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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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 $10x10m^2$ 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 wallichina* 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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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
et al.	*et alias*
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	Intergovermental 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, 1012 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