

**Tree Carbon Stock in Different Forest Types along the Humla Karnali
River Valley, Nepal**

A Dissertation Submitted for the Partial Fulfillment of the Requirements of
Masters of Science in Botany

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RECOMMENDATION

This is to certify that the dissertation work entitled “**Tree Carbon Stock in Different Forest Types along the Humla Karnali River Valley, Nepal**” submitted by **Mr. Mandhata Acharya** has been carried out under my supervision and guidance. The entire work is primarily based on the results of his research work and has not been submitted or published for any other academic degree. So I recommend this dissertation work to be accepted as a partial fulfillment of Master of Science in Botany.

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LETTER OF APPROVAL

The M. Sc. Dissertation entitled '*Tree Carbon Stock in Different Forest Types along the Humla Karnali River Valley, Nepal*' presented by Mr. Mandhata Acharya for the partial fulfillment of his Master's Degree in Botany has been accepted.

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ACKNOWLEDGEMENTS

First and foremost, I would like to express my sincere thanks to my supervisor Prof. Dr. Pramod Kumar Jha, for providing me all the facilities needed, enthusiastic supervision, valuable suggestions, creative and constructive comments, continuous encouragement and kind efforts throughout the preparation of this dissertation.

I would like to thank Prof. Dr. Ram Prasad Chaudhary, Dr. Suresh Kumar Ghimire and Mr. Kuber Prasad Bhatta for their creative and constructive comments and tireless guidance at my field work. At the same time, I would like to acknowledge Prof. Dr. Krishna Kumar Shrestha, former head of department, Central Department of Botany for his continuous encouragement in the completion of this research work.

I am grateful to Central Department of Botany (Kailash Sacred Landscape Conservation Initiatives Project) for providing financial support for this research work. Similarly, I would like to express my sincere thanks to my friends and team members of KSLCI Project Mr. Prakash Bhattarai, Mr. Raj Kumar Gautam and Mr. Mahesh Limbu for their encouragement, interaction, suggestions and continuous help during field work. Likewise, I am thankful to Mr. Jimin Lama, local assistant, for his help in my field work.

My special thanks go to Ms. Shova Baral for her continuous help, support and encouragement in completing this work. I am perpetually grateful to Mr. Sagar Baral, Ms. Rita Chhetri, Mr. Khum Bahadur Thapa Magar, Mr. Janardan Mainali, Mr. Rabindra Parajuli, Mr. Rajendra Paudel, Mr. Brishaspati Paudel and Mr. Arjun Thapa for their suggestions, encouragement and continuous help in this work. At the same time I am thankful to all my friends and staffs of Central Department of Botany for their direct or indirect help during the research period.

Finally, I am indebted to my parents and brother for their love, inspiration and support for the completion of my masters' degree.

July, 2012

Mandhata Acharya

ABSTRACT

Global climate is changing due to different anthropogenic as well as natural variability. Increasing carbon emission is one of the major concerns because it is the main causal factor for global warming. For the mitigation of this excess carbon, forest vegetation and soil play the important role. They sequester the atmospheric carbon in the form of biomass and soil organic carbons. The forests of Nepal are thus the good sequester of carbon and the forests of upper Humla also play the significant role for its sequestration.

The study was conducted in Humla district, North-Western Nepal. Seven types of forests were identified on the basis of altitude, slope and aspect along the Humla Karnali River within 2450-4250 m. In each forest type ten plots each measuring 10x10m² were randomly marked for sampling tree species. In each of the 10 plots, woody plant 10 cm in diameter at breast height (1.37 m above the ground level) were identified, counted and measured for diameter at breast height (dbh) and height. By using allometric equations and root shoot ration, the biomass of tree of each quadrat was estimated. Soil samples were collected from the sampling plots 20 cm below the ground surface for estimating the soil organic content. Latitude, longitude, altitude, aspect, slope, soil pH, soil moisture, rock cover and canopy cover were recorded for each plot.

Mean aboveground biomass, total biomass and biomass carbon stock of study area were found to be 409.97 t/ha, 516.56 t/ha and 258.28 t/ha respectively. Biomass carbon stock in seven forests types were found significantly different. Mean biomass carbon stock in Birch forest, *Abies spectabilis* forest, Birch-Abies forest, *Pinus wallichiana* forest, Mixed Coniferous forest, Mixed Broad Leaved forest and Oak-Pine forest were found 70.09, 335.15, 308.12, 314.15, 185.19, 316.36 and 278.91 respectively.

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Photo 1: Vegetation in sampling site

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	degree Celsius
%	percentage
AGB	aboveground biomass
ANOVA	Analysis of Variance
asl	above sea level
BA	basal area
C	carbon
cm	centimeter
dbh	diameter at breast height
DDC	District Development Committee
DFO	District Forest Officer
<i>et al.</i>	<i>et alias</i>
fig.	figure
g	gram
GHGs	green house gases
GLM	Generalised Linear Model
GPS	Global Positioning System
Gt	billion tones
GTOS	Global Terrestrial Observing System
h	hectare
IPCC	Intergovernmental Panel on Climate Change
km	kilometer

KSLCI	Kailash Sacred Landscape Conservation Initiative
m	meter
MAPs	Medicinal and aromatic plants
ml	milliliter
mm	millimeter
MW	Mega watt
NTFPs	Non Timber Forest Products
S.D.	Standard Deviation
SOC	soil organic carbon
sp.	species
SPSS	Statistical Package for Social Sciences
sq	square
t	ton
Tg	teragram, 10 ¹² gram
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VDC	Village Development Committee
WSG	wood specific gravity