







# MAPPING THE STATUS OF BHUTAN'S RENEWABLE (AGRICULTURAL) NATURAL RESOURCES



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# **Mapping The Status of Bhutan's Renewable (Agricultural) Natural Resources**

**Ministry of Agriculture, Royal Government of Bhutan:  
Policy and Planning Division (MoA/PPD)**

and

**International Centre for Integrated Mountain Development:  
Mountain Environment and Natural Resources' Information Systems (ICIMOD/MENRIS)**

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## Foreword

The work published here is the result of a joint initiative between the Ministry of Agriculture, Royal Government of Bhutan, and the International Centre for Integrated Mountain Development to analyse and classify the renewable natural resources (RNR) of the districts of Bhutan with a special emphasis on agriculture, and livestock. Using the RNR statistics as the main data source, thematic maps were prepared which highlight various aspects of Bhutan's rural agriculture. The themes covered include agricultural land use characteristics, cereal production and yields, agricultural inputs, horticultural production, livestock population and production, agricultural marketing, and major constraints faced by the rural farm households.

As a predominantly agricultural economy, this study has a special importance for Bhutan: more than three-quarters of its population is engaged in agriculture and related activities and agriculture accounts for nearly one-third of its GDP. State-of-the-art geo-informatics tools have been used to organise and analyse RNR databases and to help visualise and present the ground realities. The results should assist development planners and policy makers by helping them to enhance their understanding and so enable them to make better informed policy decisions.

It is our hope that the organisation and presentation of the available data in the form of an atlas will help decision makers and the donor community in their quest to help the Royal Government of Bhutan in its efforts towards sustainable development. An attempt was made to integrate and present the available information in the best possible manner. It is our sincere hope that this volume will enhance the understanding of Bhutan's natural resources and the characteristics of its agricultural economy, and that it will help in bringing about positive changes that benefit people locally and the nation at large.

We commend the study team members from MENRIS/ICIMOD and PPD/MoA/Bhutan for bringing out this important report and assure them of our full support for other joint endeavours in the future.

Dr. J. Gabriel Campbell  
Director General, ICIMOD

Dasho Sangay Thinley  
Secretary, MoA, Bhutan

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## Acronyms and Abbreviations

AEZ	agro-ecological zone
CSO	Central Statistical Organisation
DANIDA	Danish Agency for International Development
DOF	Department of Forest
ESRI	Environment Systems Research Institute
FCB	Food Corporation of Bhutan
FYM	farmyard manure
GDP	gross domestic product
Geo-ICT	geo-information and communication technology
GIS	geographic information system
HHs	households
ICIMOD	International Centre for Integrated Mountain Development
ICS	information and communication services
ICT	information and communications technology
IKM	Information and Knowledge Management (ICIMOD)
ISNAR	International Service for National Agricultural Research
LUSS	Land Use and Statistics Section
LUPP	Land Use Planning Project
masl	metres above sea level
MoA	Ministry of Agriculture
MENRIS	Mountain Environment and Natural Resources Information Systems (ICIMOD)
NCD	Natural Conservation Division
No.	number
NRTI	Natural Resources Training Institute
NSB	National Statistical Bureau
Nu	ngultrum
PPD	Policy and Planning Division

RGoB	Royal Government of Bhutan
RNR	Renewable Natural Resources
RNR-RC	Renewable Natural Resources Research Centres
SRTM	Shuttle Radar Topographic Mission
SSP	single superphosphate
WFP	World Food Programme

### Units

kg	kilogram
km	kilometre
l	litre
t	tonne (1000 kgs)

Note: Land area in Bhutan is measured in acres.  
1 acre = 4046.86 sq.m or approximately 0.4 ha

### Currency

The Bhutanese unit of currency is the ngultrum, which is on a par with the Indian rupee. In 2000, 1 US\$ = 45 Nu approx.; in 2003, 1 US\$ = 47 Nu approx.



## Concepts and Definitions

Some of the specific concepts and definitions used in the survey questionnaire are outlined below. Understanding these definitions is important for interpreting the information presented in this publication.

ArcGIS	ArcGIS is an integrated collection of GIS software products for building a complete GIS developed by the Environment System Research Institute (ESRI)
Agricultural constraints	Hindrances to achieving the full benefit of renewable natural resources potential
Agricultural input	Inputs applied to support agricultural production and productivity
Bearing trees	Fruit trees that are mature enough to bear fruit
Chemical fertiliser	Manufactured chemical compounds such as phosphate, potassium, nitrogen, and other mixed and complex fertilisers that can be applied to the soil to enhance or improve its productivity
Chushing (wetland in Bhutanese)	Terraced areas which are irrigated to grow crops – mainly paddy. When these terraces are also rainfed, other crops such as wheat, mustard, and vegetables may be grown as a second crop. The term is also used to refer to terraced areas that are only rainfed, but these are less common.
Dzongkhag	Bhutanese word for district
Farm household	A person or group of persons operating as one economic unit. The farm household usually has a common arrangement for the preparation and consumption of food, and share the same kitchen. (In this report, the terms 'farm household' and 'household' have the same meaning.)
Firewood	Consists of the woody parts of trees (wood, bark, branches, twigs, stumps, and roots) that are collected by farm households for cooking or heating
Geog	Bhutanese word for block
Improved breed	Animals whose characteristics have been improved either by selective breeding or by importing higher quality stock
Improved pasture	Land that contains improved pasture species or has been fertilised
Kamshing (dryland in Bhutanese)	Sloping agricultural land that has not been modified into terraces and where crops are grown mainly without irrigation. The main crops cultivated are maize, wheat, barley, buckwheat, and millet.
Kitchen garden	That part of cultivated farmland used to raise vegetables, spices, and fruit trees mainly to meet the household's table requirements. Kitchen gardens are generally located near the homestead.
Land use	Land operated by the farm household for renewable natural resource production
Livestock	Domesticated animals such as cattle, yak, sheep, goats, pigs, and horses
Local breed	Animals indigenous or native to the country
Mixed agriculture	A type of land use in which wetland, dryland, orchards, and kitchen gardens are adjacent to each other. This class was introduced during the 1995 mapping exercise and includes those variously used small patches of land that could not be classified uniquely as wetland, dry land, or orchard.
Plantation	Plantations of trees that are part of the afforestation or reforestation programmes carried out by the Department of Forests. Plantations of cardamom and areca nut are classified as 'orchard'.
Poultry	Birds such as hens, cocks, ducks, and so on both native and imported
Tseri/pangshing	Tseri and pangshing are Bhutanese terms for types of shifting cultivation, the practice of cultivating land for a year or two and then leaving it uncultivated for a number of years in order to allow the soil fertility to regenerate naturally.

# Table of Contents

Foreword

Acknowledgements

Acronyms and Abbreviations

Concepts and Definitions

<b>Part One – INTRODUCTION</b>	<b>1</b>
<b>Introduction</b>	<b>3</b>
<b>The Ministry of Agriculture of Bhutan and ICIMOD</b>	<b>3</b>
The Policy and Planning Division at MoA-Bhutan	4
The MENRIS division at ICIMOD	4
<b>Mapping Bhutan’s Renewable (Agricultural) Natural Resources</b>	<b>5</b>
Rationale and objectives	5
Materials and methodology	5
The RNR Census 2000	6
Presentation of the RNR census data in map form	8
Limitations	8
<b>Organisation of the Publication</b>	<b>10</b>
<b>Part Two – OVERVIEW OF BHUTAN</b>	<b>11</b>
<b>Country-wide Characteristics</b>	<b>13</b>
Physical features	13
Climate	13
Agro-ecological zones	18
Vegetation	18
Land use and land cover	20
National protected areas and biological corridors	22
<b>The Economy</b>	<b>24</b>
National development vision and policy	24
Renewable natural resources (RNR) development in Bhutan	25
<b>References</b>	<b>26</b>

<b>Part Three – MAPPING THE STATUS OF BHUTAN’S NATURAL RESOURCES</b>	27
<b>A. Agricultural Land</b>	29
Agricultural Land as a Percentage of Total District Area	30
Proportion of Different Types of Agricultural Land	32
Agricultural Area by Landholding Size	34
Farm Households by Agricultural Landholding Size	36
Households Owning Wetland (Chushing) and Size of Landholdings	38
Households Owning Dryland (Kamshing) and Size of Landholdings	40
<b>B. Agricultural Production</b>	43
Area Used to Grow Paddy	44
Area Used to Grow Maize	46
Area Used to Grow Wheat, Barley, Millet and Buckwheat	48
Area Used to Grow Potato and Chilli	50
Farm Households Cultivating Paddy	52
Farm Households Cultivating Maize	54
Availability of Wheat, Barley, Millet and Buckwheat and Percentage of Households Cultivating Them	56
Production of Paddy and Availability per Household	58
Production of Maize and Availability per Household	60
Production of Wheat, Barley, Millet and Buckwheat and Availability per Household	62
Production of Vegetables and Availability per Household	64
Yields of Paddy, Maize, Wheat and Barley	66
<b>C. Horticulture</b>	69
Total Number of Horticultural Trees	70
Total Production of Horticultural Crops	72
Apple Production and Households with Different Numbers of Apple Trees	74
Orange Production and Households with Different Numbers of Orange Trees	76
<b>D. Agricultural Inputs</b>	79
Application of Chemical Fertiliser to Cereal Crops	80
Application of Farmyard Manure (FYM) to Cereal Crops	82
Farm Households Applying Chemical Fertilisers	84
Farm Households Applying FYM and Chemical Fertilisers to Paddy	86

Farm Households Applying FYM and Chemical Fertilisers to Maize	88
Farm Households Applying FYM and Chemical Fertilisers to Potato	90
Farm Households Applying FYM and Chemical Fertilisers to Chilli	92
<b>E. Livestock</b>	95
Population of Cattle, Yak and Equine	96
Population of Sheep, Goats and Pigs	98
Farm Households Owning Cattle, Yak, Equine and Buffalo	100
Farm Households Owning Sheep, Goats, Pigs and Poultry	101
Production of Milk, Butter and Cheese	102
Meat Production from Farm Livestock	104
Consumption of Farm-Produced Meat	106
Milk Availability and Production by Local, Jersey and Brown Swiss Cattle	108
Sources of Livestock Feed and Fodder	110
<b>F. Agricultural Marketing</b>	113
Sales of Locally Produced Rice and Maize	114
Sales of Wheat, Barley, Millet and Buckwheat	116
Sales of Horticultural Tree Crops	118
Sales of Farm Produced Dairy Products	120
Sales of Farm Produced Meat	122
Sales of Vegetables	124
<b>G. Major Constraints to Farming</b>	127
Farm Households Reporting Constraints Affecting Crop Production	128
Animal Damage by Type of Animal	130
Percentage of Farm Households Reporting General Constraints	132
Farm Households by Distance (Walking Time) to the Nearest Motorable Road	134
<b>Part Four – SUMMARY AND CONCLUSIONS</b>	137
<b>Characterisation of Districts Based on Selected RNR Indicators</b>	139
<b>Conclusions and Recommendations</b>	146