

SOCIO-ECONOMIC IMPACT OF BIOGAS PLANT IN RURAL SETTING

(A Case Study of Shukranagar VDC, Chitwan District, Nepal)

A THESIS

Submitted To:

**Central Department of Rural Development
Tribhuvan University, Kirtipur, Kathmandu**

**In Partial Fulfillment of the Requirement for the Degree of
Master of Arts in Rural Development**

Submitted By:

Tikanath Ghimire

**Central Department of Rural Development
Tribhuvan University, Kirtipur, Kathmandu**

Exam Roll No. : 3365 (Batch - 2060/62)

T.U. Regd. No. : 6-1-19-486-97

August, 2006

LETTER OF RECOMMENDATION

This thesis entitled "**Socio-Economic Impact of Biogas Plant in Rural Setting: A Case Study of Shukranagar VDC, Chitwan District, Nepal**" has been prepared by Mr. Tikanath Ghimire under my supervision. I hereby recommend this thesis for evaluation by the thesis committee as a partial fulfillment of the requirement for the degree of Master of Arts in Rural Development.

Supervisor

Associate Prof. Dr. Riddhi Bir Singh
Central Department of Rural Development
Tribhuvan University
Kirtipur, Kathmandu.

Date: 2063-05-05

APPROVAL SHEET

We certify that this thesis entitled "**Socio-Economic Impact of Biogas Plant in Rural Setting: A Case Study of Shukranagar VDC, Citwan District, Nepal**" submitted by Mr. Tikanath Ghimire to the Central Department of Rural Development, Faculty of Humanities and Social Sciences, Tribhuvan University in partial fulfillment of the requirement for the Degree of Master of Arts in Rural Development has been found satisfactory in scope and content. Therefore, we accept this thesis as a part of the said degree.

Evaluation Committee

.....
Prof. Dr. Pradeep Kumar Khadka
Head of the Department

.....
Dr. Keshab Khadka
External Examiner

.....
Asso. Prof. Dr. Riddhi Bir Singh
Supervisor

Date :

ACKNOWLEDGEMENT

First of all, I am very much grateful to my thesis supervisor Associate Prof. Dr. Riddhi Bir Singh for his valuable inspiration and guidance throughout my study without whose continuous guidance and creative suggestions this task would have never been completed. Also my sincere gratitude goes to our Head of the Department Prof. Dr. Pradep Kumar Khadka for providing me an opportunity to conduct study on this topic. I am also deeply indebted to all my respected teachers for their valuable information and suggestions.

I would like to extend my sincere to all plant owners who unhesitantly responded in course of data collection. During the course of writing this thesis, I received help and suggestion from various persons institutions and friends. I would like to thank BSP, AEPC, DDC Chitwan for their kind co-operation.

Similarly, I would like to thank my friends Rambhandu, Sarad, Laxman, Navaraj, Khageshor, Santosh, Kalpana, Karuna, Arbina, Anita, Anjana, Bhes Raj, Sabina, Sita, Mrs. Srijana Ghimire for their useful suggestion and valuable help to complete this thesis.

I would like to thank my parents Mr. Chandra Bilash Ghimire and Mrs. Jhamka Ghimire for their continued encouragement and inspiration throughout my life and the study period and also thank my brother Mr. Surya Prashad Ghimire and dear cousin Shubham Ghimire.

Finally, I am alone responsible for errors of judgement or of analysis, if exists any.

August, 2006.

Tikanath Ghimire

ABSTRACT

This thesis entitled "Socio-Economic Impact of Biogas Plant in Rural Setting: A Case Study of Shukranagar VDC, Chitwan, Nepal". The general objective of this study is to assess the socio-economic impact of biogas plant installation in Shukranagar VDC, Chitwan. The specific objectives of the study are: to study the biogas plant as an appropriate alternative source of energy, to study the impact of biogas in relation to the workload; improvement in health and sanitation; time and money saving; overall energy, environment and economic benefits, to study the potential benefits of biogas plant installation in relation to use of digested slurry as fertilizer and to make recommendations and suggestions to promote biogas plant installation situation. This study has been chosen as a special topic to address the problem of energy in the study area and to provide the scope for the dissemination of the biogas technology. This study is basically based on both primary and secondary sources of data.

Like an island between Narayani and Rapti rivers Shukranagar VDC is situated in the west-southern part of Chitwan. In this VDC, there were 1436 households. In the study area there were 506 households (in selected wards-1 and 2). About 30 households have been taken as sampled households out of 506 households. Sampled households were those who had installed biogas plant. Simple random sampling technique has been used to select sample. In this study data were collected from field survey by applying household survey questionnaire and observation method.

This study found that majority of the households (50%) out of total interviewed reported that they had adopted agriculture as a main occupation. Average family size of the sampled household was 5.6 per

household. About 86.6 percent plant owners out of total interviewed were literate whereas only 13.4 percent were illiterate. Average landholding size is 17 katthas per household. About 53.3 percent out of total interviewed reported that they were from Brahmin caste.

Out of total sampled biogas plant owners, majority of the households (83.3%) had taken loan from financial institutions. About 80 percent households reported that the main reason behind the installation of biogas plant was easy and smokeless cooking. Around 86.7 percent plant owners had attached toilet with the biogas plant. Average livestock population size of sampled household was 4.3 per household. Average dung production was 24.4 kgs per household. Majority of the respondents (73.3%) reported that the agricultural production had been increased. Total average time saving was 2½ hrs per day per household. Average saving amount of money was Rs.600/- per month per household.

It was found that from the study, majority of the respondents (43.3%) has used saved time on farm activities. This study also revealed that improvement was found in health and sanitation situation. About Rs.310/- per year was saved on health treatment by each household. Majority of the respondents (86.7%) out of total interviewed reported that their social status was raised. It was also found that women were highly benefited by the biogas plant (63.3%). About 50 percent households out of total interviewed accepted that the overall energy, environmental and economic condition had been improved.

CONTENTS

	Page No.
RECOMMENDATION	i
APPROVAL SHEET	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
CONTENTS	vi
LIST OF TABLES	x
LIST OF FIGURES	xii
LIST OF ABBREVIATIONS/ACRONYMS	xiii
CHAPTER-ONE :INTRODUCTION	1-9
1.1 Historical Background	1
1.2 Historical Development of Biogas in Nepal	2
1.3 Introduction to Biogas Technology	3
1.3.1 What is Biogas?	3
1.3.2 What is Biogas Plant?	3
1.3.3 Uses and Benefits of Biogas Plant Installation	4
1.4 Statement of the Problem	4
1.5 Objectives of the Study	6
1.6 Significance of the Study	7
1.7 Limitation of the Study	8
1.8 Organization of the Study	9
CHAPTER -TWO: BIOGAS IN NEPALESE CONTEXT	10-16
2.1 Background of the Study	10
2.2 Energy Situation in Nepal	13
2.3 Energy Situation in Chitwan	14

2.4	Institutions Related to Biogas Promotion	14
2.4.1	Biogas Support Programme (BSP)	14
2.4.2	Nepal Biogas Promotion Group (NBPG)	15
2.4.3	Alternative Energy Promotion Center (AEPC)	16
CHAPTER- THREE: LITERATURE REVIEW		17-23
3.1	Conceptual Review	17
3.2	Review of Literature: Sharing Experiences	19
CHAPTER - FOUR: RESEARCH METHODOLOGY		24-29
4.1	Research Design	24
4.2	Introduction to the Study Area	24
4.3	Rationale for the Selection of the Study Area	26
4.4	Nature and Sources of Data	26
a.	Primary Sources of Data	26
b.	Secondary Sources of Data	27
4.5	Sample Size	28
4.6	Tools and Techniques of Data Collection	28
4.6.1	Structured Questionnaire	28
4.6.2	Observation	29
4.7	Analysis and Presentation of Data	29
CHAPTER- FIVE: SOCIO-ECONOMIC STATUS OF PLANT OWNERS		30-34
5.1	Occupation	30
5.2	Family Size	31
5.3	Educational Status	32
5.4	Landholding	33
5.5	Caste/Ethnicity	34

CHAPTER- SIX: USES AND IMPACTS OF BIOGAS

	PLANT INSTALLATION	35-60
6.1	Uses of Biogas	35
6.2	Impact of Biogas	35
6.2.1	Information on Biogas	36
6.2.1.1	Size of the Biogas	36
6.2.1.2	Construction Company	36
6.2.1.3	Financing Company	37
6.2.1.4	Sources of Information	38
6.2.1.5	Reasons for Biogas Plant Installation	38
6.2.1.6	Toilet Attached with Biogas Plant	39
6.3	Livestock	40
6.3.1	Livestock Population	40
6.3.2	Total Dung Production	41
6.3.3	Dung Feeding	41
6.4	Slurry	42
6.4.1	Slurry Used in Farm	42
6.4.2	Forms of Slurry Used	43
6.4.3	Impact of Slurry on Agricultural Production	44
6.5	Alternative Energy Source, Consumption and Saving	45
6.5.1	Energy Types Used Before Installation of Biogas Plant	45
6.5.2	Saving on Time and Reduction in Workload	47
6.5.3	Saving of Money on Energy	47
6.5.4	Utilization of Saved Time	48
6.5.5	Source of Firewood Collection Before Installation of Biogas Plant	49
6.6	Loan	50
6.6.1	Biogas Plant Installation on Loan	50

6.6.2	Interest Rate of Loan	51
6.6.3	Perception on Existing Interest Rate	53
6.7	Health and Sanitation	54
6.7.1	Change Found in Surrounding After the Installation of Biogas Plant	54
6.7.2	Feeling on the Menace of Flies or Mosquito	55
6.7.3	Money Spent on Health Treatment	55
6.8	Social Impacts	56
6.8.1	Raising in Social Status	56
6.8.2	Benefited by the Biogas Plant	57
6.9	Problems and Perception on the Uses of Biogas Plant	58
6.9.1	Problems of Biogas Plant	58
6.9.2	Perception of Respondents on Utility of Biogas Plant	59
6.9.3	Opinion on the Overall Energy, Environment and Economic Condition	60

**CHAPTER- SEVEN: MAJOR FINDINGS, CONCLUSION
AND RECOMMENDATION**

		61-65
7.1	Major Findings	61
7.2	Conclusion	63
7.3	Recommendation	65

APPENDIX: Questionnaire

REFERENCES

LIST OF TABLES

Table- 1	: Distribution by Occupation	30
Table-2	: Distribution of HHs by Family Size	32
Table-3	: Distribution by Educational Status	32
Table-4	: Distribution by Landholding	33
Table-5	: Distribution by Caste/Ethnicity	34
Table- 6	: Distribution of Biogas by Plan Size	36
Table-7	: Distribution by Construction Company	37
Table-8	: Distribution by Financing Company	37
Table-9	: Distribution by Sources of Information	38
Table-10	: Reasons for Biogas Plant Installation	38
Table-11	: Toilet Attached with Biogas Plant	39
Table-12	: Livestock Population	40
Table-13	: Dung Production	41
Table-14	: Dung Feeding	42
Table-15	: Slurry Used in Farm	43
Table-16	: Forms of Slurry	43
Table-17	: Impact of Slurry	44
Table-18	: Energy Types Used Before Installation of Biogas Plant	46
Table-19	: Saving on Time and Reduction in Workload	47
Table-20	: Average Saving of Money on Energy	48
Table-21	: Utilization of Saved Time	48
Table-22	: Sources of Firewood Collection	50
Table-23	: Installation of Biogas Plant on Loan	51
Table-24	: Interest Rate on Loan	52
Table- 25	: Perception on Interest Rate	53
Table-26	: Change Found in Surroundings	54

Table-27	: Feeling on the Menace of Flies or Mosquito	55
Table-28	: Money Spent on Health Treatment	56
Table-29	: Raising in Social Status	56
Table-30	: Benefited by the Biogas Plant	57
Table-31	: Problems of Biogas Plant	58
Table-32	: Perception of Respondents	59
Table-33	: Opinion on the Overall Energy, Environment and Economic Condition	60

LIST OF FIGURES

Figure-1	: Distribution by Occupation	31
Figure- 2	: Distribution by Caste/Ethnicity	34
Figure-3	: Impacts of Slurry	45
Figure-4	: Energy Types Used Before Installation of Biogas Plant	46
Figure-5	: Utilization of Saved Time	49
Figure-6	: Interest Rate on Loan	52
Figure-7	: Benefited by the Biogas Plant	58
Figure-8	: Problems of Biogas Plant	59

LIST OF ABBREVIATIONS/ACRONYMS

ADB/N	:	Agricultural Development Bank/Nepal
AEPC	:	Alterative Energy Promotion Center
BSP	:	Biogas Support Programme
DDC	:	District Development Committee
FY	:	Fiscal Year
GDP	:	Gross Domestic Product
GGC	:	Gobar Gas Company
HHs	:	Households
Hrs	:	Hours
Kg	:	Kilogram
Km	:	Kilometer
LPG	:	Liquefied Petroleum Gas
MA	:	Master of Arts
NBPG	:	Nepal Biogas Promotion Group
NEDA	:	Netherlands Development Agency
No.	:	Number
NPK	:	Nitrogen, Phosphorus, Kalium
RCNP	:	Royal Chitwan National Park
Rs	:	Rupees
SNV/N	:	Netherlands Development Cooperation/Nepal
Sq.	:	Square
TU	:	Tribhuvan University
VDC	:	Village Development Committee
WDR	:	World Development Report
WECS	:	Water and Energy Commission Secretariat