

University of Southern Queensland



THE SOCIO-ECOLOGICAL IMPACTS OF STRUCTURAL CHANGES IN THE TRANSHUMANCE SYSTEM OF THE MOUNTAINOUS AREAS OF NEPAL

A Dissertation Submitted by

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Abstract

Traditional social-ecological systems such as pastoralism can be subject to major and rapid changes, resulting in adverse social, economic, cultural and ecological impacts. Transhumance, a type of pastoralism based on seasonal and recurring movement of livestock has been undergoing unprecedented changes. In the high Himalayas, transhumance is a threatened system due to social-economic and cultural transformations brought by globalisation, shifts from subsistence agriculture (e.g. grazing) to multi-functional land use (e.g. tourism and biodiversity conservation), conservation policies and practices, and climate change. Understanding the nature, extent and impacts of these changes will inform both policy and practice. However, knowledge of the current status of the transhumance system and its socio-economic, cultural and ecological significances is very limited. This study on the transhumance system conducted in or near three mountainous protected areas of Nepal Himalayas addresses the knowledge gap.

The study integrated both social and ecological components of transhumance systems using a system thinking approach. The study was multi-disciplinary in nature and applied mixed methods using a range of tools and techniques for data collection and analysis. Socio-economic data were collected by household surveys, focus group discussion, informal interviews and key informants interviews. The ecological data were collected from the rangelands sites using horizontal transects of grazed areas to collect data on grazing intensity, species richness and other environmental variables.

The study revealed that the transhumance system is a major source of household income of herders and is also embedded with culture and traditions. The results did not support the notion that transhumance grazing is necessarily detrimental to biodiversity. Though the species richness (α -diversity) was low and nitrophilous and grazing tolerant plants were abundant nearer to the *goths* (semi-permanent stopping and camping points), the highest species richness and occurrence of rare species at mid and further distances from *goths* within 800 m transects suggest that adverse impacts were confined to very limited areas near *goths*. In fact, the results indicate that light or medium grazing intensity promotes species richness and composition in other areas.

Globalisation, particularly tourism and labour migration, state conservation policies and practices and climate change were the major drivers of change to the transhumance system. However, the intensity of pressures from those drivers on the systems varied across sites. Tourism and labour migration created shortage of labour for transhumance systems and reduced local economic dependency on such systems. The conservation programs run by government agencies produced unintended outcomes in the transhumance system. It was found that the operational freedom and flexibility of transhumant herders were reduced by conservation policies and programs creating negative attitude and perceptions among herders towards different schemes of conservation. The trends of key climatic variables (temperature and precipitation) and

perceived changes in different biophysical indicators by herders indicated that the climate change has emerged as an additional threat and has the potential to impact different components of transhumance systems (rangelands, livestock and herders).

Herders perceived that fewer households were involved in the transhumance system, herd sizes had decreased, movement patterns have been changed, dependency on transhumance was reduced and the involvement of younger generations in transhumance systems has declined. These changes can decouple social and ecological subsystems that can induce adverse social-ecological impacts. The likely social impacts are decreased livelihood options, reduced agricultural production, loss of customary lifestyle and traditional knowledge and culture. The potential ecological impacts from the loss of transhumance systems can be on biodiversity, vegetation and land use, and ecosystem functions and services.

Complete collapse of the transhumance system could be detrimental, however, some level of transhumance could be desirable. How herders and transhumance systems respond to multiple change pressures will depend on how future policy decisions will support transhumance and whether transhumance systems appear beneficial and attractive compared to other available livelihood options. The incentives to motivate herders by creating a lucrative environment for doing transhumance such as by introducing value addition technologies, certifying and levelling transhumance products, and integrating with alternate livelihood options can encourage some families to continue transhumance.

Certification of dissertation

I certify that the ideas, results, analyses and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. It is also certified that the work is original and has not been previously submitted for any other academic award.

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Abbreviations

°C	Degree Celsius
ANOVA	Analysis of variance
BZ	Buffer Zone
CA	Conservation Area
CAMC	Conservation Area Management Committee
CAMR	Conservation Area Management Rules (1996)
CBS	Central Bureau of Statistics
CCA	Canonical Correspondence Analysis
CF	Community Forest
CFUG	Community Forests Users Group
CVI	Climate vulnerability index
DCA	Detrended Correspondence Analysis
DHM	Department of Hydrology and Meteorology
DNPWC	Department of National Parks and Wildlife Conservation
DoF	Department of Forests
EXP	Expectations
FGD	Focus group discussion
GCA	Gaurishankar Conservation Area
GDP	Gross domestic product
GoN	Government of Nepal
HH	Household
HKH	Hindu Kush-Himalaya
ICIMOD	International Centre for Integrated Mountain Development
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
km	kilometre
KNP	Khaptad National Park
LU	Livestock unit
LVI	Livelihood vulnerability index
m asl	metre above sea level

m	metre
MoAC	Ministry of Agriculture and Cooperatives
n.a.	not applicable
NARC	Nepal Agricultural Research Council
NAST	Nepal Academy of Science and Technology
NPA	Negative perception and attitude
NP	National Park
NPWCA	National Parks and Wildlife Conservation Act (1973)
NTNC	National Trust for Nature Conservation
PA	Protected area
PAR	Participation
PCA	Principle Component Analysis
PPA	Positive perception and attitude
SES	Social-ecological system
SNP	Sagarmatha (Mt. Everest) National Park
sq km	square kilometre
TSES	Traditional social-ecological system
UNESCO	United Nation Educational, Scientific & Cultural Organization
VDC	Village Development Committee
WWF	World Wide Fund
yr	year

Glossary of Nepalese words

<i>aul-chana</i>	a local term for winter grazing areas in KNP
<i>bari</i>	upslope rain fed agricultural land
<i>chauri</i>	a female crossbreed of yak/nak with cow/bull and vice-versa
<i>churpi</i>	traditional cheese made from buttermilk
<i>dasara Mela</i>	a festival celebrated in far-Western Nepal
<i>dashain</i>	the biggest festival for Hindu in Nepal
<i>deuda</i>	a famous cultural song and dance in far-Western Nepal
<i>dhami-jhakri</i>	traditional witch doctor
<i>ghunsa</i>	downslope winter settlements (local Sherpa term used in SNP)
<i>goth</i>	semi-permanent shelter used by herders
<i>jestha Purnima</i>	full moon day in May
<i>jokpyo</i>	a male cross breed of yaks/nak with cows/bulls and vice-versa
<i>jyaladari</i>	a system where labour are paid in cash or kind on a daily basis
<i>karmakanda</i>	ritual activities after the death of people
<i>kharka</i>	rangelands far from the settlement areas
<i>lekh-chana</i>	a local term for summer grazing areas in KNP
<i>nawa pratha</i>	traditional system of electing <i>nawa</i>
<i>nawa</i>	elected member from the village meeting to regulate livestock
<i>patans</i>	flat grazing areas(rangelands) in the mountains
<i>purji</i>	written permission to graze livestock
<i>samudayik ban</i>	community forest
<i>tatha bata</i>	local elites
<i>vakal garne</i>	advance promising with goddess to offer something if the wish comes true
<i>yersa</i> site)	upslope summer settlements (local Sherpa term used in one site)

Publications during the PhD

1. List of journal papers

- Aryal S.**, Cockfield G., Maraseni T.N. (2015). Perceived changes in climatic variables and impacts on the transhumance system in the Himalayas. *Climate and Development*. (published online and awaiting assigning volume and issue). <http://dx.doi.org/10.1080/17565529.2015.1040718>
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2. List of conference and workshop papers

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