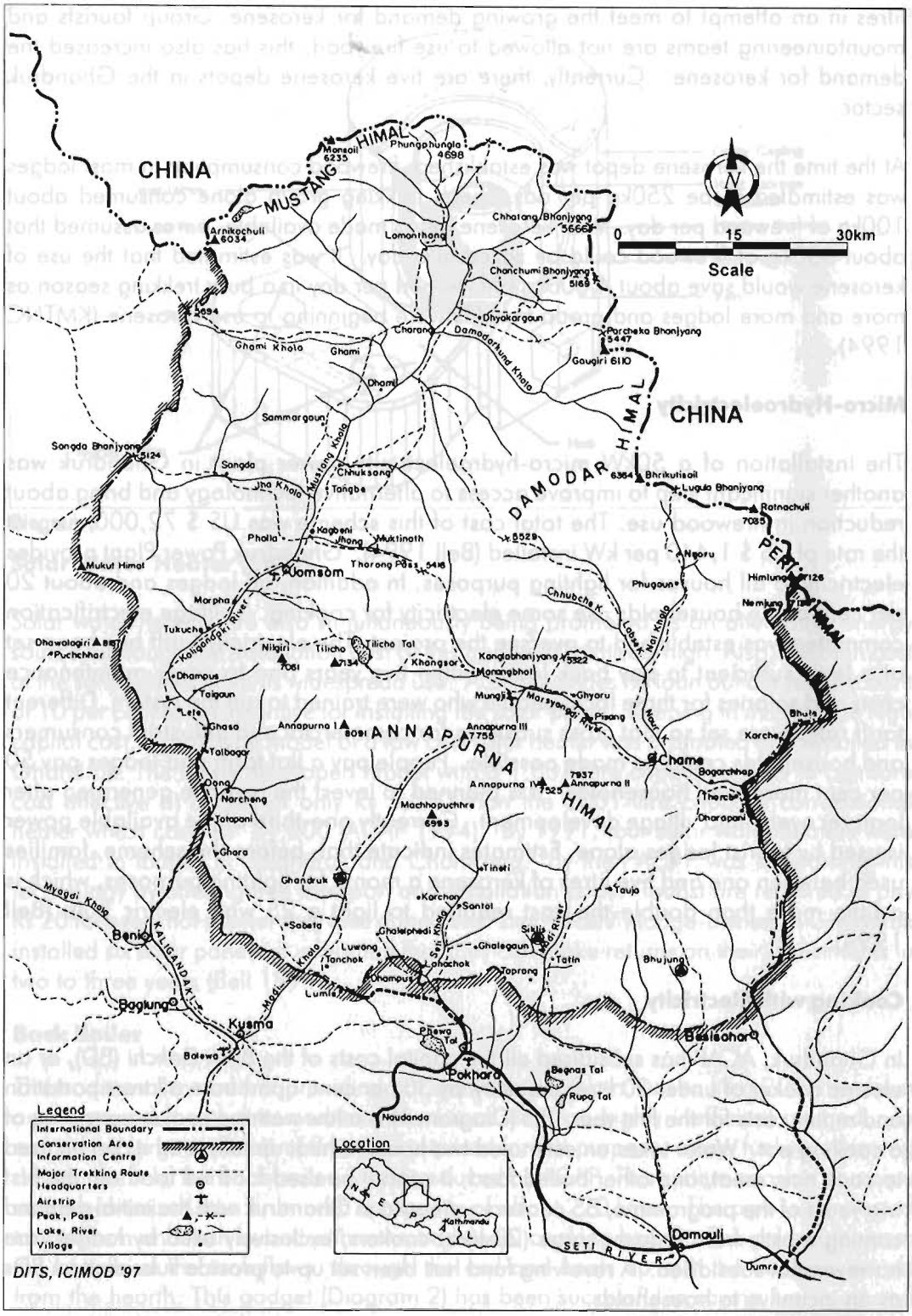
Forests that are within a two hours walking distance from village settlements are classified as protected and those beyond two hours are classified as non-protected forests. The protected forests cover 935 hectares or 31 per cent of the total area (28,931 ha) of Ghandruk VDC. The natural forests, on the other hand, cover 1,564.5 hectares or 47.5 per cent of the total area of the VDC. Felling of green trees of any species and animal grazing are prohibited in protected forests. In natural forests too green tree felling is not permitted. Cutting and collection of timber trees is regulated through permits issued by the FMC.

NEW ENERGY TECHNOLOGY AND SOURCES OF SUPPLY

In an attempt to reduce pressure on forest resources, ACAP introduced a number of fuel-efficient technologies for cooking and heating and alternative energy sources. This section first briefly highlights the new technologies introduced which will then be followed by a discussion on the impacts of the technology in relation to reducing the pressure on forest resources.

Kerosene

In response to the depletion in forest resources due to excessive use of firewood by lodges and campers, ACAP, with the support of the local people, banned all firewood use from Chhomrong to the Annapurna base camp (Map 1). To implement this policy, a 3,000-litre kerosene depot was established at Chhomrong in 1987 with financial support from the German Alpine Club. A kerosene depot management committee was subsequently constituted to manage regular supplies of kerosene to the depot for sale. The capacity of the kerosene depot was increased to 5,000 litres. At first it was a difficult task trying to convince lodge-owners to switch over to kerosene. However, the use of kerosene has gradually picked up and the consumption of kerosene has increased several fold since 1987. The capacity of the depot was further increased to 10,000



Map 1: Annapurna Conservation Area

litres in an attempt to meet the growing demand for kerosene. Group tourists and mountaineering teams are not allowed to use firewood; this has also increased the demand for kerosene. Currently, there are five kerosene depots in the Ghandruk sector.

At the time the kerosene depot was established, firewood consumption in most lodges was estimated to be 250kg per day. Each trekking group alone consumed about 100kg of firewood per day. With kerosene being made available, it was assumed that about 350kg of firewood could be saved in a day. It was estimated that the use of kerosene would save about 4,000kg of firewood per day in a busy trekking season as more and more lodges and group trekkers were beginning to use kerosene (KMTNC 1994).

Micro-Hydroelectricity

The installation of a 50kW micro-hydroelectricity power plant in Ghandruk was another significant step to improve access to alternative technology and bring about reduction in firewood use. The total cost of this scheme was US $ 72,000, i.e., at the rate of US $ 1,440 per kW installed (Bell 1994). Ghandruk Power Plant provides electricity to all houses for lighting purposes. In addition, all lodges and about 20 per cent of the households use some electricity for cooking. A village electrification committee was established to oversee the project. The electricity tariff has been set at a level sufficient to pay back loans within five years and to cover maintenance costs and salaries for three local people who were trained to run the system. Different tariff rates were set so that cross subsidies for commercial and industrial consumers and households could be made possible. People pay a flat tariff and lodges pay 50 per cent more than households. It is planned to invest the revenue generated after loan recovery into village development. Currently one-third of the available power is used by tourist lodges alone. Estimates indicate that, before the scheme, families used between one and five litres of kerosene a month for lighting purposes, which is a little more than double the cost required to light a 25 watt electric bulb (Bell 1994).

Cooking with Electricity

In Ghandruk, ACAP has subsidised all the capital costs of the *Bijuli Dekchi* (BD), or an electric cooker of under 20 litres capacity, by 30 per cent, apart from all transportation and repair costs for the first year. BD (Diagram 1) is a low wattage cooker consisting of a cooking pot. Water takes an estimated two hours to heat up fully, and it can be used to cook rice, meat, and other boiled food; it cannot be used for fried food. In the first two years of the programme, 85 cookers were sold in Ghandruk with the initial demand coming mostly from lodges. Large (20-litre) cookers, exclusively used by lodges, are however, not subsidised. A revolving fund has been set up to provide subsidies on BDs as an incentive to households.

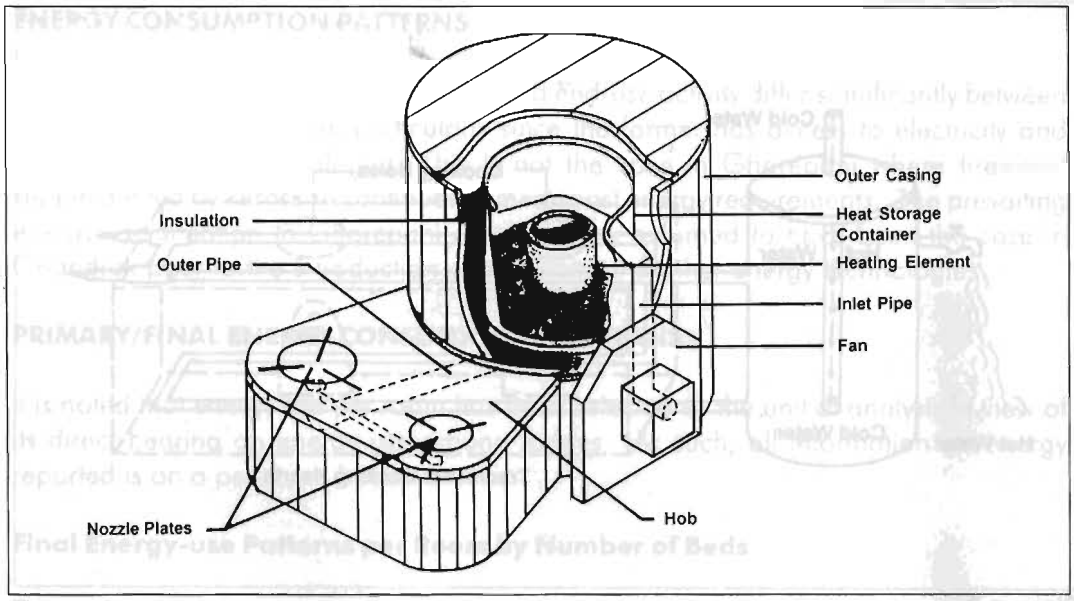


Diagram 1

Solar Water Heater (SWH)

Solar water heaters are also simultaneously being promoted as an alternative energy source, although the installation cost of this gadget is relatively high. Also, the high cost of the solar panels limits its widespread use. ACAP provides no loan but offers a discount of 10 per cent as an incentive for installing the solar panel. Keeping in mind of the high capital cost, a prototype model of a low cost solar heater was promoted and installed in Ghandruk. The newly developed model with a 1,001-litre capacity seems to be more cost effective at a cost of only Rs 5,000 than the 2001-litre capacity conventional heater which costs Rs[1] 21,000 (ACAP 1994). By 1991, four solar water heaters were installed in lodges in Ghandruk and Chomrong. By then ACAP was subsidising this technology by offering free transport and installation costs. Tourist are required to pay Rs 20 for every hot shower they take during their stay. Recently lodge-owners in Ghandruk installed six solar panels. It is learned that they can make returns on their investments in two to three years (Bell 1994).

Back Boiler

The traditional method of providing hot showers to trekkers was to fill a 200-litre drum and surround it with firewood and burn it all day – a highly inefficient method. To reduce the large amounts of firewood required for this purpose, a new fuelwood-saving device, namely, the back boiler, was introduced by ACAP. This system consists of a pipe and a galvanised iron drum with a capacity of about 220 litres. The pipe is connected to the drum and then buried within the traditional cooking hearth. The cold water from the bottom of the tank flows through the coil and heats up with the heat generated from the hearth. This gadget (Diagram 2) has been successful in saving fuelwood and

1 There are 58.05 Nepali rupees to one US dollar.

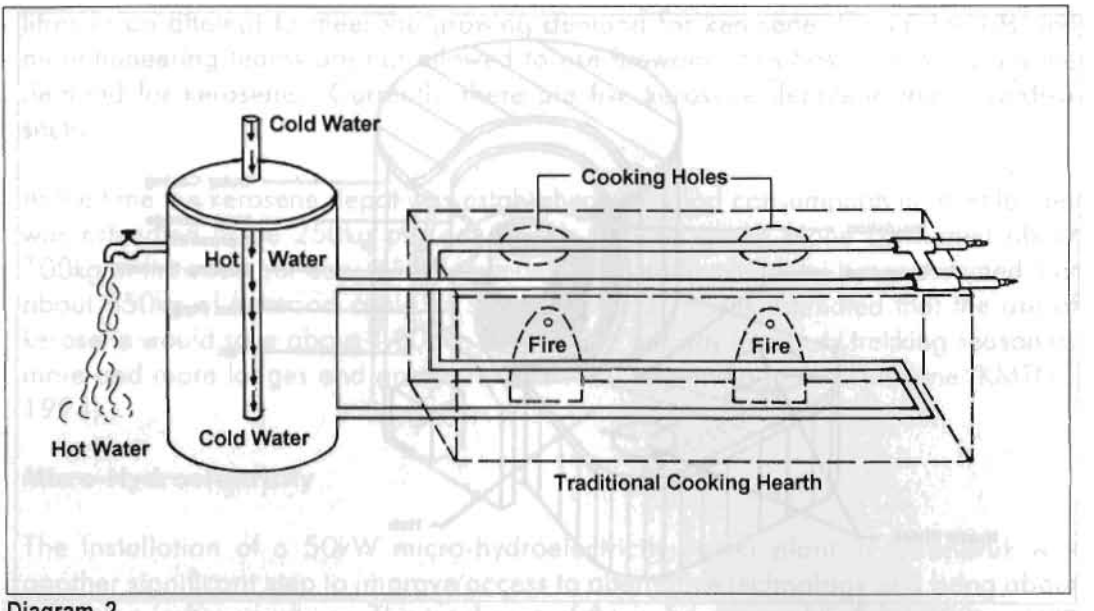


Diagram 2

consequently its demand has been growing. Back boiler technology is becoming popular among the lodges, because it is relatively inexpensive and is easy to build and operate.

The installation cost of a 100- to 200-litre drum ranges from Rs 600 to 800. The installation of a back boiler is free, and it is covered for six months for repairs and maintenance. ACAP provides a subsidy for transportation and 50 per cent of the cost of the circulatory part of the system. Reduction of the subsidy to 25 per cent has affected the demand. Moreover, it is learned that some lodge-owners have encountered technical problems with this device, leakages from the drum and blockage in the pipe being the main ones. Investigations are underway to refine this device.

Available estimates indicate that this system has been able to save on an average 675kg of wood per month, per lodge during the peak tourist season – a net reduction of 23 per cent of firewood use (Seimann and Steinbach 1993).

Improved Cooking Stoves

Improved stoves have not been widely disseminated despite their improved efficiency as well as the positive impact on health. First, the demand for space heating, and the local belief that smoke helps control pests in the wooden structure of the houses have caused some reluctance among users to fully adopt this new technology. Second, there are still some technical errors in the design of the improved stoves due to lack of interaction between end users and designers. As such, only 50 per cent of the improved stoves were reported to be used and maintained well. ACAP has slightly changed its incentive policy recently. Besides providing all construction materials, the stove owner now must pay Rs 25 to the foreman while ACAP pays the remaining Rs 55 as a subsidy (ACAP 1994).

ENERGY CONSUMPTION PATTERNS

Energy consumption patterns by sources and end-use activity differ significantly between Ghandruk and Ghorepani particularly since the former has access to electricity and other energy mix technologies. This is not the case in Ghorepani where firewood supplemented by kerosene continues to meet most energy requirements. The prevailing energy use situation in Ghorepani can be safely assumed to have been the case in Ghandruk prior to the introduction of electricity and other energy technologies.

PRIMARY/FINAL ENERGY CONSUMPTION PATTERNS

It is noted that energy use per room has been selected as the unit of analysis in view of its direct bearing on energy use among lodges. As such, all information on energy reported is on a per room basis.

Final Energy-use Patterns per Room by Number of Beds

The variation in energy use per room by number of beds is presented in Table 3. For the purpose of the analysis, lodges are classified into three groups based on the number of beds per room: low (less than 12 beds); medium (12 to 20 beds); and high (above 20 beds). The results indicate that firewood consumption per room in Ghandruk decreases and that of other energy sources, such as kerosene, LPG, and solar, increase slightly with the increase in the number of beds. The overall energy-use rates among low, medium, and large categories of lodges in Ghandruk have been found to be 19, eight,

Table 3: **Primary Energy Use Per Room Per Year by Number of Beds in Ghandruk and Ghorepani**

	Low		Medium		High	
	Mean	STD	Mean	STD	Mean	STD
Ghandruk						
Firewood (kg)	703	742	404	799	55.7	90.32
Kerosene (lit)	185	255	11	9.36	33.3	18
Electricity (kWh)	100	89	84	41	67	2
Gas (cylinder)	0.3	0.84	0.37	1.06	0.53	0.92
Solar (kWh)	0.107	0.303	0.33	0.36	0.35	0.11
Total (GJ)	19	10.25	7.74	12.96	2.77	0.37
Bed/Room	2.44	0.55	2.32	0.33	2.16	0.37
Ghorepani						
Firewood (kg)	1103	766	2171	1293	1760	1678
Kerosene (lit)	157	148	46	19	23	13
Electricity (kWh)	0	0	0	0	0	0
Gas (cylinder)	0	0	0.04	0.13	0.05	0.15
Solar (kWh)	0	0	0	0	0	0
Total (GJ)	24	15.78	38	21.70	30	28
Bed/Room	2.09	0.11	1.94	0.33	2.05	0.07

Source: Survey data

and three gigajoules (GJ) per room respectively. The corresponding figures for Ghorepani are 24,38, and 30 GJ per room. While the available information does not permit us to clarify and estimate the different effects (substitution, economies of scale, and efficiency effects) that have occurred as the number of beds per room increase, the inverse relationship observed between energy use and size of room in the case of Ghandruk warrants some plausible explanation. Given the existence of alternative sources of energy and fuel-efficient technology options, lodges in Ghandruk have diversified their energy use and this energy diversification or energy mix has enabled them to attain greater energy efficiency. The higher number of beds or rooms may be taken as a proxy for economic status. Such lodges can afford the new sources of energy and efficient technologies which are relatively expensive for smaller lodges. This implies that lodges having a larger number of beds are more likely to enjoy the advantages of energy mix, although a full substitution of fuelwood with other energy sources is not likely to take place in a short period of time. It is a gradual process.

Firewood

The average annual consumption of firewood in Ghandruk is estimated to be 475kg/room/year (or a daily average of 1.3kg/room) which is far lower (by 75%) than in Ghorepani (1,865 kg/room/year or a daily average of 5kg/room). Considering that the lodges in Ghandruk, prior to the availability of electricity and other alternative technology, would use the same level of firewood as is currently consumed by the lodges in Ghorepani, there has been a net saving of 1,390kg of firewood (75 %) per room in Ghandruk. The impact of this saving in reducing pressure on the forests is obvious as there has been less demand for and, hence, less extraction of forest resources by lodges in Ghandruk.

It should be noted, however, that variations in firewood use are much more pronounced among lodges in Ghandruk than in Ghorepani (Table 4). The quantity of firewood consumed by lodges depends, among other things, on the number of tourists served by the lodges, end-use technology, and energy mix during the peak tourist season (which normally lasts for seven months a year). Rayamajhi (1994) reported the average daily consumption figure of 28.5kg per lodge in Ghandruk after the restriction imposed by the Forest Management Committee. The estimated daily firewood consumption among Ghandruk lodge-owners in the present study is much lower, about nine kilogrammes

Table 4: **Primary Energy Use Pattern Per Room Per Year**

Energy use	Ghandruk		Ghorepani		Difference
	Mean	STD	Mean	STD	
Firewood (kg)	474.98	719.79	1865.00	1381.80	-1390.02
Kerosene (litre)	87.84	180.80	68.42	90.84	19.42
Electricity(kWh)	88.46	62.28	0.00	0.00	88.46
Solar (kWh)	0.24	0.32	0.02	0.09	0.22
Gas (cylinder)	0.37	0.90	0.02	0.09	0.35

***Source**: Survey data*

per lodge. The corresponding figure for Ghorepani is 45kg per lodge per day. Available information indicates that firewood demand per lodge is about 10 to 15 per cent of the total demand in Ghandruk (Rayamajhi 1994).

Despite a significant reduction in the use of firewood due to the introduction of alternative technology, about two-thirds of the lodges in Ghandruk still continue to use firewood. Also, firewood still continues to be the dominant energy source in Ghandruk in terms of its contribution to total energy requirements, although the share of firewood in total energy use in Ghandruk is lower (67%) than in Ghorepani (93%). Table 5 shows the contribution of different energy types to total energy consumption in Ghandruk and Ghorepani.

Firewood prices in Ghandruk (Rs 0.5/kg) have also been found to be half of the price prevailing in Ghorepani (Rs1.03/kg), perhaps reflecting its higher demand relative to supply in Ghorepani. Also, an average lodge in Ghorepani spends Rs 19,054 annually for firewood compared to Rs 5,298 in Ghandruk. Several studies carried out in the past provide estimates of the deforestation taking place in Ghorepani forests due to tourism activities. Ghorepani is an entirely new settlement that has developed due to tourism. It contains mostly lodges and almost no household settlement. Lodges in Ghorepani have no option but to consume firewood to meet their energy requirements as the contribution of other limited alternative energy sources, particularly kerosene and LPG, to the total energy is about eight per cent (Table 5). Also, Ghorepani is further away from the roadhead than Ghandruk, and this tends to increase the transport costs of any imported alternative energy and is, therefore, a disincentive to switch to alternative energy sources, unless income levels rise to make this switch possible.

Kerosene

Kerosene consumption by lodges in Ghandruk varies considerably ranging from four to 750 litres, with an annual average consumption of 88 litres per room per lodge (or a daily average of 0.24 litres per room). The corresponding figure for Ghorepani is 68 litres (0.18 of a litre a day per room) and this is about 25 per cent lower than in Ghandruk (Table 4). Almost all lodges sampled in both Ghandruk and Ghorepani use kerosene. The price of kerosene in Ghandruk (15/litre) is found to be lower than in Ghorepani (Rs 21/litre), reflecting the higher transportation costs for the latter relative to the former. Kerosene meets 27 per cent of the energy requirement in Ghandruk compared to eight per cent in Ghorepani (Table 5).

Electricity

Electricity consumption per room in Ghandruk is estimated to be 88.5 kilowatt hours (kWh) per year or an annual average of 550 kWh per lodge. About 74 per cent of the lodges reported using electricity for cooking and heating purposes as well. Among those who use electricity, the firewood consumption rate is found to be low, i.e., around 326kg per annum or a daily average of less than one kilogramme. Similarly, kerosene

Table 5: **Final Energy Use in GJ/room/Yr**

Energy use	Ghandruk		Ghorepani		Difference
	Mean	Per Cent	Mean	Per Cent	
Firewood	7.932	67.73	31.14	92.57	-23.22
Kerosene	3.189	27.23	2.48	7.38	0.70
Electricity	0.318	2.72	0.00	0.00	0.32
Solar	0.001	0.01	0.00	0.00	0.00
Gas	0.27	2.32	0.02	0.05	0.26
Total energy/room/yr	11.71	100	33.65	100	-21.94

Note: The average number of rooms per lodge in Ghandruk and Ghorepani is 8.7 and 7.3, respectively.
Source: *Survey Data and Calculations*

consumption among lodges using electricity was found to be only 22 litres a year (0.06 of a litre per room/day). Increasing use of electricity among the lodges has thus reduced dependency on forests and imported kerosene and, at the same time, saved energy bills. The substitution effects do appear to be fairly strong.

Similarly, only 74 per cent of the lodges in Ghandruk were found to have used the *Bijuli Dekchi* (BD) for cooking purposes. The annual average electricity consumption rate among BD users (105 kWh) is about 2.5 times higher than among non-users of the BD (41.6 kWh). Annual firewood consumption among BD users (190kg) was also found to be less than one-fifth the consumption rate among BD non-users (1,273kg/room/year). Similarly, kerosene consumption among BD users (46 litre/room) is about 23 per cent that of BD non-users (205 litres /year). However, kerosene use rates among space heater users were also found to be much higher than among non-users of this technology.

Solar

About 42 per cent of the sampled lodges in Ghandruk were using solar water heaters. Solar water heaters with a capacity of 200 litres are found to be rather expensive (Rs 11,000 per panel) and unreliable given the climatic conditions (sunshine) of the area, as cloudy days limit their use. As such, the consumption of solar water heaters is very low even among the users of this technology, 0.5001 GJ/room/annum. Both firewood (133kg/room) and kerosene consumption rates (23 litres/room) among solar water heater users are found to be much lower (by 83%) than among those not using this technology .

Gas

LPG is another form of energy used by the lodges, although its use is confined to about 16 per cent of the lodges surveyed in Ghandruk compared to only one lodge in Ghorepani. The average annual consumption of LPG is 0.272 GJ/room (or 3.15 kWh per lodge) in Ghandruk. The corresponding figure for Ghorepani is much lower (0.02 GJ/room). Even among those, the LPG consumption rate per room is less than 1.36 GJ in Ghandruk.

SHARE OF DIFFERENT TYPES OF ENERGY

Table 5 shows the average quantity of different energy use per room (all expressed in gigajoules) in Ghandruk and Ghorepani along with the percentage share distribution. The total quantity of overall primary/ final energy consumption amounted to 11.7 gigajoules per room in Ghandruk compared to 33.65 GJ per room in Ghorepani. This indicates that lodges in Ghandruk require about 67 per cent less energy than lodges in Ghorepani. Out of the total primary energy consumption in Ghandruk, firewood alone accounted for about 68 per cent, kerosene for 27 per cent, electricity for three per cent, and the remaining two per cent was met by solar and gas. In Ghorepani, where lodges have no access to electricity, over 92 per cent of the total energy requirements were found to be met through firewood alone, with the remaining percentage being met through kerosene and LPG. This clearly indicates the significant reduction in both the share of firewood and overall final energy requirement in Ghandruk relative to Ghorepani as a result of the availability of electricity as well as energy-efficient technologies.

FINAL ENERGY CONSUMPTION BY END-USE ACTIVITY

Table 6 shows the quantity of energy consumption by end-use activity in Ghandruk and Ghorepani. The results indicate that about 30 per cent of the total primary energy use in Ghandruk is for cooking, 40 per cent for water boiling, 23 per cent for space heating, and less than seven per cent for lighting and running electrical appliances. In Ghorepani, about 48 per cent of the total energy is used for cooking, 38 per cent for boiling water, nine per cent for space heating, and the remaining four per cent for lighting. The details are provided in Table 6.

Table 6: **Primary /Final Energy Use by End-use Activities (GJ/room/yr)**

	Cooking Heating	Water Heating	Space	Lighting	Motive	Total	Per Cent
Ghandruk							
Firewood	1.983	3.569	2.380	0.000	0.000	7.932	67.73
Kerosene	1.116	1.116	0.319	0.638	0.000	3.189	27.23
Electricity	0.115	0.000	0.032	0.140	0.032	0.318	2.72
Solar	0.000	0.001	0.000	0.000	0.000	0.001	0.01
Gas	0.218	0.054	0.000	0.000	0.000	0.272	2.32
Total	3.431	4.741	2.730	0.778	0.032	11.712	100.00
Per Cent	29.30	40.48	23.31	6.64	0.27	100	
Ghorepani							
Firewood	15.57	12.46	3.11	0.00	0.00	31.15	92.57
Kerosene	0.50	0.50	0.00	1.49	0.00	2.48	7.38
Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Solar	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas	0.01	0.00	0.00	0.00	0.00	0.02	0.05
Total	16.08	12.96	3.11	1.49	0.00	33.65	100
Per Cent	47.80	38.51	9.26	4.43	0.00	100	

Source: Survey Data and Calculations

USEFUL ENERGY USE PATTERNS

Following the procedures, as stated earlier, useful energy consumption in Ghandruk and Ghorepani has been estimated, and the results are reported in Table 7. Total consumption of useful energy in Ghandruk is estimated to be about 4.45 GJ per room per year, which is roughly 38 per cent of the primary energy requirement per room. The corresponding figure for Ghorepani is 7.54 GJ per room, which is just 22.4 per cent of its total primary energy use rate. Thus, the adoption of alternative energy technologies and energy mixes has not only reduced the overall energy requirement in Ghandruk but also improved the efficiency of energy.

As is evident from Table 7, about two-thirds of the useful energy consumption requirements in Ghandruk are met by firewood (65%), with the remaining percentage being accounted for by kerosene (28%), electricity (3%), and gas and solar (4%). In Ghorepani, firewood meets 94 per cent of the useful energy requirements with the rest being met mostly by kerosene (Table 7).

The efficiency of different energy forms in both tourist areas can be better judged from the result presented in Table 7. Energy efficiency in Ghandruk is found to be amongst the highest for gas (65%), followed by electricity (43%), kerosene (38.7%), firewood (37%), and solar (25%). It is worth noting that the efficiency of electricity used for lighting purposes has not been treated separately in terms of lumen per watt, rather

Table 7: **Useful Energy Consumption Pattern in Ghandruk Tourist Lodges (GJ/room/yr)**

	Cook-ing	Water Heating	Space Heating	Light-ing	Motive	Total	Share %	Effic-iency %
Ghandruk								
Firewood	0.379	0.785	1.737	0.000	0.000	2.901	65.19	36.58
Kerosene	0.536	0.536	0.163	0.000	0.000	1.235	27.75	38.72
Electricity	0.075	0.000	0.029	0.007	0.027	0.137	3.08	43.10
Solar	0.000	0.001	0.000	0.000	0.000	0.000	0.00	25.00
Gas	0.141	0.035	0.000	0.000	0.000	0.177	3.97	65.00
Total Useful Energy	1.130	1.357	1.929	0.007	0.027	4.450	100	38.00
Shares (%)	25.40	30.48	43.34	0.17	0.61	100		
Efficiency (%)	32.94	28.61	70.64	0.95	85.00	38.00		
Ghorepani								
Firewood	2.445	2.616	2.025	0.000	0.000	7.086	93.93	22.75
Kerosene	0.224	0.224	0.000	0.001	0.000	0.448	5.94	18.04
Electricity	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00
Solar	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00
Gas	0.009	0.001	0.000	0.000	0.000	0.010	0.13	65.00
Total Useful Energy	2.678	2.841	2.025	0.001	0.000	7.544	100	22.42
Shares (%)	35.49	37.66	26.84	0.01	0.00	100		
Efficiency(%)	16.65	21.93	65.00	0.06	0.00	22.42		

Source: *Survey Data and Calculations*

lighting purposes has not been treated separately in terms of lumen per watt, rather simple efficiency of bulbs has been used for the purpose of the study as reported in Joshi et al. (1991). For this reason, together with the fact that about 44 per cent of the electricity consumption in Ghandruk is for lighting, the overall efficiency of electricity can be believed to be higher than has been estimated in the present study.

The efficiency of overall firewood consumption (i.e., total useful firewood consumption as a percentage of firewood use in primary energy terms) in Ghandruk (36%) has been found to be higher than in Ghorepani (23%) because of the relatively higher proportion of improved stoves used in the former area than the latter area. The case for kerosene efficiency is similar, while no difference is found in the efficiency of gas. The bulk of the kerosene in Ghorepani is used for lighting, with only 40 per cent used for cooking and heating, whereas the opposite prevails in Ghandruk. The efficiency of the end-use device for cooking and heating is higher than in the case of lighting. The lower efficiency of kerosene lamps assumed for lighting purposes also partly explains the lower efficiency of overall kerosene use in Ghorepani than in Ghandruk.

Out of the total useful energy requirements in Ghandruk, about 25 per cent were for cooking, 30 per cent for boiling water, 43 per cent for space heating, and one per cent for lighting and motive power (including electric appliances) (Table 7). The corresponding figures for end-use activities in Ghorepani are: cooking (35%), boiling water (38%), space heating (27%), and lighting (less than one per cent) (Table 7).

The efficiency of overall energy by end-use activity in Ghandruk and Ghorepani is also summarised in Table 7. Despite cooking accounting for a lower share of energy in end use, cooking efficiency is higher in Ghandruk (33%) than in Ghorepani, where efficiency in cooking is only 17 per cent. Variations in end-use efficiencies between Ghandruk and Ghorepani are highlighted in Table 8. What has been observed is that due to energy mix and use of different end-use devices, Ghandruk has been able to derive more energy services from lower primary energy inputs.

Table 8: **Energy Sectors Efficiency by End-use Activity**

(%)

End-use	Ghandruk	Ghorepani
Cooking	33	17
Water Boiling	29	22
Space heating	71	65
Lighting	1	less than 1
Motive	85	-
Overall	38	22

Source: *Survey Data and Calculations*

REDUCED EMISSION

The extent to which the introduction of alternative energy technology in Ghandruk has been able to reduce carbon dioxide (CO_2) emission can be judged from the estimates reported in Table 9. In Ghandruk, where electricity and other fuel-efficient end-use devices are available, less firewood is being consumed and energy diversification has

Table 9: CO_2 Emission from Main Energy Sources

CO_2 Emission Coefficients		CO_2 Emission (Tons/room/year)		
Energy carrier	10^6ton/Pj	Energy source	Ghandruk	Ghorepani
Firewood	0.0832	Firewood	0.660	2.592
Kerosene	0.0723	Kerosene	0.231	0.180
LPG	0.0659	LPG	0.018	0.001
		Total	0.908	2.772

Source: *National Planning Commission 1995 and Survey Data*

noted that firewood emission is the major source of environmental pollution in the rural areas. Given the vital contribution of firewood to meeting rural energy requirements, a complete switch from firewood to other alternative energy sources is not at all likely in Ghandruk. Nevertheless, dissemination of improved energy devices and alternative energy sources that are suitable for local conditions can significantly contribute to reduced carbon dioxide, apart from improving the energy efficiency.

TOTAL ENERGY CONSUMPTION ESTIMATE

Given the information on the number of lodges and average number of rooms per lodge, the total quantities of both primary/final and useful energy consumption per year in Ghandruk and Ghorepani tourist areas have been computed. Total annual primary energy consumption amounts to 2,308.4 GJ in Ghandruk compared to 5,868 GJ in Ghorepani (Table 10). The annual firewood consumption in Ghandruk amounts to 1,563 GJ, which is about 29 per cent of the total firewood requirement in Ghorepani. This indicates a net saving of 3,896 GJ of energy from firewood per year (or 71%

Table 10: **Total Primary /Final Energy Use by End-use Activities (in GJ)**

	Cooking	Water Heating	Space Heating	Lighting	Motive	Total	Share
Ghandruk							
Firewood	390.86	703.54	469.03	0.00	0.00	1563.4	67.73
Kerosene	219.97	219.97	62.85	125.69	0.00	628.5	27.23
Electricity	22.60	0.00	6.28	27.62	6.28	62.8	2.72
Solar	0.00	0.16	0.00	0.00	0.00	0.2	0.01
Gas	42.87	10.72	0.00	0.00	0.00	53.6	2.32
Total (GJ)	676.3	934.4	538.2	153.3	6.3	2308.4	100
Shares (%)	29.30	40.48	23.31	6.64	0.27	100	
Ghorepani							
Firewood	2716.11	2172.88	543.22	0.00	0.00	5432.2	92.57
Kerosene	86.63	86.63	0.00	259.89	0.00	433.1	7.38
Electricity	0.00	0.00	0.00	0.00	0.00	0.0	0.00
Solar	0.00	0.00	0.00	0.00	0.00	0.0	0.00
Gas	2.43	0.27	0.00	0.00	0.00	2.7	0.05
Total(GJ)	2805.2	2259.8	543.2	259.9	0.0	5868.1	100
Shares (%)	47.80	38.51	9.26	4.43	0.00	100	

Source: *Survey Data and Calculations*

savings) in Ghandruk. The details on primary energy consumption patterns by source and end use in both tourist areas at an aggregated level are reported in Table 10. Similarly, the total useful energy consumption patterns by source and end use are shown in Table 11. The overall emission from lodges in Ghandruk is estimated to be 179 tons/year compared to 484 tons/year in Ghorepani (Table 12).

CONCLUSION

The introduction of alternative energy and fuel-efficient technologies in Ghandruk has brought about significant changes to the level of energy use as well as to the overall energy efficiency among lodges. There has been an energy transformation in the overall

Table 11: **Total Useful Energy Consumption Pattern in Ghandruk and Ghorepani Tourist Lodges (GJ)**

	Cook-ing	Water Heat-ing	Space Heat-ing	Light-ing	Motive	Total	Share %	Effici-ency %
Ghandruk								
Firewood	74.65	154.78	342.39	0.00	0.00	571.82	65.19	36.58
Kerosene	105.58	105.58	32.11	0.08	0.00	243.36	27.75	38.72
Electricity	14.69	0.00	5.65	1.38	5.34	27.05	3.08	43.10
Solar	0.00	0.04	0.00	0.00	0.00	0.04	0.00	25.00
Gas	27.87	6.97	0.00	0.00	0.00	34.83	3.97	65.00
Total (GJ)	222.79	267.37	380.16	1.46	5.34	877.11	100	38.00
Shares (%)	25.40	30.48	43.34	0.17	0.61	100		
Efficiency (%)	32.94	28.61	70.64	0.95	85.0	38.00		
Ghorepani								
Firewood	426.43	456.31	353.09	0.00	0.00	1235.83	93.93	22.75
Kerosene	38.98	38.98	0.00	0.16	0.00	78.12	5.94	18.04
Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Solar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas	1.58	0.18	0.00	0.00	0.00	1.76	0.13	65.00
Total (GJ)	466.99	495.46	353.09	0.16	0.00	1315.71	100	22.42
Shares (%)	35.49	37.66	26.84	0.01	0.00	100		
Efficiency (%)	16.65	21.93	65.00	0.06	0.00	22.42		

Source: *Survey Data and Calculations*

Table 12: **Total Co_2 Emissions from Main Sources in Tons/Year**

Energy Source	Ghandruk	Ghorepani
Firewood	130.1	452.0
Kerosene	45.4	31.3
LPG	3.5	0.2
Total	179.0	483.5

Source: *Survey Data and Calculations*

energy sector of the lodge community in Ghandruk. This transformation has only begun, and valuable lessons have been learned in bringing about this change. Several factors can be identified to be playing an important role.

There is little doubt that tourism has played an important role in this respect. Tourism has enabled the lodge community to increase their incomes which has, therefore, made it possible for them to afford the technology to bring about change in energy use. However, identifying increased income as the reason for this change is too simple. There are many other areas in mountain regions that have benefited from tourism and have not been able to bring about the type of change in energy use witnessed in Ghandruk, implying that affordability alone may not be the sole answer to reducing firewood consumption in areas that have benefited from tourism. The overall final energy use rate among low, medium, and large categories[2] of lodges in Ghandruk has been found to be 19, eight, and three GJ per room respectively. While such an inverse relationship between energy use and the number of rooms in the case of Ghandruk leads one to immediately draw a conclusion about efficiency gain, the results need to be interpreted cautiously. Lodges having a large number of rooms may be taken as a proxy for a higher economic status. Such lodges can afford the new sources of energy and efficient technologies which are relatively expensive for the lower categories of lodge. This implies that lodges having a larger number of rooms are more likely to enjoy the advantages of energy mix, although a full substitution of fuelwood with other new energy sources is an unlikely possibility.

In this, ACAP's role needs to be fully credited. ACAP as a non-profit INGO has been supporting a number of community development and conservation activities by involving both local people and lodge-owners in order to strike a sustainable balance in local needs, tourism management, and nature conservation. The Lodge Management Committee (LMC) and Conservation and Development Committee (CDC) are the key grass root institutions established to sustain the whole process of socioeconomic transformation, including various conservation-related programmes. Among these the forest conservation awareness programme can be assumed to have played an important role. This awareness programme is not confined to lodges alone but also is targetted at the household sector. However, technology adoption by households has not occurred to the extent that has been witnessed among the lodges. Although awareness among households with regards to conservation of forests and firewood use has also increased, the economic situation of households has not improved sufficiently to enable them to afford the technologies. This has been a weak point in the ACAP programme in which emphasis on income generation has received relatively less emphasis than on conservation and tourism development. Tourism development programmes are mostly confined to the lodges and only a small percentage of the household community benefit from tourism; and other income generation programmes have not developed (see Banskota and Sharma 1995b for more details).

[2] Note that lodge categories are defined in terms of the number of beds.

A third important factor that has helped bring about the energy transformation has been the development of appropriate technologies. Lodge-owners have been able to use the technologies readily without involving much additional cost. Besides efficiency gains, lodge owners using the technologies have also realised health benefits as the new technologies emit less smoke. However, with regard to solar water heaters, the climatic factors appear to constrain its wider application. Experiences gained so far from many developing countries, including Nepal, show that energy efficiency is necessary but not a sufficient condition for new technology to succeed. Generally the lack of intensive interaction between technology designers and end users has been one of the reasons for discontinuing the different end-use technologies disseminated. For example, the multiple end uses served by the traditional stove for a variety of cooking purposes, in general, and space heating in particular are not found to be handled by the existing improved cooking stove design. Such problems can be cited as among the reasons why 50 per cent of the improved stoves disseminated are no longer in use (ACAP 1994).

Clearly, several factors, such as awareness of new technology and conservation, grass roots' institutions, affordability, availability, and design, appear to be important in climbing up the energy ladder. The process of moving up the energy ladder cannot, however, be expected to take place at the same pace among the commercial (lodges) and rural household sectors. The process is rather slow in the latter case for the simple reason that the rural economy is low subsistence and is slow to transform. This is why, even after the introduction of electricity in Ghandruk, the switch over from firewood to electricity for cooking and heating purposes has not taken place. The firewood consumption rate is still 3,040kg per household per year, and electricity is mostly used for lighting purposes only. Since the household sector is the major consumer of firewood (firewood demand by lodges in Ghandruk is reported to be only 15 per cent of the total demand in Ghandruk VDC), reducing pressure on forest resources calls for simultaneous efforts to improve the economic conditions of the household sector through income-generating programmes. Even within the lodges in Ghandruk, income-generating programmes are crucial. As incomes increase, lodges-owners move from simple and inexpensive fuels to more sophisticated, convenient, and costly fuels and end-use devices, depending on the availability and reliability of such technologies. In this process of moving up the energy ladder, certain risks associated with environmental pollution/emission are likely possibilities.

A number of issues and challenges need to be carefully addressed to sustain this process of energy transformation. Promotion of energy efficiency (both technical and allocative) should receive priority in future conservation programmes. A distorted pricing regulation is always detrimental to the promotion of efficient energy use as it causes faulty, inefficient fuel uses and gives wrong investment signals to consumers. Additionally, affordability also plays an equally important role in the adoption of new technology, besides attractive prices. In conjunction with programmes to increase energy efficiency, the supply of traditional fuels should be sustained through improved management of forests and plantation programmes which require strong grass roots' institutions. In other words, conservation interventions should strike a realistic balance between sustainable supply

and demand management. This requires not only integrated environment-cum-economic policies and programmes but also an effective institutional framework from the national to grass roots' levels.

Case Study Two

Contribution of Tourist Expenditure to the Local Economy in the Annapurna Area

INTRODUCTION

Tourism is believed to be an important source of employment and income for rural people in areas where it is practised. Experiences so far, however, reveal that a large portion of the tourist expenditure carried out in mountain areas actually leaks out due to poor intersectoral linkages of the local economy with tourism. While success of mountain tourism depends on the push it can provide and the complementarity of conditions it can create for sustainable development of mountain areas, unfortunately tourism in Nepal has not been seen in terms of these multi-faceted linkages and coordinated packages of location-specific policies and programmes. Nor has the government been able to realise the full economic value of tourism, given the fact that the areas visited by tourists in the Nepal Himalayas are unique. As a unique resource not easily available in other parts of the world, scope exists for capturing a higher consumer surplus from foreign tourists without fear of competition, based on the willingness to 'pay' and the provision of high quality products and services (Wells 1993). As a result, whatever economic benefits are being realised from tourism are based on tourist expenditure on food, accommodation, transport, and so on. A large part of this income leaks out of the local areas as well as the country. Little is known, in a quantitative sense, about the varied dimensions of such leakages.

Evidence indicates that a large part of the money spent by tourists in Annapurna Conservation Area (ACA) continues to leak out. Currently, all the revenue from entry fees is deposited as an endowment fund to support the administrative and operating costs of development activities in the area. Tourists spend on accommodation, meals, wages, and on others things, but not all of this income can be expected to be fully retained in the local areas as many purchases have to be made to provide goods and services to the visitors. Additionally, many items consumed by the local people have to be imported and spending from tourism income on these items to fulfill consumption and other needs gives rise to a second round of leakages. Proper investigation of all these issues requires disaggregation of tourist spending and their relative shares in the overall share of retention of benefits within the community. Depending on the information available, it is also possible to disaggregate the information on the trends in resources made available to manage the valuable income-generating natural resources.

OBJECTIVES

The study aims to estimate the magnitude of tourism expenditure made in the Annapurna Area and the magnitude of income that is retained locally. Only the first round of leakages has been addressed, other leakages cannot be addressed due to lack of information. This understanding can provide useful information to faciliate the formulation of programmes and policies that help maximise retention of tourist spending in local areas.

The objectives of the study are:

- to estimate the magnitude of tourism expenditure made in the Annapurna area and the magnitude of income that is retained locally;
- to compare the estimated annual expenditure on managing environmental conservation in a specific area and to relate it to tourist spending in that area; and
- to analyse and identify the interventions and activities required to reduce the leakages of tourist income and maximise local retention of tourism income.

SAMPLE

A survey was carried out in late 1994 in the Ghandruk and Ghorepani areas of the Annapurna region. Visitors residing in different lodges, as well as the group tourists camping in the area, were randomly selected and asked to fill out a pre-structured questionnaire. In addition, 40 lodges and 40 households were also surveyed during this period. The present study uses information given by the 40 visitors interviewed to estimate tourist spending while in the Annapurna area (Banskota and Sharma 1995b). The present study will focus more on the expenditure made by visitors which accrues as gross income to the lodge and non-lodge communities in the area. By making deductions from the gross income; an estimate is made of the net tourism income retained within the area. The basic parameters used in the study are in most cases derived from the survey results and other relevant sources are referred to in the text.

METHODS OF ANALYSES AND ASSUMPTIONS UNDERLYING INCOME AND EXPENDITURE ESTIMATIONS

In an attempt to estimate tourist spending and its retention within the Annapurna area, information based on a case study survey is used and is supplemented with secondary sources of information. The daily average expenditure made by visitors when multiplied by the number of tourists gives the total tourist spending. Daily expenditures made by tourists take into account the different accommodation facilities used by FITs and group tourists (GTs), expenditure on meals (breakfast, lunch, and dinner), payment as paying guests, drinks purchased during the trek, and other local expenses, e.g., handicrafts and payment to porters. The expenditure made by tourists accrues as (gross) income to lodges, the local community, porters, and to the ACAP area through the conservation area fee. All these various expenditures made by the visitors has been taken into account. On the lodge and community side, an estimate of their average annual expenditure has been derived to estimate the magnitude of the tourism income that is retained locally, based on some simplifying assumptions. Specific details on the assumptions made are provided below.

Expenditure Per Visitor

Tourist expenditure is composed of expenditure on accommodation, food, payment to porters, purchase of drinks, fruits and handicrafts, and the conservation area fee.

Expenditure made by visitors is further grouped into community and lodge incomes. Gross lodge income consists of accommodation and food expenditure made by visitors in the lodges. Gross community income (non-lodge gross income) consists of expenditure made by visitors in the form of camping charges, as paying guests, porter wages, and other local expenditures on drinks and handicrafts. The conservation area fee is also treated as part of the community income.

Accommodation Expenditure

Lodge

Private lodges are the main accommodation facilities available to trekkers visiting the conservation area. FITs generally use lodges for accommodation, and this expenditure accrues as gross accommodation income to the lodges.

Camping

GTs generally use tents and thus have to pay camping charges. This expenditure is assumed to accrue as gross income to the community or to non-lodge owners. It is also possible that lodges rent camp grounds to pitch tents. However, since this information is not available, all income that accrues from camping charges is assumed to be a part of the community income.

Paying Guest

Some FITs and GTs also use private homes for accommodation. The rates (food and accommodation) charged to paying guests are assumed to be equivalent to the rates charged by the lodges. This income is also assumed to accrue to the community.

Food Expenditure

Visitors (FITs) were asked to provide information on the meals they had taken, the price of meals, as well as the average frequency of meals they had eaten to derive visitor expenditure on meals. Information on breakfasts, lunches, and dinners was collected separately. The per visitor, per day food expenditure is the sum of expenditures on breakfasts, lunches, and dinners made by visitors in lodges. The prices for meals as reported by FITs are used to derive food expenditure for visitors who use private homes.

Other Local Expenditure

In addition, visitors (both FITs and GTs) were asked to provide information on the expenditure they made during the trek on various things such as tea, soft drinks, fruit, handicrafts, and so on. This is a lump-sum expenditure made by visitors.

Porters Hired and Wages Paid

FITs and GTs hire different numbers of porters and some visitors do not hire any porters. The wages paid to porters also differ between FITs and GTs and different wages are paid to male and female porters. Furthermore, not all porters hired at the beginning of the trek are retained throughout the entire length of the trip. The assumptions regarding porters hired and wages paid can be summarised as follow (Banskota and Upadhyay 1989).

- Two FITs hire one male porter.
- Only 15 per cent of the FITs hire porters.
- Three porters are hired for every two members of a GT.
- Two-thirds of all the porters hired are males and one-third are females.
- On an average male porters are paid Rs 275 per day and female porters are paid Rs 85 only. The higher wages paid to male porters are because, besides porters, males are hired as cooks, kitchen boys, guides, and sirdars and the wage rates reflect the average paid to different male porters.

Conservation Area Fee

All visitors have to pay the Conservation Area Fee of Rs 650 and this is also treated as part of tourist expenditure in the area accruing to the community.

Total Visitors

Here, the total number of visitors that visited the Annapurna area reported by the KMTNC is used. The survey data provide information on the percentage distribution of trekkers that used lodges and camped, as well as those that stayed as paying guests. This distribution was then applied to the aggregate data given by the KMTNC. The total number of visitors visiting the Annapurna area have been distributed into FITs (55%) and GTs (45%).

Total Visitor Expenditure

The average expenditure per FIT and GT is first derived based on the above assumptions from the survey data and is then multiplied by the total number of visitors to the Annapurna

area in 1994 (Annapurna Conservation Area Project, Annual Progress Report 1994) to obtain total visitor expenditure. This total expenditure is the gross income that accrues to lodge-owners and the community.

Lodge and Community Expenditures

Obtaining detailed information on the different expenditures made by the lodges and the community was not possible and requires a detailed survey and resources. Secondary sources are used to provide a rough approximation of the total expenditure made by the community and lodges to obtain an estimate of the tourism expenditure that is retained locally.

In order to obtain lodge expenditure, estimates provided by the Nepal Rastra Bank (NRB 1988) are used. Local expenditure accounts for 82 per cent of the gross income. In other words, 82 per cent of the gross lodge income estimated from the survey data is assumed to be in the form of lodge expenditure. The resulting expenditure is then assumed to be distributed over the food (67%), wages and salaries (19%), energy (9%), and others (5%). A large part of the expenditure on food and energy leaks out of the area. The details on these parameters are provided in NRB (1988).

Retention of Lodge Income

The major items of expenditure made by lodges are on food, energy, salaries, and others. Of the total expenditure made on food by lodges (67% of lodge expenditure), 75 per cent is assumed to be spent on food imports. This is based on information collected from the lodges on the magnitude of major food items imported. Firewood and kerosene are the major energy sources used by lodges, although some lodges, especially those in Ghandruk, also use electricity and LPG. Kerosene is becoming a popular alternative to firewood in some areas, but it is not likely to replace firewood for many years to come. Although large quantities of firewood are consumed by lodges even in Ghorepani and Ghandruk, over time, with the many awareness programmes introduced by ACAP, people are beginning to understand conservation. Judging from the results obtained from the survey, it is estimated that about 35 per cent of the total energy bill actually leaks out from the area in the form of kerosene imports annually. The amount spent on firewood is nearly three times higher and is assumed to be fully retained locally. Most of the Annapurna area is many days walk from the road and transporting kerosene would add to its cost, thus making kerosene relatively unaffordable for many lodges. Additionally, as inaccessibility (from the road) increases, firewood prices decrease and, although quantities consumed may be higher, the total expenditure on firewood may not increase to the levels observed in Ghandruk and Ghorepani. Some places in the Annapurna area have electricity, and it is assumed that the income from electricity is also retained locally.

Annual payments in the form of wage and salaries to persons employed by the lodges (which constitutes 19% of the lodge expenditure) are assumed to be fully retained locally.

Lodges also spend on linen, quilts, mattresses, etc. There is no systematic record of this type of expenses.

Retention of Community Income

The conservation area fee which all visitors have to pay is assumed to be fully retained locally, although the fee is currently set aside as an endowment fund. Tourist expenditure accruing to the community is grouped into food and other non-food components, the latter being composed of camping charges, accommodation in private homes, porter wages, ACAP fees, and other local expenses. The community also spends on food imports, but the amounts spent by the community are not likely to be as large as those spent by the lodges. The "Multi-Purpose Household Budget Survey (1988) provides an idea of the expenditure pattern of households in Nepal (NRB 1988). Households in mountain areas have been selected to represent the community in the Annapurna area. The average household expenditure on imported food and non-food as a percentage of total expenditure is derived from the NRB results. This percentage is two per cent for food and 26 per cent for non-food (NRB 1988).

Porter income is first adjusted before applying the leakage factor to non-food components. Not all porters are hired from the area. As a result, all porter income cannot be treated as accruing to the community. It has been assumed that 59 per cent of the porters hired are from the local area and 41 per cent are from outside the area (Banskota and Upadhyay 1989). The income accruing to only 59 per cent of the porters is treated as part of the community income and a leakage factor of 0.28 is applied to reflect an additional leakage based on the NRB survey.

On the whole, some basic methods and assumptions underlying expenditure and income retention estimated for FITs and GTs separately can be summarised in the box.

DISCUSSION OF RESULTS

Visitor Characteristics

Trekkers are generally categorised into either free independent trekkers (FITs) or trekkers whose trips are fully organised by local travel or trekking agents, including meals and accommodation (Lama and Sherpa 1994). Most trekkers visiting the area were Europeans (80%), followed by Asians (10%). The distribution of the trekkers by nationality does not vary much between FITs and GTs. About 53 per cent of the trekkers surveyed in the study area were FITs and the remaining were GTs (Table 13). Of the total visitors surveyed, 55 per cent were females and 45 per cent males. The FITs interviewed were comprised of an equal percentage of male and female trekkers, whereas among the GTs, female trekkers constituted a relatively larger share (62%). Each FIT and group trekker surveyed had come in a group and the average group size of the FITs (3) was about one-third that of group trekkers (8) (Table 13). Mean trekking days for FITs totalled about 14 days and for GTs about 17 days. Asian tourists spend on an average

Tourism Expenditure Accruing to Lodges	= Expenditure on accommodation + expenditure on meals
Tourism Expenditure Accruing to the Community	= Expenditure on (camping + private homes) + Meals as Paying Guests + Expenditure on drinks, fruits, handicrafts, etc + porter wages + ACAP Fee.
Total Tourist or Visitor Expenditure	= Tourism Expenditure Accruing to Lodges + Tourism Expenditure Accruing to Community
Lodge Expenditure	= 0.82 * Tourism Expenditure Accruing to Lodges
Lodge Food Expenditure	= Lodge Expenditure *0.67
Lodge Wages & Salaries	= Lodge Expenditure *0.19
Lodge Energy Expenditure	= Lodge Expenditure *0.09
Lodge Other Expenditure	= Lodge Expenditure *0.05

Total Lodge Expenditure
Leakage from:

1. Food = 0.75 per cent of food expenditure
2. Energy = 0.35 per cent of energy expenditure
3. Others = 0.26 per cent of other expenditures

Total Community Expenditure
Leakage from:

1. Community Food Import = Tourism Expenditure on Food Accruing to Community * 0.02
2. Community Non-food Expend = Tourism Expenditure on Non-food Accruing to Community*0.26.

Table 13: **Percentage Distribution of Trekkers by Continents and Sex**

Trekkers	Europe	Aust-ralia	USA	Asian	Male	Female	Average		% of Trekkers
							Night	Size	
Independent	77.3	9.1		13.6	52	48	13.77	2.73	53
Group	83.3	5.6	5.6	5.6	38	62	16.61	7.89	47
Total	80.0	7.5	2.5	10.0	45	55	15.19	6.33	100

one week only. Also, the number of trekking days for male trekkers was found to be relatively higher than that of female trekkers among both the FITs and GTs. The age group distribution of trekkers indicates that a large majority of trekkers in both groups falls into the 19-35 age group, followed by the 36-50 age group, and finally the 51 plus age group.

Private lodges, camping, and private homes or paying guests are the main accommodation facilities available to trekkers visiting the conservation area. Some trekkers use a combination of these facilities (Table 14). Group trekkers reported the maximum use of tents (i.e., camping) and lodges, whereas FITs reported a maximum

Table 14: **Percentage Distribution of Visitors Using Different Facilities and Distribution of Visitor Nights by Type of Accommodation Facilities Used**

Visitors' Category	Lodge	Tents	Private Homes
Percentage Distribution of Visitors Using Different Facilities			
Independent	9.00	0.00	2.45
Group	1.67	11.06	1.89
Total	5.70	5.35	2.20
Percentage Distribution of Visitor Nights			
Independent	77	1	19
Group	7	81	12

Visitors reported use of a combination of different facilities. For example, FITs reported camping besides using lodges and private homes. Likewise, GTs had used lodges as well as private homes

use of lodges and private homes. The FITs mostly used lodges (77%) for accommodation, whereas the group trekkers used tents most of the time (81%). Both FITs and GTs were found to use other types of accommodation besides lodges and tents. Also note that both FITs and group trekkers had spent a small percentage of their stay as paying guests in private homes (Table 14).

Distribution of Visitor Expenditure

Expenditures made by visitors on accommodation, food, other local expenses, and porter wages are sources of gross income to the lodges and community. Visitors' expenditure could be the main source of income for the lodges, whereas for the community there could be other more important sources of income.

Table 15 provides information on the accommodation rates, meal prices, and porter wages paid by FITs. It is assumed that GTs also pay the same prices as FITs if they decide to use the local facilities. Almost all FITs use the local lodges and hence accommodation expenditures are simply the rate charged per night, per bed–times nights spent. The mean accommodation rate per night is Rs 56. These rates do not vary much among the lodges in both Ghorepani and Ghandruk as indicated by their respective low standard deviations.

FITs eat at the lodges, but not all eat all three meals. About 90 per cent of the FITs reported that they had used lodges to eat their meals, whereas 72 per cent of the group trekkers had reported meals were served to them by the agents who had arranged the

Table 15: **Average Accommodation and Meal Prices Paid and Other Expenses**

(in Rs)

	Accom	Break.	Lunch	Dinner	Local	Food
Mean	56	35	48	33	284	284
Std	32	30	33	29	257	86

Source: *Survey data*

trekking trip. The frequency of visitors using local lodges for food has direct implications on the income of local lodges. When meals are prepared and served by trekking agents, as in the case of group trekkers, local people or lodges make little profit, except for the raw food items purchased locally. Both groups of trekkers reported spending on drinks (coke, tea, handicrafts, etc) during their treks and the average expenditure made by both groups of trekkers was about the same.

Information on wages and porters hired was not uniformly provided by the visitors. FITs do not hire many porters during their trek. Group trekkers were not able to provide information on the number of porters hired, and information was collected from their support staff. The wages paid by FITs and group trekkers vary modestly with FITs paying on an average Rs 275 per day and GTs paying Rs 168 per day for a male porter. About one-third of the GTs also reported hiring female porters and paying on an average Rs 85 per day.

A majority of the visitors indicated that the prices charged were reasonable. A small percentage of the visitors indicated that meal prices were high. A majority of the visitors indicated that both meals and accommodation quality were fairly good. A similar response was also obtained in the case of hygiene and sanitation conditions in the facilities used by visitors (Table 16).

Table 16: **Visitors Comments on Meals, Room Quality, and Hygiene and Sanitation**

(in %)

Comments on	Independent			Group		
	Good	Fair	Bad	Good	Fair	Bad
Food	57.1	42.9	-	57.1		42.9
Rooms	23.8	71.4	4.8	-	75.0	25.0
Hygiene & Sanitation	38.1	47.6	42.9	42.9		14.3
	Fair	Low	High	Fair	Low	High
Price of Meals	9.5	28.6	6	85.7		-
Price of Lodging	-	26.3	73.7	-	50.0	-

Note: - indicates no response.

The expenditure made by tourists is disaggregated in several different ways. First, the expenditure is divided in terms of FITs and GTs over the different items of expenditure. Second, the expenditure accruing to lodges and the community and the average contribution by FITs and GTs are highlighted. Finally, a picture of aggregate expenditure is provided.

Average Expenditure per Visitor

Table 17 provides detailed information on expenditures made by an average FIT and GT during their entire stay in the Annapurna region as well as the distribution of the expenditure. An average FIT was found to spend Rs 4,280 relative to the average expenditure made by the GTs of Rs 7,635. Average daily expenditure of an independent

Table 17: **Visitor Expenditure Pattern and Its Distribution**

(Rs in '000')

	Accom	B-fast	Lunch	Dinner	Food	Local	Wage	Fee	Total	Per Trekker
FITs										
Lodges	**17454**	**9800**	**11813**	**14055**	**35668**	**0**	**0**	**0**	**53122**	**2273**
Per cent	32.86	18.45	22.24	26.46	67.14	0.00	0.00	0.00	100.00	NA
Per cent	84.89	77.88	83.23	75.90	78.75	0.00	0.00	0.00	53.10	53.11
Community	**3107**	**2784**	**2380**	**4462**	**9625**	**12352**	**6638**	**15192**	**46913**	**2007**
Per cent	6.62	5.93	5.07	9.51	20.52	26.33	14.15	32.38	100.00	NA
Per cent	15.11	22.12	16.77	24.10	21.25	100.00	100.00	100.00	46.90	46.89
Total	**20561**	**12583**	**14193**	**18517**	**45293**	**12352**	**6638**	**15192**	**100036**	**4280**
Per cent	20.55	12.58	14.19	18.51	45.28	12.35	6.64	15.19	100.00	NA
Per Fit	880	538	607	792	1938	529	284	650	4280	NA
GROUP										
Lodge	**510**	**478**	**4674**	**4674**	**9827**	**0**	**0**	**0**	**10337**	**541**
Per cent	4.93	4.62	45.22	45.22	95.07	0.00	0.00	0.00	100.00	NA
Per cent	13.17	16.13	1222.25	1467.23	268.18	0.00	0.00	0.00	7.62	7.63
Community	**3872**	**2963**	**382**	**319**	**3664**	**14852**	**100845**	**12429**	**135662**	**7095**
Per cent	2.85	2.18	0.28	0.23	2.70	10.95	74.34	9.16	100.00	NA
Per cent	88.37	86.11	7.56	6.38	27.16	100.00	100.00	100.00	92.92	92.93
Total	**4382**	**3441**	**5057**	**4993**	**13491**	**14852**	**100845**	**12429**	**145999**	**7635**
Per cent	3.00	2.36	3.46	3.42	9.24	10.17	69.07	8.51	100.00	NA
Per GT	229	180	264	261	706	777	5274	650	7635	NA

Note: Magnitudes of expenditures in Rs are provided in the first row of each block. The second and third rows show row and column sum percentages, respectively. NA means not applicable.

trekker for accommodation, breakfast, lunch, and dinner exceeds that of a group trekker as expected, since FITs depend on local facilities and GTs, who bring most of their food and tents, do not depend on local facilities. The average expenditure made by FITs for accommodation and food is almost three times that of the expenditure made by an average GT, but, on the other hand, the average expenditure on porter wages made by a GT is significantly higher than that made by a FIT[3]. Also note that, among the three meals, expenditure on dinner accounts for the largest share among the FITs. The share of other local expenditures made by GTs is slightly greater than that made by FITs. Finally, the Conservation Area Fee accounts for 15 per cent of the total FITs' expenditure and eight per cent of the GT expenditure.

An average FIT spends Rs 4,280 in the Annapurna region, and this includes the Conservation Area Fee as well. Of this total spending, food (45%) and accommodation (21%) together account for 66 per cent. Within food, dinner accounts for the maximum share, followed by expenditure on lunch and breakfast. Local expenditure and porter

[3] Although the expenditure made by a GT on porter wages appears to be high, this is not the case if examined minutely. For example, if two porters are hired for 10 days (which is less than the average duration of stay by an average GT), at an average wage rate of Rs 275 per day, the total expenditure on wages works out to be Rs 5,500.

wages account for 12 and seven per cent respectively of the FIT expenditure and, finally, the conservation fee accounts for a small 3.9 per cent of the total expenditure (Table 17).

Likewise, an average GT spends Rs 7,635, about 1.8 times more than the average expenditure of a FIT. The distribution pattern of this expenditure is totally different from that of FITs. Payment of porter wages alone accounts for about 69 per cent of average GT expenditure locally. The Conservation Area Fee accounts for about nine per cent, other local expenses account for 10 per cent, and this leaves 12 per cent expenditure on food and accommodation. This low level of expenditure on food and accommodation in the case of the GT is obvious, since both these arrangements are made by the trekking company. Such expenditures are not accounted for in the analysis.

Income Accruing to Lodges and the Community

FITs

Table 17 shows the total expenditure made by FITs that accrues as gross income to lodges and the community. Of the total estimated FITs' expenditure of Rs 100,036 thousand, 53 per cent accrues as gross income to the lodges and 47 per cent accrues as gross income to the community. The lodges realise 33 per cent of this gross income in the form of accommodation charges and 67 per cent in the form of meal charges.

On the other hand, FITs also contribute to the community through their expenditure in the form of camping, paying guests, other local purchases, payment to porters, as well as the Conservation Area Fee. The distribution of these expenditures is on food and accommodation (27%), other local expenses (26%), wages (14%), and the ACAP fee (32%). The total of all these expenditures is Rs 46,913 thousand and it comprises about 47 per cent of the total FITs expenditure that accrues as gross income to the community.

GT

There is a disparity in the expenditure patterns of FITs and GTs, with GT's expenditure being more biased towards the community. The total annual expenditure made by GTs in the area is estimated to be about Rs 145,999 thousand, of which only about eight per cent accrues as gross income to the lodges and the remaining 92 per cent accrues as gross income to the community. Details are highlighted in Table 17. The bulk of GT expenditure that accrues as income to the community is accounted for by the payment of wages to porters. The Conservation Area Fee accounts for only about nine per cent of the total GT expenditure. The three expenditure items, namely, wages, fees, and other local expenses taken together account for about 96 per cent of the total expenditure that accrues as gross income to the community.

Table 18: **Percentage Distribution of Visitor Expenditure and Gross Income Accruing to Lodges and Community**

(Rs '000')

	Accom	B-fast	Lunch	Dinner	Food	Local	Wage	Fee	Total	Per Trekker
Total Lodge	**17964**	**10278**	**16488**	**18729**	**45495**	**0**	**0**	**0**	**63459**	**1493**
Per cent	28.31	16.20	25.98	29.51	71.69	0.00	0.00	0.00	100.0	NA
Per cent	72.02	64.14	85.65	79.67	77.39	0.00	0.00	0.00	25.79	25.79
Per Lodge	78	44	71	81	197	0	0	0	275	NA
Community	**6979**	**5747**	**2762**	**4780**	**13289**	**27204**	**107483**	**27621**	**182576**	**4297**
Per cent	3.82	3.15	1.51	2.62	7.28	14.90	58.87	15.13	100.0	NA
Per cent	27.98	35.86	14.35	20.33	22.61	100.0	100.0	100.0	74.21	74.21
ACAP Area	**24943**	**16025**	**19250**	**23510**	**58784**	**27204**	**107483**	**27621**	**246035**	**5790**
Per cent	10.14	6.51	7.82	9.56	23.89	11.06	43.69	11.23	100.0	NA

Finally, Table 18 provides an aggregate picture of the expenditures made by both FITs and GTs that accrue as gross income to the lodges and community. What the Table indicates is that of the total estimated annual expenditure of Rs 246,035 thousand made by visitors in the Annapurna region in 1994, lodges accounted for about 26 per cent and the community accounted for about 74 per cent. An average visitor spends about Rs 5,790, of which Rs 1,493 accrued as gross income to the lodges and Rs 4,297 accrued as gross income to the community.

Accommodation accounted for about 28 per cent of the gross income of the lodges and the remaining was accounted for by meals. With respect to the community, accommodation and food accounted for only about 11 per cent of the visitors' expenditure. Wages accounted for about 59 per cent of the total community income, other local expenditure and the ACAP fee together accounted for the remaining 30 per cent of visitor expenditure. Finally, an estimate of the annual gross income per lodge has also been made and is provided in Table 18.

The results indicate that FITs directly support the local lodges through their expenditure on accommodation and meals in a more significant way than the GTs. On the other hand, GT expenditure is more diffused throughout the community, although they contribute in a much smaller way to the local lodges. Although the amount that accrues as gross income to the community is seen to be large, the leakages from this area of income are also believed to be high.

LODGES AND COMMUNITY EXPENDITURES AND INCOME RETENTION

Lodges have to spend on a variety of things to cater to the tourists. Many different kinds of food have to be purchased. Energy has to be purchased and wages to the employees have to be paid. Thus, four sources of expenditure made by lodges have been taken

into account given the information available from the NRB on the share of lodge expenditure on food, energy, salaries, and others.[4]

Most lodges are managed by family members, only a few hire people. Lodges hire different numbers of people during the peak and slack seasons. An average lodge provides employment to about 7.5 people each year. Females comprise about 55 per cent of the employees in the lodges. Most lodge employment (75%) is undertaken by family members and local labour is hired (25%) to meet peak season demands. An average lodge was reported to hire 1.12 males and about 1 female in a year. The information reported by the NRB is very similar to the findings of the present survey and since the present survey did not have adequate information on the wages paid by the lodges to different employees, the results reported by NRB have been used. Moreover, while wages are an expenditure of the lodges, this accrues to the community. Table 19 provides the retention of lodge income calculated based on the assumptions already discussed, which is about 55 per cent of the total tourist expenditure that accrues to lodges.

Table 19: **Lodge Expenditure Pattern and Income Retention**

(Rs '000')

	Food	Salary	Energy	Other	Total
Distribution of Expenditure	34,864	9,887	4,683	2,602	52,036
Local Retention	8,716	9,887	3,044	1,951	23,598
% Retention with savings	NA	NA	NA	NA	55
% Retention without savings (%)	25	100	65	75	45

Note: *Savings refers to income (18%) referred to in the text.*

On an average, lodges spend 82 per cent of the gross income on various items. Food accounts for the largest share of this expenditure (67%), followed by salaries (19%), energy (9%), and other expenditures (5%). The retention of this expenditure on salaries can be assumed to be very high as most employees will be from within the area. Food expenditures also leak out substantially from within the local area. An idea of lodge-owners' responses to the origin of major food items is provided in Table 20. On an average, 75 per cent of the lodge expenses on food are estimated to leak out from the area based on the results reported in Table 20.

Some details on energy expenditure made by the lodges were obtained from the field. The main sources of energy for the lodges are firewood, kerosene, electricity, LPG, and solar panels . Use of solar energy and LPG has only just begun. Note that expenditure on solar energy is the cost of installing a solar panel and is a fixed cost. Other energy costs are variable. In calculating the net income, the fixed cost incurred to obtain solar panels is not accounted for. Table 21 provides information on the relative share of

[4] Lodges also have to purchase linen, other manufactured materials, as well as furniture. Information is not available on these expenditures and hence they are not accounted for. Thus, local retention of income by lodges will be lower than that implied in the present discussion. See NRB 1989 for more details.

Table 20: **Sources of Possible Leakage from Tourist Generated Income**

(in %)

Items	Ghorepani		Ghandruk	
	Local%	Import%	Local%	Import%
Rice	0.00	100.00	3.18	96.82
Flour	4.12	95.88	48.41	51.59
Bread	14.71	85.29	42.42	57.58
Vegetables	85.25	14.75	79.09	20.91
Meat	75.00	25.00	81.94	18.06
Eggs	0.00	100.00	1.14	98.86
Milk	0.00	100.00	21.14	78.86
Fruit	0.88	99.12	0.00	100.00
Jam/Butter	0.00	100.00	0.00	100.00
Furniture	90.29	9.71	85.45	14.55
Cloth/Drinks/Mattresses	5.56	94.44	0.00	100.00
Total	23.59	76.41	31.91	68.09

Table 21: **Share of Average Annual Energy Expenditure per Lodge**

	Shares %
Firewood	54
Kerosene	36
Electricity	1
LPG	8
Average (Rs)	19,171

Table 22: **Source of Community Income and Its Retention**

(Rs in '000')

	Food	Accommo dation	Porter	Other	Fee	Total
Without Fee						
Income	13,289	6,979	107,483	27,204	0	15,4955
Retention	13,024	5,164	45,658	20,131	0	83,977
% Retention	98	74	42	74	0	54
With Fee						
Income	13,289	6,979	107,483	27,204	27,621	18,2576
Retention	13,024	5,165	45,658	20,131	27,621	11,1599
% Retention	98	74	42	74	100	61

variable energy expenses per lodge. Expenditure on firewood accounts for the largest (54%) variable energy expenditure made by lodges, followed by kerosene (36%), although lodges in Ghorepani spend more on firewood than lodges in Ghandruk (see the first report in this volume for more details on energy use).

The expenditure incurred by the community has been derived based on the assumption made previously and the results are provided in Table 22. The community expenditures have been derived under two scenarios, namely, first treating the ACAP fee as part of the community income and, second, not treating it as part of the community income. Table 22 provides estimates of the community income that is retained locally under these two scenarios. Under the without ACAP fee scenario, visitors' expenditure accruing to the community is estimated at Rs 154,954 thousand (at 1994 current prices) of which about 54 per cent is estimated to be retained locally (a retention of 98% from food expenditure and 50% from non-food expenditure). When the Conservation Area Fee is taken into account (second scenario), community income is Rs 182,575 thousand, of which 61 per cent is estimated to be retained locally (a leakage of 42% from non-food and 2% from food expenses).

OVERALL RETENTION OF TOURIST SPENDING

The overall retention of tourist-generated lodge and community incomes is presented in Table 23. The magnitude of retention is found to be almost equal among both the community (54%) and lodges (55%), when the ACAP fee is not considered as part of the community income. However, if the fee is considered to be part of the community income, the retention scenario changes somewhat, with higher retention reflected in the community (61%). If the total income retention for the Annapurna area as a whole is considered (lodge+community) then the retention rate is about 60 per cent when the

Table 23: **Overall Retention of Lodge and Community Income**

(Rs in '000)

With fee	Lodge	Community	Total
Tourist Income	63,459	182,576	246,035
Per Cent	26	74	100
Total Expenditure	52,036	182,576	234,612
Per Cent	22	78	100
Retained	35,021	111,599	146,620
Per Cent	24	76	100
Total Retention as % of Income	55	61	60
Without fee			
Tourist Income	63,459	154,955	218,414
Per Cent	29	71	100
Total Expenditure	52,036	154,955	206,991
Per Cent	25	75	100
Retained	35,021	83,977	118,998
Per Cent	29	71	100
Total Retention as % of Income	55	54	54

fee is treated as part of the income. Alternatively, when the fee is not treated as income, the overall retention is about 54 per cent.

The retention of tourism income estimated in this study should be taken as an upper limit. In the first place, the leakages taken into account are only first-round leakages. Further expenditure and, hence, leakages have not been taken into account. Also, it is likely that not all the Conservation Area Fee will be retained. It is difficult to provide an estimate of the leakages that occur in the other rounds of expenditure due to lack of information.

COMMUNITY AND TOURISM LINKAGES

The information about purchases made by lodges provides some idea of the extent of linkages between tourism and the local community. One way of judging this linkage is by analysing the food imports made by the lodges. Many food items that can be grown locally can be supplied to the lodges. Imports are considered to be purchases made by lodges (and local households) from outside the area. The higher the degree of imports, the higher will be the leakage, implying a low level of retention of tourism income within the local community, and, hence, a low multiplier effect. Although not all forms of purchases can be made locally, many perishable items can be produced locally to cater to the tourists.

Lodge owners can purchase food items from the local communities or, in an agricultural setting such as the study area, could supply from their own sources. Thus, the imports of basic food items would be low. Lodge owners were asked to provide information about the share of expenditure on different items, giving the source of purchase (local or import) in order to understand the extent to which the lodges depend on the local community to cater to tourists (see Table 20).

Rice is a prime food item for catering to tourists. Lodge owners indicated that almost all the rice is imported from Pokhara, despite it being grown locally. Other food items that can be produced locally but are currently imported are flour, bread, eggs, and milk. Most manufactured goods cannot be produced locally and have to be imported.

Therefore, based on the information presented above, the link between tourism and community development is not very strong. It should be noted that about 50 per cent of the group tourists purchase most of their food items in Pokhara. The scope for strengthening tourism and community linkages can be realised if many perishable food items were to be produced locally and their supply assured. This would lead to a greater scope for retaining a larger share of tourism income locally.

ANNAPURNA CONSERVATION AREA FEE AND ANNUAL ACAP EXPENDITURES

ACAP has encouraged local participation in resource management, and this is different from other protected areas where resource management and protection is carried out

directly by the government. The Conservation Area Fee charged to visitors is retained in the endowment fund and interest earned is being locally invested alongside other grants raised by ACAP. This reinvestment of the Conservation Area Fee has in itself brought about an integration of tourism, local community development, and resource management.

An estimated sum of Rs 27,621,100 accrued in the form of Conservation Area Fees (Rs 650 per tourist multiplied by the total number of tourists visiting the area (Annex 1)) in 1994 and constitutes about 11 per cent of the total tourist spending in ACAP. Table 24 provides the direct annual expenditure made by ACAP to manage the conservation area over the last three years (1992/93 -1994/95). Details are provided in Annex 2. ACAP's annual expenditure increased from Rs 36.79 million in 1992/93 to Rs 63.46 million in 1994/95[5]. During this short period, it is observed that the share of programme expenditure has declined from about 80 per cent in 1992/93 to about 45 per cent in 1994/95. Operating costs and capital investments are increasing.
Also the programme expenditure made by ACAP in 1994/95 is almost equal to the

Table 24: **Annapurna Conservation Area Project Expenditure**

	1992/93	1993/94	1994/95
Personal/administrative	6,132	12,418	29,756
	(17)	(20)	(47)
Capital expenditure	1,426	1,649	5,077
	(4)	(3)	(8)
Programme expenditure	29,239	48,045	28,635
	(79)	(77)	(45)
Total	**36,797**	**62,112**	**63,468**
	(100)	**(100)**	**(100)**

Source: *Obtained from KMTNC, Kathmandu Office.*
Note: *Figures in parentheses are in percentages (rounded off)*

Conservation Area Fee collected and the overall expenditure by ACAP in the same period is lower than the estimated tourist spending. For example, overall tourist spending in the ACAP area was Rs 246 million (in 1994) which is almost four times higher than the overall expenditure made by ACAP during the same year (i.e., Rs 63.5 million). In other words, the overall expenditure by ACAP in 1994/95 is only about 25 per cent of the overall expenditure of visitors.

Expenditure on conservation area capital investment and operating costs (staff salaries, administrative costs, maintenance costs, and so on) constitutes the direct costs of conservation. Experiences from other protected areas indicate that such direct costs of managing valuable natural resource are many times (as high as five times) higher than

[5] Total ACAP expenditure in 1994/95 excludes institutional development support expenses (Rs 9520,000) and is not taken into account in Table 24 (Annex 2).

managing valuable natural resource are many times (as high as five times) higher than expenditure by tourists for the sake of enjoying these assets. Indirect costs should, however, not be overlooked.

Indirect costs of conservation include such things as damage caused by the existence of the conservation area and are usually borne by the local community–for which generally no compensation is paid, e.g., damage caused to protected wildlife. There is neither an estimate of this indirect cost, nor any mechanisms for compensation.

Another issue relates to the *ad hoc* nature of setting the Conservation Area Fee. Are tourists paying more or less to enjoy the unique attributes of the Annapurna area? This is a question that has not been scientifically addressed. The unique attributes of the Annapurna area are scarce and theoretically must command a high price. It is important, therefore, to understand how much tourists are willing to pay to enjoy this unique natural area. When visitors were asked whether their trip had been enjoyable and if it met their expectations, the answer of more than ninety-four per cent was in the affirmative and only five per cent of independent trekkers were disappointed (Table 25). This information provides scope for exploring the willingness of the tourists to pay more.

Table 25: **Visitors Overall Trekking Experience**

	Independent	Group	Overall
Most Enjoyable	19	18	37
	(90)	(100)	(95)
Less Enjoyable	2	-	2
	(10)		(5.1)
Total cases	21	18	39
	(100)	(100)	(100)

IMPROVING RETENTION OF TOURIST EXPENDITURE: CONSTRAINTS AND SCOPE

The survey data revealed that only 12 per cent of the active population (aged 10 years and above) in Ghandruk were engaged in tourism. Only those households that operated lodges had direct linkages with tourism. Indirect or secondary occupational linkages of household members come through the sale of their agricultural produce or from being occasionally employed in tourist-related activities.

Establishing indirect or backward linkages of the household sector with tourism activities is an essential step for extending tourism benefits to a wider local community. Developing this link will also help minimise tourism income leakage. When asked whether the degree of such indirect occupational linkage with tourism was high, moderate, or nil, only about 10 per cent of the economically active household members employed in the agricultural sector stated that their occupational linkage with tourism was high. The degree of such a linkage was found to be naturally high among those whose major

occupation was business and tourism, but as this group constitutes a relatively low proportion of the total active labour force (11%), the scope for enlarging the retention of tourist spending must come through establishing a strong linkage of tourism with the agricultural base of the rural masses on the basis of the comparative advantage of its hinterland.

Currently, the large majority of households in the area produce food which only meets their bare subsistence needs, and a fairly large per cent still continue to experience chronic food deficit as an annual phenomenon, even after more than a decade of ACAP intervention in the area. ACAP interventions do not appear to be very proactive in addressing the needs of agricultural transformation by supporting a number of income -generating programmes linked to tourism. Many food items that can be produced locally are still mostly being imported from outside. Currently, a small per cent of the households surveyed (8% paddy producing and 16% potato cultivation) dispose of their surplus produce to tourist lodges. Tourism should make the maximum use of locally-produced products and services, and the first step is to improve the local production base.

Thus, there is scope to intensify market-based agricultural produce through crop diversification backed by adequate skills and outreach support. While most of the households surveyed have had access to skills' training and hence perceive improvements in their skills due to ACAP, there are no linkages of such skills to income-generating activities. In other words, skill development programmes are not backed by the provision of broad-based income-generating programmes. This is also reflected in terms of displacement of labour away from agriculture as perceived by over 60 per cent of the households that were surveyed.

All this evidence indicates a fairly weak supply component of tourism with lodges being heavily dependent on the outside economy in catering to tourists, while at the same time a larger percentage of the rural population has not received adequate incentive or opportunities to realise tourism benefits through augmenting their production base. In such a situation, tourism leakages are manifest at multiple levels. On the demand side, tourists are not finding the opportunity to spend on what they are willing to pay more for, e.g., quality and diversified products and services.

It should be realised that there is a limit to how much tourism can contribute to the development of a local area. For the last thirty years, Nepal has not been able to develop new tourism products, except for trekking tourism, and this has largely been created from demand side pressures. Interviews with tourists indicated that not all come to the Annapurna region to trek and over 50 per cent indicated that their main motivation in visiting the area was to enjoy nature. There is enormous scope for developing new tourism products to serve the different interests of tourists, on the one hand, and also to develop manpower to manage these new products. With over ten years of experience, ACAP has been unable to provide any direction in this area. Development of new products does not mean that the old trekking tourism product has to be de-emphasised.

Trekking will always continue to be an integral part of mountain tourism. International tourism trends indicate the scope for tapping new markets as people's concern for the environment and the desire to see nature in her many manifestations are increasing. Nepal and the Annapurna region, with its rich ecological diversity, have the scope to lead Nepal's mountain tourism to more prosperous heights.

It is also interesting to note that over 90 per cent of the visitors surveyed indicated that their visit was most enjoyable as per expectation. This fact, if explored more adequately, will enable us to identify visitors willing to pay more to visit the Annapurna area. Scope exists to tap this large tourist consumer surplus through proper demand management strategy. As most tourists give first rank to viewing scenery rather than to trekking as their motivation for touring in the area, diversification, in terms of both area and product, offers a new opportunity to generate more tourist spending in the local economy. The existing level of tourist information and the marketing strategy of ACAP have to be improved as about two-thirds of the tourists visiting the area are not aware of the retention of the Conservation Area Fee in the destination area.

The additional income generated through a demand management strategy in the form of pricing is not likely to be retained locally unless it is well backed by sound supply management strategies. Currently, ACAP intervention strategies appear to be weak in both respects. While ACAP has been able to improve the social and environmental carrying capacity of the area to some extent, it has paid little or no attention to the economic carrying capacity, so vital for improving the economic conditions of the local people and promoting sustainable mountain tourism.

There is a great deal of scope for improving the retaining capacity of the income earned as well as for improving tourism income accruing to the Annapurna Conservation Area. A great deal of work on the aspects of both demand and supply is necessary. On the supply side, a greater emphasis on improving the productive capacity of the local area in terms of being capable of supplying the local tourism industry with vegetables, meat, eggs, fruit, milk, and other products is needed. Tourism in the Annapurna area is seasonal, and will most likely continue to be seasonal in nature, but there is little doubt that tourism in the area will decrease. Besides developing the local production base, there is a need to develop new tourism products in the area. With over thirty years of tourism history in the Annapurna area, the local tourism industry has not been able to develop and diversify products. ACAP can still play a major role in this respect. The local people's capacity to organise and manage different aspects of the tourism industry and natural resources has been greatly improved, but many still do not seem to have the incentive or opportunity to participate in the tourism industry.

REFERENCES

Banskota, K. and Sharma, B., 1995a. *Mountain Tourism in Nepal: An Overview*. ICIMOD Discussion Paper Series No. MEI 95/7. Kathmandu: ICIMOD.

Banskota, K. and Sharma, B., 1995b. *Tourism for Mountain Community Development: Case Study Report on the Annapurna and Gorkha Regions of Nepal*. ICIMOD Discussion Paper Series No. MEI 95/11. Kathmandu: ICIMOD.

Banskota, K. and Upadhyay, M., 1989. 'A Survey of Trekking Tourists in Langtang National Park'. Kathmandu, Nepal.

Bell, J., 1994. 'Cook Electric: The Ghandruk Experience'. In *Intermediate Technology*.

Gurung, H.B and Arthur, B., 1995. *Eco-Trekking in the Southern Annapurna Himal*. Kathmandu, Nepal: Annapurna Conservation Area Project/King Mahendra Trust For Nature Conservation.

Joshi, B. and Rijal, K, 1991. 'Decentralised Energy Planning Model for Optimal Resource Allocation with a Case Study of Domestic Sector of Rurals in Nepal'. In *International Journal of Energy Research*, Vol 15, pp 71-78. England: John Wiley.

King Mahendra Trust For Nature Conservation, 1994. *Annapurna Conservation Area Project, Annual Progress Report* (15th July 1993 to 14 July 1994). Kathmandu, Nepal: King Mahendra Trust for Nature Conservation.

King Mahendra Trust For Nature Conservation, 1990. *Annapurna Conservation Area Project, Annual Progress Report* (March 1986 to December 1989). Kathmandu, Nepal: King Mahendra Trust for Nature Conservation.

Kodani, R, H.Park and Ramani, K.V., n.d. *Integrated Energy Planning*, A Manual, Vol 2. Kuala Lumpur, Malaysia: Asian and Pacific Development Centre.

Lama, W. and Sherpa, A, 1994. 'Tourism Development Plan for the Makalu-Base Camp Trek and the Upper Barun Valley', Revised draft report. Nepal: Makalu-Barun Conservation Project.

National Planning Commission Secreteriat,1995. *Perspective Energy Plan (PEP) for Nepal*, Volume 2, Main Report and Volume 2: Annexure, Project no NEP/91/003-11, Kathmandu.

Nepal Rastra Bank (NRB), 1988. *Multipurpose Household Budget Survey*. Kathmandu: Nepal

Rayamajhi, S. 1994. 'Management of Natural Resource: An Assessment of the Forest Conservation Program Conducted by the Annapurna Conservation Area Project in Ghandruk VDC'. M.S. Thesis, Agricultural University of Norway.

Rijal, K, Bansal, N.K. and Grover, P.T., 1990. 'Rural Household Energy Demand Modeling: Case Study of Nepal'. In *Energy Economics*, Vol 12.4, pp 279-288. England: Butterworth/Heinemann Ltd.

Siemann, D. and Steinbach, T. 1993. *Analysis and Evaluation of Project Activities in Tourism Impact Areas*. Harvard: Harvard University, John F. Kennedy School of Government and Annapurna Conservation Area Project.

Wells, M., 1993. 'Neglect of Biological Riches: The Economics of Nature Tourism in Nepal'. In *Biodiversity and Conservation* 2, 445-464.

Annexes

Annex 1: **Visitors to the Annapurna Area**

Months	1989	1990	1991	1992	1993	1994
January	1,525	2,374	1,879	1,639	2,355	1,979
February	2,578	2,845	2,590	1,201	3,428	3,313
March	5,085	5,348	5,389	8,199	6,357	6,873
April	2,430	3,853	4,441	5,072	5,583	5,371
May	4,217	1,120	1,325	1,553	1,444	1,792
June	148	337	317	515	507	527
July	416	315	443	617	476	297[1]
August	396	445	721	975	688	NA
September	1,711	2,107	2,909	3,508	2,069	NA
October	4,633	7,768	7,586	9,989	9,607	NA
November	9,129	5,711	5,186	7,089	6,360	NA
December	4,326	3,588	5,727	4,096	3,717	NA
Total	**36,594**	**35,811**	**38,513**	**44,453**	**43,131**	**20,152**

Source: *KMTNC, ACAP's Entry Fee Collection Counter, Department of Immigration, Thamel, Kathmandu*

Note: [1] Based on the Entry Fee Collected up to 22 July, 1994

Annex 2: **Annapurna Conservation Area Project, Annual Budget Breakdown**

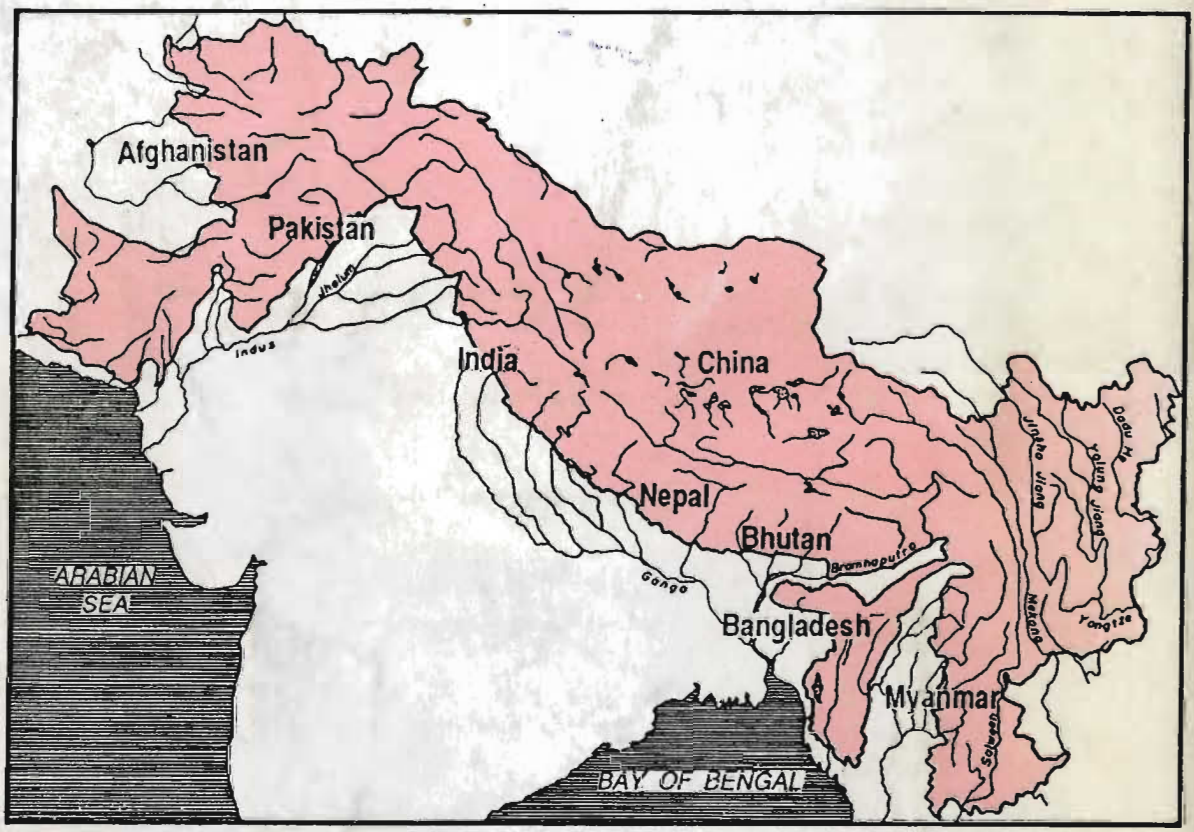
	1992/93	%	1993/94	%	1994/95	%
Administrative	1,363,846	3.71	2,450,283	3.94	4,458,000	6.11
Salary	747,203	2.03	1,314,817	2.11	3,454,000	4.73
Allowances	183,000	0.50	347,240	0.56	1,397,000	1.91
Travel	410,000	1.11	565,000	0.91	480,000	0.66
Stationery	500,000	1.36	900,000	1.45	500,000	0.69
International travel	273,000	0.74	840,000	1.35	452,000	0.62
Office materials	67,000	0.18	108,500	0.17	122,000	0.17
Books and periodicals	173,100	0.47	618,900	1.00	504,000	0.69
Rent consultancy fee	250,000	0.68	342,000	0.55	320,000	0.44
Local conveyance	80,000	0.22	525,000	0.84	427,000	0.59
Water and electricity	52,900	0.14	145,000	0.23	147,000	0.20
Postage, telephone, fax	206,000	0.56	341,500	0.55	313,000	0.43
Fuel & lubricant for vehicle	177,360	0.48	290,520	0.47	564,000	0.77
Fuel for heater and generator	43,000	0.12	403,000	0.65	0	0.00
Entertainment	280,000	0.76	740,000	1.19	495,000	0.68
Staff welfare	115,000	0.31	265,000	0.43	281,000	0.38
Promotion advertisement	92,000	0.25	224,700	0.36	155,000	0.21
Repair and maintenance	576,000	1.57	865,000	1.39	665,000	0.91
Medical kit	18,000	0.05	17,000	0.03	44,000	0.06
Staff training	64,000	0.17	80,000	0.13	128,000	0.18
Staff uniform	75,000	0.20	275,000	0.44	175,000	0.24
Insurance	160,000	0.43	180,000	0.29	200,000	0.27
Bank charges	12,000	0.03	80,000	0.13	25,000	0.03
Charity and donations	35,000	0.10	52,000	0.08	0	0.00
Miscellaneous	179,072	0.49	515,220	0.83	576,000	0.79
Sub total	**6,132,481**	**16.67**	**12,485,680**	**20.08**	**15,882,000**	**21.76**
Capital Expenditure						0.00
Furniture & fixtures	120,000	0.33	320,500	0.52	349,000	0.48
Equipment	565,000	1.54	1,028,000	1.65	595,000	0.82
Building	0	0.00	201,000	0.32	30,000	0.04
Vehicle	741,000	2.01	100,000	0.16	0	0.00
Sub total	**1,426,000**	**3.88**	**1,649,500**	**2.65**	**974,000**	**1.33**
Projects						
Personnel expenditure	6,217,876	16.90	11,950,033	19.22	13,874,000	19.01
Capital expenditure	1,402,500	3.81	3,966,500	6.38	4,103,000	5.62

Annex 2 **(Cont'd)**

	1992/93	%	1993/94	%	1994/95	%
Project activities						
Forestry	2,915,546	7.93	0	0.00	0	0.00
Natural resource conservation	0	0.00	5,123,756	8.24	3,468,000	4.75
Heritage/culture conservation	0	0.00	1,735,000	2.79	2,415,000	3.31
Environmental day	0	0.00	0	0.00	15,000	0.02
Agricultural Development	1,240,085	3.37	1,465,498	2.36	1,010,000	1.38
Conservation education	3,496,008	9.50	3,991,634	6.42	0	0.00
Alternative energy	1,473,103	4.00	3,026,669	4.87	4,551,000	6.24
Community projects	2,399,522	6.52	5,698,193	9.16	4,200,000	5.75
Research	210,000	0.57	289,000	0.46	0	0.00
Women's development	1,001,721	2.72	1,417,936	2.28	1,036,000	1.42
Monitoring and evaluation	100,000	0.27	0	0.00	868,000	1.19
Conservation fund	1,100,000	2.99	0	0.00	0	0.00
Soil and water conservation	250,000	0.68	50,000	0.08	0	0.00
CE extension, motivation	323,000	0.88	0	0.00	1,762,000	2.41
Health & sanitation programme	225,000	0.61	750,000	1.21	0	0.00
Skill development programme	50,000	0.14	20,000	0.03	0	0.00
Consultancy services	50,000	0.14	80,000	0.13	0	0.00
Tourism development	125,000	0.34	990,000	1.59	1,113,000	1.52
Mustang tourism project	4,200,000	11.42	0	0.00	0	0.00
Production of saleable items	2,449,500	6.66	2,965,000	4.77	2,520,000	3.45
Trekking guide training	0	0.00	175,000	0.28	299,000	0.41
Rural development	0	0.00	0	0.00	4,163,000	5.70
Miscellaneous	0	0.00	4,350,999	7.00	10,735,000	14.71
Sub total	**29,228,861**	**79.45**	**48,045,218**	**77.27**	**56,132,000**	**76.91**
Grand total	**36,787,342**	**100.00**	**62,180,398**	**100.00**	**72,988,000**	**100.00**

Participating Countries of the Hindu Kush-Himalayan Region

- Afghanistan
- Bhutan
- India
- Nepal
- Bangladesh
- China
- Myanmar
- Pakistan



International Centre for Integrated Mountain Development

4/80 Jawalakhel, G.P.O. Box 3226, Kathmandu, Nepal

Telex : 2439 ICIMOD, NP
Telephone : (977-1-525313)
e-mail : dits@icimod.org.np

Cable : ICIMOD, NEPAL
Fax : (977-1) 524509
(977-1) 536747