Vascular Plant Species Richness along Elevation Gradient of the Karnali River Valley, Humla District, Nepal Himalaya

A Dissertation Submitted for Partial Fulfillment of Requirement of the Master Degree in Science, Central Department of Botany, Tribhuvan University.

Submitted by

Prakash Bhattarai

Plant Systematics and Evolution Unit

Exam Roll No.: 5802

T.U. Regd.No.: 7-2-49-1128-2002

Central Department of Botany

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RECOMMENDATION

November 2011

It is hereby recommended that Mr. Prakash Bhattarai, a M. Sc. Botany final year student at Tribhuvan University, Institute of Science and Technology, Kirtipur, Kathmandu has carried out research work entitled **"***Vascular Plant Species Richness along Elevation Gradient of the Karnali River Valley, Humla District, Nepal Himalaya***"** under our supervision and guidance. This entire work is based on the field work performed by the candidate and the work brings out useful findings in the field of ecology of plants. The work is primarily based on the data collected by the student himself and the results of this work have not yet been submitted for any other academic degree.

This dissertation has been recommended for acceptance as a partial fulfillment of the requirement of Master's Degree in Botany at an Institute of Science and Technology, Tribhuvan University.

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Supervisor	Co - Supervisor
Ram Prasad Chaudhary, Ph.D.	Mr. Kuber Prasad Bhatta, M.Sc.
Professor	Lecturer
Central Department of Botany	Bhaktapur Multiple Campus
Tribhuvan University, Nepal	Tribhuvan University, Nepal

LETTER OF APPROVAL

The M. Sc. Dissertation entitled '*Vascular Plant Species Richness along Elevation Gradient of the Karnali River Valley, Humla District, Nepal Himalaya*' presented by Mr. Prakash Bhattarai for the partial fulfillment of his Master's Degree in Botany has been accepted.

Expert Committee

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Ram Prasad Chaudhary, Ph.D.

Professor

Central Department of Botany

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Krishna Kumar Shrestha, Ph.D.

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Tribhuvan University, Nepal.

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Prakash Bhattarai

November 2011

ABSTRACT

The Himalayan mountain range exhibits the largest elevation gradient in the world and a very wide range of climatic zone. Study of species richness with elevation has been known for over a century and found a different trend with elevation. This study shows the pattern of species richness with altitude and the environmental factors that are responsible for creating such pattern. The study was conducted in Humla District, North-West Nepal which is located near recently declared Api-Nampa Conservation Area. The sampling method was designed to include all the habitat types and vegetation zones within 2800 to 4400 m in the southern slope of the southern Himalayan main range. Five plots of 10 × 10 m were sampled in each 100 m elevation band i.e. a total of 80 plots between 2800-4400 m. Presence – absence data was used for the analysis. Latitude, longitude, altitude, aspect, soil pH, soil moisture, rock cover and grazing intensity were recorded for each plot. The total vascular plants along with the life forms were regressed against the altitude as well as different environmental parameters. A Generalised Linear Model was used to elucidate the pattern of species richness. A Poisson error distribution with a Chi square-test statistics was used for the analysis. A quasi- Poison error distribution with F-test was used where the data showed the over dispersion. A total of 199 vascular plant species were recorded of which 165 species were dicots, 23 monocots, 145 herbs, 21 trees, 35 shrubs, 7 gymnosperms and 4 pteridophytes. Species density of total vascular plants and all life forms showed a unimodal pattern except monocot (linear pattern) with altitude. Species density of total vascular plants showed a linear pattern with RRI, pH, rock cover and grazing intensity however, a unimodal pattern was observed with soil moisture. Species richness of total vascular plants and all the life forms showed a unimodal pattern with altitude. The species richness pattern was found similar for both empirical and interpolation of species data . Besides that the species richness pattern was also similar for different life forms. A number of environmental variables play a dominant role to explain the pattern of richness at the local scale. Thus, considering multiple gradients would help to reveal better pictures of richness patterns and the potential mechanisms that structure the distributions of biodiversity in high mountainous region.

TABLES OF CONTENTS

ACRONYMS AND ABBREVIATIONS

°C	Degree Celsius
DCA	Detrended Correspondence Analysis
DDC	District Development Committee
GLM	Generalised Linear Model
ICIMOD	International Centre for Integrated Mountain Development
KATH	National Herbarium and Plant Laboratories
KSLCI	Kailash Sacred Landscape Conservation Initiative
m	metre
m a.s.l.	metre above sea level
MDE	Mid-domain Effect
mm	milimeter
RRI	Relative Radiation Index
VDC	Village Development Committee