

**PROBLEMS AND PROSPECTS OF RENEWABLE ENERGY USE FOR  
SUSTAINABLE TOURISM PROMOTION IN NEPAL**

*(A Case Study of Lukla-Monjo Trekking Route in Chaurikharka VDC of  
Solukhumbu district)*

**A Thesis Submitted to the Central Department of Rural Development for  
the Partial Fulfillment of the Requirements of**

**Master's Degree of Arts in the Faculty of Humanities and Social Sciences**

**By**

**Ballav Mani Dahal**

**TU Regd. No. 14356-87**

**Central Department of Rural Development**

**Tribhuvan University**

**Kirtipur, Kathmandu**

**Nepal**

**November, 2006**

## ACKNOWLEDGEMENT

First of all, I would like to extend my sincere gratitude to Prof. Dr. Jagan Nath Shrestha, Director of the Centre for Energy Studies (CES) at the Institute of Engineering (IoE), Tribhuvan University (TU), for encouraging me to carry out this research study. The study would not have been successful without his guidance and supervision.

I would also like to express my heartfelt thanks to the residents of the Chaurikharka Village Development Committee (VDC) of the Solukhumbu district, especially the respondents, for providing me with necessary data and information.

The entire team of the Nepal Tourism Board (NTB) deserves special thanks for their technical as well as financial support. I am indebted to the Himalayan Rescue Association Nepal (HRA), the Trekking Agents Association of Nepal (TAAN), the Rural Energy Development Programme (REDP), Eco-Himal, Lotus Energy (P) Ltd., and the Sagarmatha National Park (SNP) for their technical help.

I cannot help extending my hearty thanks to TRPAP's National Programme Manager Mr. Rabi Jung Pandey, Environment Specialist Mr. Hari Krishna Upreti and GIS (Geographic Information System) Associate Mr. Balendra Prasad Deo, and managing director of Danfe Travels & Tours (P) Ltd. Mr. Pabitra Kumar Karki for their necessary help. I am also thankful to Mr. Lila Bahadur Baniya, Manager of the Sustainable Tourism Development Unit (STDU) of NTB, for his kind cooperation.

My thanks are also due to my spouse Mrs. Gita Dahal, little daughter Ms. Bini and niece Ms. Menuka for creating a very favourable environment at home.

I am equally indebted to my colleagues Mr. Bhagirath Khatiwada, Mr. Ramesh Neupane, Mr. Shankar Sunar, Mr. Shesh Raj Dahal, Ms. Jeny Shrestha, Ms. Reema Dahal, Mr. Anil Neupane, among others, for their continued encouragement and invaluable support. I would also like to thank Mr. Hari Raj Joshi, editor of Image Nepal, and Dr. Chuda Bahadur Shrestha and Mrs. Chetana Lokshum for their cooperation.

Last but not least, I am also grateful to Mr. Sonam Sherpa, managing director of the Khangri Resort, Lukla, Mr. Phintso T. Lama, managing director of the Everest Summit Lodges, Mrs. Lakphuti Sherpa, owner of the Sunny Garden Hotel & Restaurant, Lukla and Mrs. Phura Yangji Sherpa, owner of the Mera Lodge, Lukla, for their necessary support.

Ballav Mani Dahal

## ABSTRACT

Sustainability has become a vital issue in the development sector these days. As the world's largest industry having multiplier effects, tourism has now been facing challenges of sustainability. The emergence of the concept of sustainable tourism has taken place in response to the adverse environmental and social problems created by mass tourism. This form of tourism is primarily associated with renewable energy and environmental conservation. From the point of view of energy, tourism can operate in any host destination in a sustainable manner only through the promotion of renewable sources of energy. The use of traditional sources of energy and other non-renewable ones such as fossil fuels gives rise to environmental problems.

In the context of Nepal, it is widely accepted that the existing poverty can be significantly reduced only through the promotion of sustainable tourism. In the same vein, the title of this research study was selected with the objective of analysing the problems and prospects of renewable sources of energy for sustainable tourism promotion along the Lukla-Monjo trekking route in the Chaurikharka Village Development Committee (VDC) of the Solukhumbu district. With several sunny days and a lot of water resources, the study area holds immense potentiality for harnessing solar power and hydro-electricity.

The whole population living along the Lukla-Monjo trekking trail was the universe of the study. Only 40 out of around 100 tourist standard hotels, resorts and lodges were taken as sample units based on gender composition. The respondents were chosen randomly, while the sampling area was selected purposively.

Primary data were collected from field survey, observation and interviews with key respondents, while secondary data were gathered from both published and unpublished materials. Probability sampling on a simple random basis was applied. The study is descriptive as well as exploratory in nature.

The use of fuel-wood in the study area has been very high. While looking at the quantity of energy used in a hotel/ lodge, about 30 kilogrammes of fuel-wood was found to be used daily. Similarly, 14.2 kilogrammes of Liquidified Petroleum Gas (LPG) and 5 litres of kerosene was used by a tourist hotel/lodge per day. When the reasons behind of the use of solar PV was analysed, an overwhelming 70% used it due to better lighting quality, while 20% consumed it for monetary saving and the remaining 10% opted it for environmental preservation.

In the course of analysing the satisfaction level of the respondents about the use of renewable sources of energy, about 77.5% had good satisfaction level and the remaining 22.5% gained average satisfaction level. Similarly, about 65% of the respondents opted for reduction. When the respondents' views on use of RE and its contribution in forest conservation was evaluated, about 70% replied in a positive light. As asked whether the use of RE could help in the promotion of tourism, about 80% of the respondents opined positively. Economic barrier, technological hurdle, problems related to operation and maintenance, shortage of human resources and institutional weaknesses were found to be the major challenges for maximising the use of renewable sources of energy and promotion of sustainable tourism.

A careful long-term planning associated with sustainable tourism development and promotion of renewable sources of energy is required. This alone could help conserve the awe-inspiring natural and cultural endowments of the area.

The outcome of this research is expected to be helpful for policy-makers to implement new programmes not only in the study area, but in other similar regions of the country as well.

# TABLE OF CONTENTS

**ACKNOWLEDGEMENT**

**ABSTRACT**

**TABLE OF CONTENTS**

**LIST OF TABLES**

**LIST OF FIGURES**

**LIST OF MAPS**

**ACRONYMS**

## **CHAPTER ONE**

### **INTRODUCTION**

**1-10**

1.1 The Study Context	1
1.2 Statement of the Problem	4
1.3 Objectives of the Study	5
1.4 Definition of Key Concepts & Variables	5
1.5 Conceptual Framework of the Study	6
1.6 Rationale of the Study	8
1.7 Limitations of the Study	9
1.8 Organisation of the Study	9

## **CHAPTER TWO**

### **LITERATURE REVIEW**

**11-36**

2.1 Tourism and Tourist	11
2.2 Emergence of Sustainable Tourism	12
2.3 Sustainable Tourism Development	13
2.4 Principle of Sustainable Tourism	14
2.5 Energy and Tourism	15
2.6 Opportunity for Energy and Tourism	16
2.7 The Kyoto Protocol Principles of Kyoto Protocol	19
2.7.2 Objectives of Kyoto Protocol	21
2.8 Various Sources of Renewable Energy Used in Tourism Sector	21
2.9 Tourism and its impact on Forest Resources	22
2.10 Energy and Poverty Reduction	23

2.11 Renewable Energy and Tourism in the Tenth Plan	25
2.12 The Government's Policy on Renewable Energy Technologies	26
2.13 Targets of Tenth Plan on Renewable Energy Technologies	27
2.1.4 Subsidy Policy on Renewable Energy Technologies, 2000	28
2.1.4.1 Subsidy Policy on Renewable Energy Technologies, 2000	28
2.1.4.2 Criteria for Subsidy on Renewable Energy Technologies	29
2.1.4.3 Subsidy for Renewable (Rural) Energy, 2006	30

### **CHAPTER THREE**

#### **RESEARCH METHODOLOGY 37-40**

3.1 Rationale for the Selection of the Study Area	37
3.2 Research Design	37
3.3 Nature and Sources of Data	37
3.4 Sample Size	38
3.5 Variables and their Operationalisation	38
3.6 Data Collection Techniques & Instruments	39
3.7 Reliability	40
3.8 Methods of Data Analysis	40

### **CHAPTER FOUR**

#### **DATA ANALYSIS AND INTERPRETATION 41-67**

4.1 Solukhumbu District at a Glance	41
4.2 Tourism Potentiality in Khumbu Region	43
4.3 Description of the Study Area	44
4.3.1 Major Attractions of Study Area	45
4.3.2 Accessibility	46
4.3.3 Accommodation	46
4.3.4 Tourist Flow Trend	46
4.4 Energy Use Scenario in Solukhumbu	47
4.4.1 District Energy Resources and Technologies	48
4.5 Energy Consumption Scenario	49
4.5.1 Total Energy Consumption in Commercial Sector	50
4.6 Socio- economic Profile of the Respondents	51
4.6.1 Ethnic Composition	51
4.6.2 Education	52
4.6.3 Level of Awareness	53

4.6.4 Amenities in Hotels/ Lodges	54
4.6.5 Sources of Investment in Renewable Sources of Energy	54
4.6.6 Sources of Credit of the Respondents	55
4.6.7 Awareness Level of the Respondents on the Provision of Subsidy	56
4.7 Type and Quantity of Energy Used in Hotels and Lodges	57
4.8 Reasons Behind the Use of Renewable Sources of Energy	58
4.9 Energy Use Pattern	58
4.9.1 Energy Types Used in Hotels and Lodges	58
4.9.2 Types of Energy Resources Used Before Installation of Renewable Sources of Energy	59 60
4.9.3 Major Factors Responsible for Deciding to Install Renewable Sources of Energy	60
4.9.4. Major Application Areas of Renewable Energy	61
4.9.5 Impact of Energy Use	61
4.9.6 Satisfaction Level of Hotel Entrepreneurs towards Use of Renewable energy	62
4.9.7 Hotel Entrepreneurs' Views Regarding the Promotion of Quality Hotel Management by Use of Renewable Sources of Energy	63
4.9.8 Reduction of Use of Non-renewable Sources of Energy	64
4.9.9 Use of Renewable Sources of Energy and Forest Conservation	64
4.9.10 Sustainable Tourism Promotion and Use of Renewable Sources of Energy	65
4.10 Subsidy Policy	66
4.11 Challenges of Using Renewable Sources of Energy	67
<b>CHAPTER FIVE</b>	
<b>FINDINGS, CONCLUSION AND RECOMMENDATIONS</b>	<b>68-72</b>
5.1 Findings	68
5.2 Conclusion	71
5.3 Recommendations	71
<b>BIBLIOGRAPHY</b>	<b>i-iii</b>
<b>ANNEX- I QUESTIONNAIRE</b>	<b>iv-vii</b>
<b>ANNEX-II PHOTOGRAPHS</b>	<b>viii-xvi</b>

## **LIST OF TABLE**

### **CHAPTER FOUR**

#### **DATA ANALYSIS AND INTERPRETATION**

Table 4.1 Description of Land Use Type in Chaurikharkha	45
Table 4.2 Total Energy Consumption	49
Table 4.3 Educational Institutions in the District	50
Table 4.4 Educational Status of the Respondents	52
Table 4.5 Attitude of Hotel Entrepreneurs towards Use of Renewable Sources of Energy	53
Table 4.6 Possession of Amenities in Hotels and Lodges	54
Table 4.7 Sources of Investment of the Respondents in Renewable Sources of Energy	55
Table 4.8 Sources of Credit of the Respondents	56
Table 4.9 Awareness Level of the Respondents on the Provision of Subsidy	56
Table 4.10 Respondents' Views on the Use, Quality and Cost of Energy	57
Table 4.11 Respondents' Views on Use of Renewable Sources of Energy	58
Table 4.12 Major Energy Types Used in Hotels and Lodges	59
Table 4.13 Types of Energy Used Before Installation of Renewable Source of Energy	59
Table 4.14 Major Factors Responsible for Deciding to Install Renewable Sources of Energy	60
Table 4.15 Major Areas of using Renewable Energy	61
Table 4.16 Benefits Achieved from Renewable Energy by Hotel Entrepreneurs	62
Table 4.17 Satisfaction Level of Respondents Towards Use of Renewable Energy	62
Table 4.18 The Respondents' View on Enhancement of Quality Hotel Management Using Renewable Source of Energy	63
Table 4.19 Respondents' Views on the Reduction of the Use of Non-renewable Sources of Energy	64
Table 4.20 Respondents' Views on Use of Renewable Sources of Energy and its Contribution in Forest Conservation	65
Table 4.21 Respondents' View on Use of Renewable Energy for Tourism Promotion	66
Table 4.22 Satisfaction Level of Respondents on Subsidy Policy	66
Table 4.23 Types of Challenge Faced by Respondents	67



## **LIST OF GRAPHS**

### **CHAPTER FOUR**

#### **DATA ANALYSIS AND INTERPRETATION**

Graph 1 Trekker Arrivals in Sagarmatha National Park	47
Graph 2 Total Energy Consumption in Commercial Sector	51

## **LIST OF MAPS**

### **CHAPTER FOUR**

#### **DATA ANALYSIS AND INTERPRETATION**

Map 1 Map of Solukhumbu District	43
Map 2 Map of the Study Area	47

## ACRONYMS

A. D.	Anno Domini
AEPC	Alternative Energy Promotion Centre
B. S.	Bikram Sambat
BSP-Nepal	Biogas Support Programme-Nepal
BZ	Buffer Zone
BZMC	Buffer Zone Management Committee
CBS	Central Bureau of Statistics
CDM	Clean Development Mechanism
CES	Centre for Energy Studies
CFUGs	Community Forestry User Groups
DDC	District Development Committee
DKK	Danish Krone
DNPWC	Department of National Parks and Wildlife Conservation
EC	European Commission
EEA	European Environment Agency
EU	European Union
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GHG	Green House Gas
GIS	Geographic Information System
GJ	Gega Joule
IAEST	Association of International Scientific Experts in Tourism
ICIMOD	International Centre for Integrated Mountain Development
ICS	Improved Cooking Stove
IFEN	Institut Francais Del' Environment
INGOs	International Non-Governmental Organisations
IoE	Institute of Engineering
IPPC	Intergovernmental Panel on Climate Change
IWM	Improved Water Mill

JI	Joint Implementation
KL	Kilo Litre
KW	Kilowatt
LPG	Liquidified Petroleum Gas
MBNP	Makalu Barun National Park
MD	Managing Director
MDGs	Millennium Development Goals
MH	Mega Hertz
MoCTCA	Ministry of Culture, Tourism and Civil Aviation
MW	Megawatt
MWH	Megawatt per Hour
MT	Metric Ton
NAC	Nepal Airlines Corporation
NEA	Nepal Electricity Authority
NGOs	Non-Governmental Organisations
NNCT	National Nature Conservation Trust
NPM	National Programme Manager
NTB	Nepal Tourism Board
NTO	National Tourism Organisation
PRA	Participatory Rural Appraisal
PRSP	Poverty Reduction Strategy Paper
PV	Photo Voltaic
RE	Renewable Energy
REDP	Rural Energy Development Programme
REF	Rural Energy Fund
REST	Renewable Energy for Sustainable Tourism
RETs	Renewable Energy Technologies
SHSs	Solar Home Systems
SLC	School Leaving Certificate
SNP	Sagarmatha National Park
SNV	The Netherlands Development Agency
SPCC	Sagarmath Pollution Control Committee
ST-EP	Sustainable Tourism-Eliminating Poverty
STN	Sustainable Tourism Network

TAR	Tibet Autonomous Region
TIA	Tribhuvan International Airport
TRPAP	Tourism for Rural Poverty Alleviation Programme
TSE	Tourism Society of England
TU	Tribhuvan University
UAE	United Arab Emirates
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational and Scientific Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNWTO	United Nations World Tourism Organization
VDCs	Village Development Committees
WCED	World Conference on Environment and Development
WSSD	World Summit on Sustainable Development