

**SPECIES RICHNESS PATTERNS ALONG ALTITUDINAL GRADIENT IN
MANASLU CONSERVATION AREA, CENTRAL NEPAL**



**A Dissertation submitted for the partial fulfillment of
Masters of Science in Botany**

Submitted by

Rita Chhetri

Exam Roll No.: 5804

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Central Department of Botany

Tribhuvan University

Kathmandu, Nepal

July 2011

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Cover Photographs: Mount Manaslu(Above), *Cassiope fastigiata*(Wall.) D.Don, *Dactylorhiza hatagirea* (D.Don) Soo, *Podophyllum hexandrum* Royle, *Iris kemaonensis* D.Don ex Royle, *Morina polyphylla* Wall. ex DC. and *Abies spectabilis* (D.Don) Mirb. (Below from left to right).

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RECOMMENDATION

This is to certify that Ms. Rita Chhetri has carried out the dissertation work entitled '**Species richness patterns along altitudinal gradient in Manaslu Conservation Area, Central Nepal**' under our supervision and guidance. The work is primarily based on the data collected by the student herself and the results of this work have not yet been submitted for any other academic degree.

We therefore recommend her work for approval and acceptance for the partial fulfillment of Master Degree in Botany from Tribhuvan University, Nepal.

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11 July 2011

LETTER OF APPROVAL

The M. Sc. Dissertation entitled '**Species richness patterns along altitudinal gradient in Manaslu Conservation Area, Central Nepal**' presented by Ms. Rita Chhetri for the partial fulfillment of her Master's Degree in Botany has been accepted.

Expert Committee

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ABSTRACT

Species richness is currently the most widely used measure of diversity which is assumed as a simple and easily interpretable indicator of biological diversity. The present study was carried out in Manaslu Conservation Area, namely two VDCs Samagaun and Lho. The study addresses the plant species richness patterns, floristic composition and distribution as well as a comprehensive series of environmental factors affecting the vegetation of the area. A total of 70 plots of 10 m x 10 m each were laid from the altitude of 3000 m to 4400 m in different habitat types with in an interval of 100 m altitudinal band. Five subplots were laid in each altitudinal band. All the flowering plants species present in each plot were documented. Moisture, pH, aspect, latitude, longitude and altitude of each plot were recorded. The flowering plants were further classified into various lifeforms as dicots, monocots, gymnosperm, woody and herbs and their altitudinal range were also computed from Press *et al.*, (2000) for interpolated empirical richness. Detrended Correspondence Analysis (DCA) was used to analyse the distribution and abundance of the species with respect to altitude. A Generalized Linear Model (GLM) along with quasi-Poisson error distribution and F-test statistics was used to evaluate the richness pattern along the altitudinal gradient. The patterns of richness were interpreted with relation to altitude, soil moisture and pH. A total of 161 species were recorded, representing 124 dicots, 24 monocots and 10 gymnosperms. Dicots (124 species) were found dominant over the monocots (24 species). Similarly, herbaceous species (114 species) dominated the woody species (47 species). Total species density varied from 29 to 62 within the sampling plots. A unimodal relationship between diversity pattern and altitude was the most common pattern observed. Species density of dicots, monocots and herbs showed a unimodal pattern when regressed against altitude while woody species and gymnosperms decreased linearly with altitude. The species richness (except woody species, which showed linear decrease) and interpolated empirical richness of all the life forms showed a unimodal pattern with altitude. A positive linear pattern was observed when moisture and pH were regressed against altitude. No significant relationship was found between the species density and RRI. The environmental variables play significant role to explain the species richness patterns. Therefore, these do affect the patterns, composition and distribution of plant species.

Keywords: Lifeforms, Environmental factors, GLM, DCA, Unimodal.

ACRONYMS

°C	Degree Celsius
a.s.l.	Above sea level
DCA	Detrended Correspondence Analysis
GLM	Generalised Linear Model
m	meter
mm	millimeter
MDE	Mid-domain Effect
MCA	Manaslu Conservation Area
RRI	Relative Radiation Index
VDC	Village Development Committee

LIST OF FIGURES

Fig. 1: Location of the study area and sampling plots.

Fig. 2: Sampling design in a hypothetical mountain slope (a) sampling strategy for each 100m belt and (b) sampling strategy for each plot.

Fig. 3: Diagram showing the total number of species of different lifeforms and functional groups.

Fig. 4: DCA diagram for species distribution.

Fig. 5: Relationship between total plant species with altitude.

Fig. 6: Relationship between species density with altitude of different functional groups.

Fig. 7: Relationship between species richness with altitude of different functional groups.

Fig. 8: Relationship between interpolated empirical species richness with altitude of different functional groups.

Fig. 9: Relationship between species density and environmental variables.

TABLE OF CONTENTS

RECOMMENDATION

APPROVAL LETTER

ACKNOWLEDGEMENTS

ABSTRACT

ACRONYMS AND LIST OF FIGURES

TABLE OF CONTENTS

CHAPTER	PAGE NO.
1. INTRODUCTION	1
2. MATERIALS AND METHODS	8
2.1 Site Description	8
2.2 Methodology	14
3. RESULTS	18
3.1 Species Composition and Distribution	18
3.2 Species Richness Patterns	20
3.3 Environmental Variable and Species Density	26
4. DISCUSSION	27
4.1 Species Composition and Distribution	27
4.2 Species Density and Richness	28
4.3 Environmental Factors	31
5. CONCLUSIONS	32
REFERENCES	33

APPENDICES

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