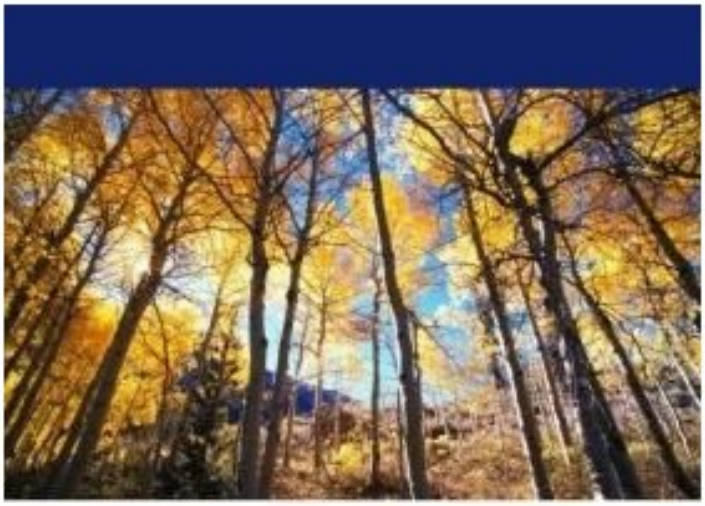

Anuja Raj Sharma

Impact of Community Forestry on Income Distribution

With case studies from Nepal

LAMBERT Academic Publishing

IMPACT OF COMMUNITY FORESTRY ON INCOME DISTRIBUTION: WITH CASE STUDIES FROM NEPAL

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PREFACE

The study of the impact of community forestry on income distribution in Nepal faces two equal and opposite dangers. It can become obsessed with the minutiae of certain aspects in particular area or it can become enraptured with the elegance of mathematical generalities.

Neither the minutiae nor the generalities are objectionable in themselves. However, the danger lies in failure to relate hard facts of theories to what happens to the beneficiaries of community forestry after large-scale transfer of community forests in the country.

The availability of community forests as a local resource to the local populace has opened avenue for further development. The response at local level has been quite encouraging. People at their own initiatives have launched poverty reduction activities in the community forests. This new power is expected to have an enduring effect in poverty alleviation in the country however, this aspect has so far not been adequately dealt. Despite its alluring success, community forestry has not been credited for the magnificent poverty reduction in Nepal and it is an impetus to initiate research in this direction.

The other aspect is that real decisions has to be made by the people as managers of the forest but not by the conventional foresters, and both the quality of information and complexity of the models tend to place the study beyond where they wish to reach.

Acknowledging these dangers, this thesis has been, in a sense, written for people with their feet in ground and their heads in the clouds. It starts with the assumption that the hard facts of inequalities in resources should offer help to realise limitation of resources and demarcate univocal theories about unjust distribution with the ground realities.

The content of the thesis: In writing this thesis, I have tried to steer a ZIGZAG course between principle and practice by asking myself three questions: what impact has community forestry on income distribution? what decision do we need to make for poverty alleviation through community forestry? and what constraints that we have to face in community forest management?

I have concentrated on National FUG database to generate information on community forestry and while doing so I have failed to use the latest one even if I desired, due to logistic problems. Nonetheless, I have consulted the latest database for computing the Gini coefficient of community forestry distribution in Nepal. For measurements, I have used local measurements which may not be always scientific or metric, as the conversion would often lead to a bizarre. Nonetheless, I have time and again tried to relate that with the metric system. I opt to use local units because community forestry is more about people who use and protect them than merely a discipline of science. For monetary units, Nepalese currency has been used sometimes with equivalent US dollars only for those who may not understand it.

Some calculations are based on primary data while most of them are based on secondary sources. I have tried to indicate the sources for convenience. The details of calculations are included in the Annex for reference.

The content of the thesis is naturally guided by the research proposal, my own research interests and specialisms, and it may not please everyone. There can also be criticism in the front of literature review with more focus on distributional aspects rather than on community forestry. And the reason being: community forestry in itself is a much-discussed theme in Nepal, in every five years a national workshop is being held in Nepal as a tradition. The last workshop was held in August 2004 and almost 80 papers on sustainable forest management, livelihood and governance aspects of community forestry were presented. All the papers are published in an almost 600 page proceeding of the workshop and CDs are also available. For those readers, who may have appetite for community forestry, are urged to refer to the proceedings. The fifth National workshop of community forestry has been just concluded and the proceeding is being prepared.

In devoting much space to selected issues, I have inevitably done less than justice to other aspects of a very broad subject. In particular, marketing aspect of community forestry is dealt peripherally, as they bear decisions in the forest management. This is by no means to suggest that these are less important issues pertaining to income distribution in community forestry. Moreover, very little space is devoted to the wider political economy of community forest development. This subject is discussed at length by Graner (1997).

Although I have covered important aspects of income distribution in community forestry, some controversial points are also included such as the recent amelioration of land inequality in Nepal. There may be places where the arguments, and the mathematics, become hard to follow. It is worth persisting, however, because these are complexities of the real world.

I think that the chapters of the thesis follow a logical sequence of thought. There is no need, however, to set off from this point with the grim resolution of reaching the back cover via all intermediate chapters. Although the contents of the chapters are endlessly cross-linked, many of the chapters can be regarded as free-standing by those with some background knowledge on community forestry and economics.

Anuja Raj Sharma
Mitrapark, Kathmandu
January 2010

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I am also thankful to the publishers of the following journals who have kindly allowed me to reproduce, in modified form, materials which I originally published in those journals: *Banko Janakari* (in Chapter 6) proceedings of the International workshop on Forestry and *Journal of Natural History Museum* (in Chapter 5) and proceedings of World Forestry Congress (in Chapter 7).

The completion of this book would not have been possible, had there not been immense support from my family members especially my mother, my wife Ajita, and daughters Neha and Megha. I owe a lot to them.

Anuja Raj Sharma

Mitrapark, Kathmandu, Nepal

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LIST OF ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
ADLI	Agriculture Development Led Industrialisation
AFDC	Aid for Families with Dependant Children
ANOVA	Analysis of Variance
BNI	Basic Needs Indicator
CBR	Crude Birth Rate
CBS	Central Bureau of Statistics
CDR	Central Development Region
CF	Community Forestry
CGE	Computable General Equilibrium
CPR	Common Property Resource
DFO	District Forest Office/r
DFRS	Department of Forest Research and Survey
DoF	Department of Forests/ Nepal
EDR	Eastern Development Region
EEI	Economic Empowerment Index
FAO	Food and Agriculture Organisation
FUG	Forest User Group
FWDR	Far-Western Development Region
FY	Fiscal Year
GDI	Gender Development Index
GDP	Gross Domestic Product
GNP	Gross National Product
HDI	Human Development Index
HH	Household
HMG	His Majesty's Government/Nepal
HPI	Human Poverty Index
ILO	International Labour Organisation
IMF	International Monetary Fund
IMR	Infant Mortality Rate
IVM	Income Variance Method
KRM	Kanel's Reduction Method

LE	Life Expectancy
LRMP	Land Resource Mapping Project
MDG	Millenium Development Goal
MFSC	Ministry of Forests and Soil Conservation
MMR	Maternal Mortality Ratio
MOPE	Ministry of Population and Environment
MW	Mega Watt
MWDR	Mid-Western Development Region
NDHS	Nepal Demographic Health Survey
NER	Net Enrollment Ratio
NLSS	Nepal Living Standards Survey
NPC	National Planning Commission
NR	Nepalese Rupees
NRB	Nepal Rastra Bank
PPR	Private Property Resource
PRA	Participatory Rural Appraisal
RBG	Redistribution Before Growth
RWG	Redistribution With Growth
SAL	Structural Adjustment Lending
SAM	Social Accounting Matrix
SAP	Structural Adjustment Programme
SEI	Social Empowerment Index
SPSS	Statistical Package for Social Sciences
TDN	Total Digestible Nutrient
TFR	Total Fertility Rate
TU	Tribhuvan University
UNDP	United Nations Development Programme
US	United States of America
USAID	United States Agency for International Development
VDC	Village Development Committee
WTA	Weak Transfer Axiom
WDR	Western Development Region

CHAPTER 1

INTRODUCTION

1.1 Glimpse of the Nepalese Economy

1.1.1 Country Background

Nepal lies between India to the south and Tibet, an autonomous region of China to the north. It lies between latitudes 26°15' and 30°30' north and longitudes 80°00' and 88°15' east. The total population of Nepal is 26.4 million (CBS, 2007) with an annual growth rate of 2.25 percent (period 1991-01). Population density, for the year 2001 is estimated to be 157 persons per square kilometre. The average life expectancy is 63.7 years (male 63.3 and female 64.1 years) while the infant mortality rate (IMR) is 48 per 1000 live birth in 2007 (CBS, 2007). The overall literacy rate in 2001 is 54.1 percent (Male 65.5 percent, Female 42.8 percent). A majority of the population still lives a rural life as current population in 58 urban areas is about 14 percent. The people of Tibeto-Burmese origin inhabit the eastern and higher region of Nepal, where as the Indo-Aryans pre-dominate the lower and western part of the country. The Mountain, Hills and Terai had a population of 7.3, 44.3 and 48.4 percent of the total, in 2001 (CBS, 2004b). The country is one of the poorest as subsistence agriculture is still the main stake of the economy. Agriculture and Forestry constitute 32.57 percent of Gross Domestic Products (GDP). However, the country is experiencing a rapid socio-economic transformation under increasing marketing influence (APROSC, 1980; Banskota, 1989).

1.1.1.1 Geographic and Administrative Divisions

The country comprises of several ecological belts running approximately in east-west direction. The southern most belt is the Terai, a northern fringe of Gangetic plain. This belt bordering with India is no more than 150 meters above the mean sea level. In the northern most part of the Terai lies the Siwalik belt rising to almost 1500 meters. Frequently the Siwaliks are delineated from a northern mountainous belt, the Mahabharat lekh, by broad valleys called the Inner Terai. The Mahabharat range arises to over 3000

meters. The Middle Hills of Nepal lies towards the north of the Mahabharat range. A few tectonic basins such as Kathmandu, Pokhara, Dang, Surkhet etc., are embedded in the Middle Hills. The land still rises to the north of the Middle Hills from 2,300 to 4,000 meters and beyond, known as the Himalaya. The Himalaya includes snow-capped peaks, glaciers, high altitude river valleys and a series of mountains with the world's highest peak Mount Everest (8848 meters). Nepal lies mostly the south of Himalaya but there are still some places like Manang, Mustang in Nepal, north to Himalaya. These places in most respects resemble the high altitude deserts of central Asia and Tibet.

The country is divided into 75 administrative units, the Districts, 14 Zones and 5 Development Regions. Each Development Region has some area of Mountain, Hills and Terai. The Development Regions comprise of different Zones and each Zone consists of many Districts. Each District is further divided into Village Development Committees (VDCs). The VDC has about 4000 inhabitants and is further divided into nine wards.

1.1.1.2 Climate, Temperature and Rainfall

The climate of Nepal is monsoon but diverse due to great variety of topography. The altitude and topography has a profound effect on weather and climate as within a narrow span of 100 kilometres, the altitude changes to over 3000 meters. This gives opportunity for this small country of 147 thousand square kilometres, to experience from tropical to tundra type of climate. The eastern part of Nepal receives heavy rainfall that declines steadily towards the west (Griffin, 1988). Thus almost all climatic zones of the world exist in Nepal. There are four main seasons: Summer (June-September), Autumn (October-March), Winter (December-February), and Spring (March-May). In general, the Terai belt has tropical climate, the Hills has sub-tropical and temperate climate while the Mountain belt has sub-alpine, alpine and tundra climate. The temperature in the country also varies widely. January is the coldest month in which mean minimum and maximum temperature over Nepal ranges from -9.7^0 C to 10.8^0 C and from 3.8^0 C to 23.4^0 C respectively. Similarly, in the hottest month of June and July, the monthly mean minimum and maximum temperature over Nepal ranges from 0.9^0 C to 23.9 C and from 11.9^0 C to 39.9^0 C respectively (Deo, 1997).

In a normal year, the average annual precipitation is about 1500 mm varying according to the topographical variations. Normally, the monsoon enters Nepal from south-east side of the country in around mid-June and lasts up to mid-September. There is a sharp variation in rainfall due to the variation in topography. The foothills of Churia range receive the heavier rainfall while the Hills get the heaviest rainfall specially in Pokhara region.

1.1.1.3 Religions, People and Languages

The total population of Nepal is 22.7 million (CBS, 2004c). Nearly 7.8 percent of the population reside in the High Mountains while 43.1 percent population is in the Middle Hills. The Terai region harbours 49.1 percent of the population. The distribution of population in Nepal by ecological regions is given in Table 1.1. The detail of the distribution is given in the Annex 1D.

Table 1.1

Distribution of population in Nepal by ecological belts

Ecological belts	Number of districts	Total population	Percent	Number of HH	Average HH size
High Mountain	16	1781656	7.8	342110	5.21
Middle Hills	39	9800411	43.1	1894294	5.17
Terai/Inner Terai	20	11154867	49.1	1937970	5.76
Nepal	**75**	**22736934**	**100**	**4174374**	**5.45**

Source: Computed from CBS, 2004c.

Nepal is a recently declared secular state but with majority of population (80.6 percent) practising Hinduism. The second largest religious group, is Buddhist, 10.7 percent of the population. There are 8.7 percent of population following other religions like, Islam,

Christianity, Jainism etc. Hindus and Buddhists live together and worship each others' deities and celebrate some common festivals of both religions.

According to Population Census 2001, about 100 ethnic/caste groups reside in Nepal. Roughly, they are of two major origins, namely Indo-Aryan and Tibeto-Burmese. The first one consists of Brahmins, Kshetries, Kayasthas, Baniyas, Telies, Kushuwas, Majhis, Chamars etc. These people inhibit the Terai and Hilly areas of the country. Similarly, the second group consists of Bhotes, Sherpas, Thakalis, Newar, Gurung, Magars, Limbus, Paharis etc. The people of this origin live mostly in the Mountain and Hilly areas of the country but some have migrated to the Terai belt.

In Nepal, almost all ethnic groups have their own language but Nepali is the national language. It is the mother tongue of 48.6 percent of the people. In addition, Maithali, Bhojpur and Tharu are the mother tongues of 12.3 percent, 7.5 percent and 5.9 percent of the total population respectively. Similarly, Abadhi, Tamang and Newari are the mother tongue of 2.5 percent, 5.2 percent and 3.6 percent of the total population respectively. Likewise Magar and Limbu are the mother tongues of 3.4 percent and 1.5 percent of the total population respectively.

Thus Nepal is a country of multi-religious, multi-ethnic and multi-lingual country. There are altogether 93 languages spoken in the country.

1.1.1.4 Major Demographic Indicators

Demographically, there is a wide disparity among the different ecological belts of Nepal. The major demographic parameters of the country are presented in Table 1.2.

Table 1.2

Major demographic indicators of Nepal

S. No.	Parameters	Attributes
1.	Total population	26.4 million
2.	Population density	157 persons/sq. km.
3.	Crude Birth Rate (CBR)	29.2 per 1000 population
4.	Crude Death Rate (CDR)	8.5 per 1000 population
5.	Total Fertility Rate (TFR)	3.1 per woman
6.	Infant Mortality Rate (IMR)	48 per 1000 live birth
7.	Average Life Expectancy Male Female	63.7 years 63.3 years 64.1 years
8.	Literacy Rate Male Female	54.1 percent 65.5 percent[1] 42.8 percent

Sources: CBS, 2004b. HMG/UNCTN, 2005. CBS, 2007.

Table 1.2 indicates that the CDR and IMR is still quite high while the literacy rate is quite low. These figures related to low life expectancy at birth along with other figures place Nepal in the category of developing country.

Demographic indicators by ecological belts

Demographically there is wide disparity among the ecological belts of Nepal. The major indicators at national as well as ecological belts level are presented in Table 1.3.

[1] Adult literacy rate reported is 81 percent among the male and 54.5 percent among the female for Nepal (UNDP, 2009).

Table 1.3

Major demographic indicators of Nepal by ecological belts

S. No.	Indicators	Ecological belts			
		Mountain	**Hills**	**Terai**	**Nepal**
1.	Total population	1687859 (7.29 %)	10251111 (44.28 %)	11212453 (48.43 %)	23151423
2.	Population density (Person per sq km)	32.6	167.1	329.6	157.3
3.	Population growth rate	1.57	1.97	2.62	2.25
4.	Sex ratio	98.39	95.84	103.8	99.8
5.	Total literacy Percentage	43.5	58.6	51.3	54.1
6.	Male literacy	59.9	70.6	62.1	65.5
7.	Female Literacy	30.4	47.3	40.1	42.8
8.	Average HH Size	5.28	5.17	5.75	5.44

Source: CBS, 2004b.

Table 1.3 shows that the population growth rate is 2.2 while the population density is 157.3 in the country. The population density is almost 10 times greater in Terai than in the Mountain region. The average household size (5.44) is quite high while the literacy rate (54.1) is quite low in comparison with other developing countries.

Occupational structure

Table 1.4 presents the details about economic activities of people (aged 10+ years) in Nepal.

Table 1.4

Percentage distribution of the employed population by major areas of economic activity

Source of Industry	Both sexes	Male (percent)	Female (percent)
Agriculture and forestry	6496222	52	48
Fishing	8467	85	15
Mining and quarry	16048	64	36
Manufacturing and recycling	872254	52	48
Electricity gas and water supply	148218	22	78
Construction	286418	82	18
Wholesale and retail trade	863773	60	40
Hotels and restaurants	120889	65	35
Transport, storage and communication	161638	96	4
Financial intermidiation	46765	85	15
Real state, renting and business activities	29922	86	14
Public administration and social security	301024	88	12
Education	228381	74	26
Health and social work	61797	71	29
Other community, social and personal service activities	72575	85	15
Private households with employed persons	105139	60	40
Extra-territorial organisations and bodies	58273	94	6
Non stated	22395	59	41
Total	9900196	57	43

Source: UNDP, 2004.

Table 1.4 indicates that majority of the economically active population is still engaged in agriculture and forestry (65.6 percent). Manufacturing and recycling (8.8 percent) and wholesale and retail (8.7 percent) are the other major sectors of employment. The job opportunities in the non-agricultural sector are quite low. But the proportion of population engaged in agriculture, forestry and fishing has been declining over the years. It was 94.35 percent in the year 1971, 91.15 percent in the year 1981 while it was 81.23

percent in the year 1991.

1.1.1.5 Development and Empowerment Indices

Human development index

Nepal's HDI index is 0.534 with substantial difference between urban and rural HDI indexes (The calculation of Nepal's HDI is given in the Annex 1C). The HDI index for 2006 also varied widely by ecological belts and development regions as there were variations regarding life expectancy, adult literacy and mean years of schooling. The Mountain region had the lowest value (0.436) while the Hills and Terai had the value of 0.543 and 0.494 respectively. The Central Development Region (CDR) had the highest HDI value of 0.531 while the Mid-Western Development Region (MWDR) had the lowest value (0.452). Similarly the HDI values for Eastern, Western and Far-Western Regions were 0.526, 0.516 and 0.461 respectively (UNDP, 2009).

The life expectancy is highest for the EDR (64.9 yrs) whereas it is lowest for FWDR (54.3 yrs). By ecological belts, life expectancy at birth is highest for Hills (65.5 yrs) while it is lowest for the Mountain (52.5 yrs). Similarly, life expectancy at birth for urban areas is 64.5 yrs against 60.6 yrs for rural areas. The urban areas are also too good in adult literacy with 68.3percent literacy whereas the rural areas have only 45 percent. The literacy is highest in the Hills, followed by the Terai and least in the Mountain. The adult literacy is highest in the Western Development Region. The mean years of schooling for Nepal is 2.75 yrs, the urban areas have about 5 years of mean schooling while the rural areas have only 2.35 years of schooling. The mean years of schooling is also highest for the Hills, followed by Terai and Mountain. By Development Regions, the WDR has the highest mean years of schooling whereas FWDR has the lowest mean years of schooling. The HDI by ecological and development regions of the country in year 2001 is given in the Annex 1E.

Economic empowerment index

The economic empowerment index (EEI) for the country is 0.337, which is 0.518 for the

urban areas while it is only 0.304 for the rural areas (UNDP, 2004). The EEI is highest for the Terai region (0.392) while it is lowest for the Mountain region (0.236). Similarly, EEI is highest for the Central Development Region (CDR, 0.383) whereas it is lowest for the Mid-western Development Region (MWDR, 0.247). In Nepal, every one out of three households is electrified. Almost 82.5 percent of the urban households are electrified as against only 21 percent of the rural households. The electrification is highest in the Hills whereas it is lowest in the Mountain. The Central Development Region has the highest electrification while the Far Western Development Region has lowest of it.

Nepal has also high land inequality and this inequality is higher in the urban areas than in the rural areas. Land inequality in the Hills and Mountain are similar whereas it is higher in the Terai. By Development Regions, the Central Development Region has highest land inequality while it is lowest for the Mid- Western Development Region.

Per capita GDP at Purchasing Power Parity for Nepal is estimated at US$ 1597. The estimate for urban areas is almost double than for the rural areas (US$ 3149 against US$ 1286). The Hills has the highest Per capita GDP (US$ 1683 against US$ 1158 and US$ 1584 for Mountain and Terai respectively). By Development Regions, the CDR has the highest Per capita GDP (US$ 1989) while FWDR has the lowest per capita GDP (US$ 1023) (UNDP, 2009). The economic empowerment index for the country is given in the Annex 1F.

Social empowerment index

The social empowerment index (SEI) for Nepal is 0.406 and different parameters of the index are given in the Annex 1G. The SEI for urban area is 0.604 against 0.372 for the rural areas. The SEIs for Mountain, Hills and Terai regions are 0.315, 0.476 and 0.362 respectively. The SEI for the Western Development Region (0.468) is highest while it is lowest for the Mid-Western Development Region (0.33).

The infant mortality for Nepal is 68.5 and it is even higher for the rural areas (70). Infant mortality is the highest in the Mountain (109). Among Development Regions, MWDR has the highest infant mortality (103). Every alternate child in Nepal is malnourished, the

problem of malnourishment is higher in the rural areas than the urban areas. The percentage of malnourished children is highest in the Mountain and by development region, the figure is highest for the MWDR while it is lowest in the EDR. The details of the social empowerment index for Nepal and regions are given in the Annex 1G.

Human poverty index

The HPI value for Nepal is 35.4, which is 38.2 for rural areas and 20.7 for urban areas. The HPI for Mountain, Hills and Terai are 43.3, 32.7 and 36.9 respectively (UNDP, 2009:41). By development regions, the Far-Western Region has the highest HPI of 39.0 while it is lowest for Eastern Development Region (33.7). The HPI values for Central, Western and Mid-western regions are 35.3, 33.2 and 38.7 respectively.

The Human poverty index for Nepal by regions for year 2001 is given in the Annex 1K. Human poverty index for the research districts is also given in the Annex 1B.

HPI measures were not always lowest where income was highest, to the extent that income poverty measures were underestimating poor men's, women's and children's human poverty conditions. This meant that poor people were more capability-poor than income- poor (NESAC, 1998 cited in Upadhya, 2006).

1.1.1.6 Gender Related Development

The Gender related development index (GDI) focuses on capability while Gender empowerment measure shows the use of those capabilities in taking advantage of opportunities in life. The Gender related development index (GDI) for Nepal is 0.499. GDI for rural and urban areas are 0.471 and 0.618 respectively. Similarly GDIs for Mountain, Hills and Terai are 0.423, 0.534 and 0.482 respectively. The Central Development Region has the highest GDI (0.517) closely seconded by Eastern Region (0.516) while it is lowest for Mid-Western Development Region (0.441). The GDI for Western and Far-Western Regions are 0.511 and 0.447 respectively (UNDP, 2009).

From Gender perspective, women lag behind their male counterparts in adult literacy,

mean years of schooling etc however life expectancy of female is slightly greater than male. The average life expectancy of female is 61.5 yrs while that of male is 60.5 yrs. Only 34.9 percent of the adult females are literate against 62.7 percent male literacy rate. The mean years of schooling for female is 1.95 yrs whereas the males have 3.56 years of schooling in Nepal. The life expectancy of both male and female is lower than the national figure in Mid-Western and Far-Western Regions. Female literacy is also quite low (<30 percent) in these two Regions. The details of information regarding gender related development index for Nepal by regions is given in the Annex 1I.

1.1.1.7 Health Indicators

Generally, health indicators of a country shed light on development sphere of a country. Table 1.5 shows the major health indicator of the country.

Table 1.5

Major health indicators of Nepal

Description	1973/74	1995/96	2001	*2007**
Infant Mortality (Per '000)	156	102	64.4	48.0
Child Mortality (Per '000)	222	165	-	61.0
Crude Birth Rate (Per '000)	44.7	37.5	31.28	29.2
Crude Death Rate (Per '000)	22.2	16.9	9.22	8.5
Life Expectancy (years)	40.9	54.02	62.2	63.7

*Sources: Economic Survey, Various fiscal years, Statistical Pocket book, various issues, * CBS, 2007*

It is clear from the health indicators that there is a substantial improvement in the field of health in recent years.

1.1.1.8 Gross Domestic Product (GDP) and Per Capita Income

The GDP at factor cost at current prices for the fiscal year 2003/04 had been NRs 473876 million which is 8.4 percent higher than that for fiscal year 2002/03. The

contribution of agricultural and non-agricultural sectors 39 percent and 61 percent respectively for the fiscal year 2003/04. Agriculture sector growth rate for the period 1994/95 to 2003/04 remained at 3.42 percent per annum while the non-agriculture sector growth for the same period stood at 4.26 percent per annum. The highest growth rate sectors for the mentioned period are electricity, Gas and Water (8.99 percent), followed by Transport, Communication and Storage (5.83 percent) and Community and Social Services (5.30 percent). The calculation of decade growth rate of GDP by sectors is given in Annex 1A. Table 1.6 shows the contribution of different sectors to GDP in different years and growth rate of GDP. It is quite obvious from Table 1.6 that the contribution of non-agricultural sector has been increasing gradually but the contribution of agriculture sector is still high in comparison to other developing countries.

Table 1.6

Gross Domestic Products by ISIC Division (at 1994/95 prices)

Rs in million

S.No.	Description	1994/95	2002/03	2003/04*	Change percent 02/03-03/04	Decade growth percent (94-04)	2008/09** (current prices)
1.	Agriculture, Fisheries and Forestry	85569	111471	115774	3.9	3.42	396150
2.	Mining and Quarry	1117	1601	1610	0.6	4.14	5541
3.	Manufacturing	19555	25384	25822	1.7	3.13	219320
4.	Electricity, Gas and Water	2862	6072	6211	2.3	8.99	27636
5.	Construction	23093	32724	32800	0.2	3.97	120069
6.	Trade, Restaurant and Hotel	24326	29267	31135	6.4	2.78	193668
7.	Transport, Communication and Storage	13995	22113	23310	5.4	5.83	156580
8.	Finance and Real estate	20534	29333	30174	2.9	4.35	168918
9.	Community and Social Service	18924	29319	30120	2.7	5.30	50996
10.	Agriculture	85569	111471	115774	3.9	3.42	391282
11.	Non-agriculture	124407	175813	181182	3.1	4.26	1062178

Source: CBS, 2004a.

*** CBS, 2009.*

The structure of GDP shows among the production sector of economy, agriculture occupied 32.4 percent, followed by whole sale and retail trade 13.7 percent, transport, communication and ware housing 10.5 percent. Among other remaining sub sectors, real estate and professional services 8.3 percent. Like wise, education, financial intermediation and electricity, gas and water have their respective 6.0 percent, 4.8 percent, 1.7 percent shares to GDP. Of the remaining portion, education, public administration and defense shared 2.0 percent, hotel and restaurant 1.5 percent, and health works contributed 1.3 percent to GDP (Economic Survey, 2008/09).

Estimates of Per capita income

The estimated per capita income of Nepal[2] is NRs 17722 which is highest for the Central Development Region (NRs 21610). The estimated per capita income is lowest for the Mid-Western Development Region (NRs 13366). The estimated per capita incomes for Mountain, Hills and Terai are NRs 15066, NRs 19263 and NRs 16713 respectively.

The Analysis of GDP contribution by sectors shows that Agriculture, Fisheries and Forestry (38.4 percent) has the highest contribution in GDP followed by Trade, Restaurants and Hotels (11.3 percent). The GDP contribution of Finance and Real estate sector is 10.6 percent while that of Construction sector is 10.1 percent. The GDP contribution of Community and Social services and Manufacturing sectors are almost 9 percent. The Transport, Communication and Storage sector contributes 8.5 percent of the GDP while Electricity, Gas and Water contributes 1.8 percent. The contribution of Mining and Quarry is the least (0.5 percent). The estimates of GDP by sectors and per capita income by regions for Nepal are given in the Annex 1H. The contribution of Hills (48.1 percent) is highest in the GDP closely followed by the Terai region (45.7 percent) and least by the Mountain region (6.2 percent). By Development Regions, the CDR (42.3 percent) has the highest contribution in the GDP, followed by EDR (21.2 percent) and WDR (18.9 percent) respectively. The percentage contribution of different ecological belts and Development Regions in the GDP of the country by sectors is given in the Tables 1.7 and 1.8 respectively.

[2] Per capita GDP in Nepal for 2008/09 was NRs 34732 (CBS, 2009).

1.1.1.9 Infrastructure Development in Nepal

The basic requirements of rapid development of every economy are the availability of infrastructure facility like roads, means of communication, banking facilities etc. By fiscal year 2003/04 development of physical infrastructures are as follows:

Transport and Communications: Transport and communication facilities play an important role in the rapid development of a country. However, in Nepal the development of transport facilities is not satisfactory as there are still districts in the Mountain region which are not connected by the roads. By mid-March 2007 altogether 17609 kilometres of roads (5222 km Black-topped, 4738km Gravelled, and 7649 km Fair weather roads) are available in Nepal (Economic Survey, 2006/07). According to above figures, the lengths of roads per thousand population is only half a kilometre.

Air transport plays an important role in Nepal because of difficult terrain. Altogether 747981 passengers travelled in domestic aircraft in year 2003. There are altogether 44 airports in the country in 40 districts. Besides air facility, the only rail-way available in Nepal covers 52 kilometre from Jainagar-Janakpur-Bijalpur in Nepal.

In the field of communications, 3992 post offices are rendering services through out the country. The proportion of households with telephone services is 3.91 in the country. The proportion of urban household with telephone service is 20.24 while it is only 0.82 for rural households. The proportion of households with telephone service in Mountain, Hills and Terai are 0.5, 5.77 and 2.54 respectively. The Central Development Region has the highest proportion of households with telephone service (7.61) while the Far-western Development region has the lowest (1.01) proportion of households with telephone service.

Table 1.7

Percentage Contribution in GDP by Ecological Belts

S. No.	Sectors	Ecological belts			Total (Million NRs.)
		Mountain	Hills	Terai	
1.	Agriculture, fishery and forestry	8.1	42.6	49.3	151058
2.	Mining and quarry	5.9	69.4	24.7	1924
3.	Manufacturing	2.3	37.9	59.8	35495
4.	Electricity, gas and water	3.3	38.4	58.3	7004
5.	Construction	6.4	66.7	26.8	39584
6.	Trade, restaurants and hotels	6.5	43.4	50.1	44571
7.	Transport, communication and storage	2.7	45.9	51.4	33297
8.	Finance and real estate	6.5	46.5	46.9	41635
9.	Communication and social services	5.3	69.5	25.2	38997
10.	Total	6.2	48.1	45.7	393564

Source: Computed from UNDP, 2004.

There are 180 towns in the country having digital automatic telephone services. Altogether there are 389255 telephone lines distributed in the country by the year 2003. There are 7491 internet connections and 112007 mobile phones distributed. There are altogether 249 telephone exchanges, public call offices and wireless stations in the country. Regarding registered newspapers, there are altogether 3741 newspapers on the country and among them 251 are daily newspapers.

Banking facility: Adequate banking facility is also essential for the speedy development of economy in the country. Altogether there are 435 branches of commercial banks functioning through out the country by mid-July 2005. The banking habit of the people is growing in these days. The total deposits in the commercial banks were Rs 17329.4 million in year 1990 and Rs 125141.1 million in 2000. The total deposits mobilisation of

the commercial bank amounted to NRs 481.44 billion during the first eight months of fiscal year 2008/09 (Economic Survey, 2008/09).

Table 1.8

Percentage Contribution in GDP by Development Regions

S. No.	Sectors	Regions					Total (Million NRs)
		EDR	CDR	WDR	MWDR	FWDR	
1.	Agriculture, fishery and forestry	24.5	31.6	21.2	12.4	10.4	151058
2.	Mining and quarry	14.0	51.5	18.5	8.1	7.9	1924
3.	Manufacturing	22.0	58.8	12.3	4.4	2.5	35495
4.	Electricity, gas and water	20.6	56.0	18.1	3.5	1.7	7004
5.	Construction	11.9	50.6	20.5	8.1	8.8	39584
6.	Trade, restaurants and hotels	23.0	37.8	20.5	10.8	7.9	44571
7.	Transport, communication and storage	21.9	49.1	17.3	7.5	4.2	33297
8.	Finance and real estate	22.9	38.5	19.9	10.3	8.4	41635
9.	Communication and social services	13.2	60.9	12.9	7.8	5.2	38997
10.	Total	21.2	42.3	18.9	9.8	7.8	393564

Source: Computed from UNDP, 2004.

In Nepal 19.85 percent of households have access to institutional credit. This proportion is lowest for Mountain region (14.06 percent) while it is 25.74 percent for the Terai region. By Development Region, the Mid-Western Development Region (0.96) has the lowest access.

Social services: Nepal government is providing maximum services to the people of Nepal. The government has allocated substantial amount of budget in social sector. In FY 2004/05 budget (NRs 115289 million) the government has allotted 47.42 percent of budget for the development of social sector. The percentage shares of different sub-sectors are as follows: education (13.26 percent), health (9.56 percent), drinking water

(7.56 percent), local development (13.01 percent) and other social services (4.00 percent).

In the field of education, the government is trying to ensure that, by 2015, children every where, boys and girls alike, will be able to complete primary schooling. NER in grade 1-5 increased from 69 percent in 1995 to 84 percent in 2004 according to data from the Ministry of Education and Sports. Although 76 percent of the children enrolled in Grade 1 reached Grade 5 in 2004, a 13 percent jump from year 2000, significant number of children continue to drop out of school before completing their primary education cycle. The educational attainment of Dalits remains below the national average with two-thirds of them being illiterate (UNDP, 2004). The PRSP/Tenth Plan also envisages the universalisation of primary education, to equip citizens with the knowledge and skills to lead better lives. The Tenth Plan envisages a NER of 90 percent in primary education, 70 percent literacy in 6+ age group, 63 percent in the 15+ age group, and female literacy of 55 percent by 2007. Government has reinforced its commitment to achieve the targets. Of the total budget in 2003/4, 16.2 percent had been allocated to education sector and which had been increased to 17 percent in the year 2004/05. According to needs assessment study 2005, Nepal will need a total of Rs 22128 million in 2005, and Rs 41 million by the year 2015 to attain the MDG in education (HMG/UNCTN, 2005). The level of education attainment for population aged 6 and above by sex from 1981 to 2001 is given in the Annex 1J. There has been substantial increase in secondary, SLC and intermediate and above level of education in the country in 2001 in comparison to 1981. Similarly, the proportion of no schooling has also dropped significantly by year 2001 and has remained as a single digit figure. Teacher student ratio, school student ratio and population per school figures are given in Table 1.9.

Table 1.9 shows that teacher student ratio and school student ratios are satisfactory but population per school is still very high on the lower secondary and secondary level of education. The above figures also suggest that there are many drop-outs beyond primary level of education.

Table 1.9

School, student and teacher ratio, 2009

Level of Education	Student/School	Teacher/School	Student/Teacher	Student/Trained Teacher
Primary	1:154.6	4.6	33.3	49.6
Lower secondary	1:137.9	3.5	39.6	73.2
Secondary	1:109.7	4.1	26.5	37.2

Source: Computed from Economic Survey, 2008/09.

So far health services are concerned, Nepal government is trying to reduce the under 5 mortality by two thirds between 1990 and 2015. The target for 2015 in IMR is 34 while for under 5 mortality rate is 54. Nepal had staggering infant mortality rate (IMR) of 200 per 1000 live births some 30 years ago, the IMR today is 64 per 1000 live births. The under 5 mortality rate was found to be 91 per 1000 live births in the same survey, which has decreased to 82 in 2005 (NDHS, 2001).

The other health related target of MDG is to reduce by three quarters, between 1990 and 2015, the maternal mortality ratio. The target of maternal mortality ratio (MMR) is 134 by 2015. Similarly, the percentage of deliveries attended is 60 percent by 2015 and contraceptive prevalence rate is 67 percent. The most recent figure for MMR is 415 in 100,000 births from NPC. In Nepal over 80 percent of the deliveries still takes place at home. Most of the births are assisted by family members and neighbours with only one fifth of the deliveries attended by health workers. Antenatal attendance is low with only 14 percent of the women attending the recommended four antenatal visits, and only about one seventh of adolescent mothers attending the antenatal clinic. Only 17 percent of women receive a post-natal check within 48 hours (NDHS, 2001).

Nepal government has been trying to make available maximum health services to maximum number of people to meet the health-related targets of MDG. However, the health services in Nepal are insufficient due to a number of reasons. Some of them are

lack of skilled manpower, health centres and skilled manpower that prefer to serve remote populace. Table 1.10 shows the health services available in Nepal.

Table 1.10 indicates that the number of health service centres, skilled manpower and hospital beds are not sufficient for the population. Besides, the qualified doctors and skilled manpower are concentrated in the developed cities only.

1.1.1.10 Foreign Aid to Nepal

Till 1951 Nepal was virtually isolated from the outside world. It received the first capital assistance from India in 1952 and from US in 1955, and till 1956 there were only two donors for Nepal. After the lunching of first five-year plan in 1956, the sources and volume of foreign Aid to Nepal increased rapidly because of its strategic location between India and China and also its non-aligned and friendly relations with other countries. The share of foreign aid as percent of the GDP was 4.6 percent in 1999/00 while it increased to 6 percent in 2004/05. The proportion of grant is 2.9 percent while loan constitutes 3.2 percent of the GDP. The total foreign aid disbursement in 2004/05 was Rs 23,657 million of which Rs 9,266.3 million was loan and the rest in the form of grant. The total foreign aid commitment for first eight months of fiscal year 2008/09 is Rs 43,134.3 million (Economic Survey, 2008/09).

Table 1.10

Government sector health services available in Nepal, 2006/07

Description	Total number	Per unit population
Hospital	87	261344
Health centres & Health Posts	682	33339
Sub-health post and Primary health centres	3334	6820
Total health services Centres	4103	5542
Doctors*	1361	17011
Nurses**	11637	1954
Health assistants	7491	4372
Ayurvedic Physicians	754	30155
Other health workers	7175	3169
Health volunteers and other members	63326	360
Total Health Manpower	91744	248
Hospital beds	6944	3275

Source: Economic Survey, 2006/07.

** Government employed only*

*** Nurses and Assistant Nurse, mid-wives registered in Nepal Nursing Council only.*

An analysis of aid disbursement from 1998/99 to 2004/05 shows that the loan component far exceeded the grant initially but from FY 2001/02, there is sharp decline in the loan amount while the grant portion increased sharply and since then both components have steadily increased with loan amount still exceeding the grant amount. The total amount of aid disbursement reached NRs 23657.3 million in FY 2004/05. The details of the aid disbursement from 2000/01 to 2007/08 are given in the Annex 1L (Economic Survey, 2008/09).

1.1.1.11 Nepal's Foreign Trade

In the early stage of Nepal's economic development, Nepal's foreign trade was limited to India and Tibet. Till 1960s, India's share in Nepal constituted the major bulk. However,

after the adoption of trade diversification policy by Nepal government, the country undergone structural change in foreign trade both in term of countries and commodities.

Export

Nepal mainly exported vegetable ghee (16.2 percent), Zinc sheet (10.7 percent), textiles (10.4 percent), jute goods (9.4percent), Juice (8.7 percent), herbs and Ayurvedic medicines (6.6 percent), polyster yarn (4.5 percent), tooth paste (4.5 percent), pulses (2.3 percent), cardamom (2.1 percent) etc in fiscal year 2004/05 to India. Similarly, the export commodities such as readymade garments (61.6 percent), hand knitted woollen carpet (59.0 percent), pashmina (10.5 percent), handicrafts (6.5 percent) etc are exported to the third countries in the same fiscal year. The total amount of export to India is NRs 27.76 billion during the first eight months of FY 2006/07 which has decreased by 6.4 percent as compared to the previous year. Total exports during the first eight months of FY 2006/07 decreased by 6.6 percent totalling to NRs 39.99 billion, compared to 13.3 percent growth in the corresponding period of FY 2005/06.

Total export during the first eight months of FY 2008/09 has risen by 17.1 percent to NRs 44.3 billion while the corresponding period of FY 2007/08 had a decline in the export. Similarly, remittance has reached NRs 131.0 billion during the first eight months of FY 2008/09 (Economic Survey, 2008/09).

Import

Nepal imported a total of NRs 72.12 billion worth of commodities from India in the first eight months of fiscal year 2006/07. The manufactured goods comprised 31.7 percent of the import followed by mineral fuels and lubricant (27.6 percent). The machinery and transport equipment constituted 11.9 percent of the import while chemical and drugs constituted 9.6 percent of the import. The rest consists of food and live animals, animal and vegetable oil and fats etc. Similarly, the total value of imports from overseas countries in first eight months of FY 2005/06 was NRs 45.31 billion and the composition of the import was: manufactured goods (23.2 percent), machinery and transport equipment (22.9 percent), animal and vegetable oil and fats (14.4 percent), chemicals and

drugs (14.1 percent), crude materials (7.8 percent) etc. Nepal in spite of various efforts towards export promotion and trade diversification has been facing huge trade deficits. Nepal has a trade deficit of NRs 131.73 billion during the first eight months of FY 2008/09 (Economic Survey, 2008/09).

The total merchandise export in FY 2002/03 was NRs 22579 thousand while the merchandise import was NRs 64297 thousand in the same year. Hence the total trade deficit was NRs 41718 thousand in FY 2002/03. Total imports during the first eight months of FY 2006/07 totalled NRs 114.69 billion in which imports of India remained NRs 72.12 billion while from other countries, a total of NRs 42.57 billion. The total trade deficit during the first eight months of FY 2006/07 remained NRs 73.22 billion (Economic Survey, 2006/07).

1.1.1.12 Natural Resources

Forests and water are the most significant natural resources of Nepal. According to a survey, the forest constitutes about 29 percent of the total land area of the country. However, forest resource is gradually depleting due at an annual deforestation rate of 1.7 percent in the country from 1978/79 to 1994. In Terai plains, forest area has decreased at an annual rate of 1.3 percent from 1978/79 to 1990/91. In the Hilly area, forest has decreased at an annual rate of 2.3 percent from 1978/79 to 1994. Out of total land area (14.72 million ha) forest covers about 4.27 million ha (29 percent) and shrub covers 1.56 million ha (10.6 percent). Both forest and shrub together cover 39.6 percent of the total land area of the country. Reachable forest area of Nepal is 2.18 million ha (about 52 percent of the total forest area). The biggest reachable forest area is in EDR (0.58 million ha) and the smallest in WDR (0.26 million ha). Total stem volume (over bark) is 388 million m^3. Mean stem volume (ob) of Nepal is 178 m^3/ha. The average number of stems per hectare is 408. They are divided into diameter classes 10-20 cm (244 stems/ha), 20-50 cm (143 stems/ha) and over 50 cm (21 stems/ha). The main tree species in terms of proportion of total stem volume are Sal (Shorea *robusta*) with 28.2 percent of total volume, Oak (Quercus spp) with 9.3 percent and Asna (Terminalia *alata*) with 7.6 percent, Chirpine (Pinus *roxburghii*) with 6.3 percent, Abies *spectabilis* with 4.4 percent, Rhododendron spp with 4.2 percent and Alnus *nepalensis* with 2.9 percent.

Water is another most significant natural resource of the country. Nepal has the potential to produce almost 83000 MW of power from the utilisation of its vast water resources shown in Table 1.11. In addition to this, the country can provide adequate irrigation facilities to the peasants by the proper management of the water resources.

Table 1.11

Theoretically feasible hydropower potential of river courses in Nepal (in MW)

Name of river basin	Potential concentrated in the river courses (in MW)		
	Major river[1]	Small rivers[2]	Total
Sapta Koshi	18750	3600	22350
Sapta Gandaki	17950	2700	20650
Karnali and Mahakali	32680	3500	36180
Southern rivers	3070	1040	4100
Total	72450	10840	83290

Source: Khatri and Upreti, 2003.

1. Catchment area 1000 sq km and above.
2. Catchment area between 300-1000 sq km.

The estimated irrigable land area of Nepal is about 2.6 million hectares of which 1.36 million hectare is in Terai, 1.05 million hectare in Hills and 0.23 million hectares in Mountain region. The overall net command area of irrigation is 943000 ha of which 77 percent is in Terai and 20 percent in the Hills.

The surveys and exploratory works carried out so far have indicated occurrence of deposits such as iron, copper, lead, zinc, cobalt, mica, slate, sulpher, garnet, platinum, limestone etc. The minerals that are being excavated include limestone, marble etc. Some mineral-based plants have been set up. However, the results of surveys and exploratory works carried out since Nepal embarked on planned development tend to suggest that Nepal is not rich in minerals as one is tempted to believe on the basis of some ancient records and legends.

Distribution of land by farm-size

The distribution of land by farm-size for Nepal is given in Table 1.12. The Table shows that 24.44 percent of households are landless. The highest percentages of households are marginal cultivators (27.59 percent) followed by the small cultivators (20.15 percent) (UNDP, 2004: 176).

Table 1.12

Percentage distribution of households owning self operated land by farm size, 2001

Category	Nepal
Landless	24.44
Semi-landless (<0.2 acres)	6.98
Marginal cultivators (0.21-1 acres)	27.59
Small cultivators (1.01-2 acres)	20.15
semi-medium (2.01-4 acres)	13.42
Medium cultivators (4.01 - 10.0 acres)	6.25
Large cultivators (10.01 + acres)	1.17
Total HHs	4,174,374

Source: UNDP, 2004.

Poverty incidence by farm size

The incidence of poverty by farm size in different ecological regions in the country is given in Table 1.13. Table 1.13 shows that the incidence of poverty is higher among the holders of small size farms (< 0.5 ha) in all ecological regions except Terai where the productivity of land is relatively higher. The incidences of poverty reduce by almost 20 percentage points between the larger (>1 ha) and smaller farm size (Upadhya, 2006).

Table 1.13

Poverty incidence by farm size in different ecological regions of Nepal

Farm size	Mountain	Hills	Terai
Below 0.5 ha	77.8	70.3	39.7
0.5 ha - 1.0 ha	67.3	64.3	32.3
Above 1.0 ha	39.7	51.0	23.6

Source: Sharma and Chhetry, 1997 cited by Upadhya, 2006 modified.

1.2 Conceptual Arguments

Development efforts in the initial stage are marked with increased inequality, explained by Kuznets Curve or Kuznets inverted U hypothesis. Analysing data from developed and underdeveloped countries, Kuznets observes, "Income distribution in these underdeveloped countries is somewhat more unequal than in the developed countries during the period after the second world war" (Kuznets, 1955, p. 20).

Kuznets observation still dominates not only in development but also in the domain of environment. Inequality is perceived as an inevitable consequence of early growth and rapid industrialisation, while the latter as a symbol of modernisation and prosperity. The approach is guided by the linkages, based on a high "Structural interdependence between forestry and the industrial sector of the economy (Westoby, 1962).

Similarly, Robinson (1976, p. 123) writes, "The studies support the Kuznets U hypothesis that during development the distribution will initially become more unequal and only later becomes more equal." However, development economists, already in as early as 1970s, started to believe that the turning point in the mentioned curve depends much on the policies.

This shift in development philosophy got immediately reflected in development policies

at global level including in the Forest sector. The newer perspective required that the development should be achieved on the basis of increased rural income and output. The 'integrated rural development' became a buzzword in the development sphere. More and more importance was placed on achievements of equity, and emphasising the distribution aspects underlying growth and development. People's participation in the development process became mandatory.

Development objective required narrowing the 'poor-rich' gap, which in turn required enhanced productivity of small enterprises, reform in distribution mechanism, redistribution of resources and increased off-farm employment. The first two development strategies depend directly on policy choice. Moreover, there are two schools, concerned with policy choice that govern growth and equality, *viz.,* 'Re-distribution before growth' and 'redistribution with growth'. The proponents of the former believe on improved asset-distribution, consequently production increases and negative effects on the poor get avoided. While the supporters of latter argue for a larger share of economic growth proceeds to be channelled in the areas where it gets accumulated by the poor as an asset, especially in the areas of nutrition, health and education during the course of development (Chenery et al. 1974).

In an address to the Eighth World Forestry Congress, Westoby took a major departure from his previous stance, acknowledging, "The dreamed snowball-effect of forest industries on rural economies has not materialized" (Westoby, 1987).

Thus, the shift from 'Industrial led development' to a 'rural oriented approach' paves way for Community or Social Forestry with greater emphasis on equity, distribution aspect and mandatory participation.

While development philosophy underwent major shift, the science of natural resource management also had the same fate. During 1960s, Hardin's notion on 'Tragedy of the Commons' was at sway, with a concern for either privatisation or more state control on common resources. However, the proponents of privatisation are still unable to propose suitable institutional alternatives to contain externalities of the Commons. Moreover, the socio-economic dimension of the Commons is almost lacking in the notion.

A comprehensive study, based on data from eighty villages from twenty one districts in dry regions of seven states of India, reveals the significance of Common Property Resource (CPR) in employment and income generation for the rural poor. The income derived from CPR ranges between Rs. 530 and Rs. 580 per household per year in different areas (Jodha, 1986). According to the study, "Rural inequalities generated by the Private Property Resource (PPR) based farming system are partly reduced by CPRs as the resource poor households (unlike the rich), significantly supplement their income from CPRs" (Jodha, 1986, p. 1171). The dependence of poor on CPR is also quite high because "Between 84 and 100 per cent of the poor households gathered food, fuel, fodder and fibre items from CPRs" (Jodha, 1986, p. 1171). Moreover, the CPR also acted as a cushion during the crisis situation such as prolonged drought periods. CPR also has role in reducing income inequalities.

> The pattern of inter-class differences in CPR suggests that CPRs help reduce the rural inequalities… measured with the Gini coefficient, are reduced when CPR incomes are included in household income…The values of the Gini coefficient varied from 0.37 to 0.50 in different areas when income from all sources excluding the CPR was considered. However, once CPR-based income was included in household income, the value of the Gini coefficient declined and ranged between 0.32 and 0.41 in different areas (Jodha, 1986, p. 1177).

It is obvious that the Tragedy of Commons concerns with ecological aspect while Jodha's observation emphasises on socio-economic role of the Commons and failure of privatisation and distribution of CPR lands to benefit the poor. He writes, "although the privatisation of CPRs was promoted in the name of helping the poor, very little land was received by them" (Jodha, 1986, p. 1178). Redistribution of such land causes the disentitlement of the poor " To sum up … privatisation of CPRs as a strategy to help the rural poor yielded a negative result" (Jodha, 1986, p. 1179).

The above Indian experience is also supported by many examples from Nepal, "Where the 'Tragedy of Commons' does not hold true. Such resources are regulated by the local communities and are not open access" (Gilmour, 1990). The conceptual simplicity of Hardin's notion of 'common resources' confuses 'open access' and 'common property' (Bromley, 1986).

Community forestry (CF) is regarded as an exemplary against the notion of 'Tragedy of

Commons' which requires either privatisation or nationalisation of common resources for long term sustainability (Gilmour, 1990; Bromley, 1986).

CF is hailed as a success in replenishing greenery in once a barren Hills of Nepal, but, Are there sufficient studies on its socio-economic consequences, income distribution in particular?

There are many studies regarding the income distribution, carried out by different organisations and individuals (e.g., Aryal, 1995; Gurugharana, 1995; Islam, 1983; Lohani, 1978; NPC, 1977; NRB, 1985; Ostuka et al. 1993; Sah, 1991; Suvedi, 1986 etc) in Nepal.

In 1976/77, the National Planning Commission (NPC) conducted a first large-scale national survey employment, income distribution and consumption patterns. The survey used the tools such as Lorenz curve, Gini coefficient and Calorie needs to assess income inequality and poverty. Deriving a subsistence income level of Rs 2 per person per day, the absolute number of poor people was estimated at 37.2 percent in rural areas and much lower, at 17 percent in urban areas. The national average poverty was estimated at 36.2 percent of the population (Upadhya, 2006).

Lohani (1978) observed that lowest 40 percent of households received about 8 percent of total income while 59 percent was pocketed by the highest 20 percent of the households. His findings also reinforced the earlier study by NPC regarding higher inequality in the rural setting.

Islam (1983) analysed pattern of income and land distribution to take a stock of poverty and determine its trend. He reported uneven pattern of income distribution in Nepal as the share of lowest 40 percent of households in total income was less than 14 percent. While the top 10 percent households enjoyed more than 46 percent of it.

The next large-scale survey, a multipurpose household budget survey conducted by the Nepal Rastra Bank during 1984-85, followed a "basic needs" income approach to estimate poverty incidence. The study covered more than five thousand households and

reported highest inequality in the Hills followed by the Terai and the Mountain respectively. Furthermore, the incidences of poverty were 43 and 19 percents in rural and urban sector respectively and 42.55 percent of the total population, was poor (NRB, 1985). The poverty incidence was found to be highest in the rural hills (52.9 percent) and in the Terai (35.4 percent), and much lower in urban Nepal (Upadhya, 2006).

Suvedi (1986) compared income distribution in two villages representing the Hill and the Terai. Even though the average income of the poor in the latter was reported to be higher, the inequality was also substantial. The study also gives insights on the sources of income for the poor and identifies wage labour as one of the important source of income.

A case study on poverty in Sindhuli reports "existing distribution of income is highly unequal and it helps to strengthen the circle of poverty…it is not only that inequalities and concentration of income are acute but...the level of income itself is low...for maintaining livelihood" (Aryal, 1995, p. 40). Gini-coefficient is used as a major determinant of poverty and the ratio calculated is 0.3112 among total sample. The study also calculates Sen's Poverty Index considering and not considering the income inequality as 0.1962 and 0.1436 respectively (Aryal, 1995, p. 40).

Most of the studies reported so far circumvent prevailing poverty and inequality. There are also a few studies that focus on the impact of development interventions: agriculture-modernisation, improved crops, and green revolution in particular.

Sah (1991) examines income distribution by caste and farm size and reports, "household incomes vary significantly by caste and farm size and depend on resource ownership" Furthermore, "Large farm households depend more on land and capital returns while small farm households depend more on labor returns and hired labor" (Sah, 1991). Using the social accounting matrix framework, the study recommends "making available additional land and capital resources to smaller farms yields higher returns and incomes than the same resources availed to the large farms" (Sah, 1991).

Another study on the adoption of modern varieties reports that the adoption does not worsen the household income distribution according to the results of the counterfactual

Gini-decomposition analysis (Ostuka, Barker and Thapa, 1993).

Except the sporadic studies carried out as an academic requirement or case study, there is very little research work on analysing the impact of development endeavour on poor people's livelihood as Gurugharana (1995) correctly writes:

> Unfortunately ... plans, programmes and projects for the last four decades ... multi-lateral and bi-lateral donor, have done very little in benefiting the poor ... dualistic impact on the economy deteriorating the existing inequality in distribution of income...
>
> Very few... researches and studies have been conducted to examine the causal factors and forces... kept the poverty mass... shielded from impact of development process. Among those few studies, the World Bank's 1989-90 study... Nepal: Poverty and Incomes is the first comprehensive study which analysed the socio-economic determinants of poverty, evaluated past poverty alleviation efforts, and suggested it's own strategies (Gurugharana, 1995, p. 2-3).

Gurugharana (1995) makes a bitter remark on the failure of donor sponsored development initiative to address poverty issues properly. He laments, "the plans, programmes and projects made in Kathmandu, with the help of donor, usually flow like ripples on the surface and leave the hard-core poor, who lie like bed-rocks on the bottom, completely untouched" (Gurugharana, 1995, p. 8).

Deo (1997) based on secondary data, collected jointly by NRB, NEPAL and ADB, Manila from 7336 households to review rural credit in 1992-93, did an assessment of income inequality and poverty in rural Nepal.

Nepal Living Standard Survey (NLSS) Report 1996 was published in May 1997 covering income, employment and adequacy of consumption. The report also covers credit and savings, remittances and non-farm economic activities. The most recent data available regarding poverty situation in the country derives from NLSS conducted by CBS in 2003/04. The first NLSS (Table 1.14) uses a poverty line of Rs 5,089 per person per year to establish that 42 percent of the population (43 percent in rural and 22 percent in urban area is poor).

The second NLSS uses Rs 7,696 as the poverty line income per capita per year to arrive

at 31 percent absolute poverty…The incidence of poverty is found to be highest in the hills (35 percent), followed by the mountain (33 percent), a reversal from the past (Upadhya, 2006, p. 230).

Table 1.14

Trends in the incidence of poverty in Nepal

Source Year	Population below Poverty line (percent)			Number of poor population (000)
	Urban	Rural	Nepal	
NPC 1977	17.0	37.2	36.2	4,897
MPHBS 1985	19.2	43.1	42.5	6,852
NLSS/CBS 1996	21.6	43.3	41.8	8,560
NLSS/CBS 2004	9.6	34.6	30.8	7,640

Source: NESAC 1998; CBS 2005 cited by Upadhya, 2006, p. 230.

A major gap identified in review of literature is lack of research on the consequences of large transfer of state owned forest to the local communities as community forests particularly on income distribution. There is a dearth of literature regarding institutional aspect of distribution of income particularly in community forestry.

Community forestry is often lauded as a successful intervention at macro level that heralds the Forest Sector of Nepal. Community forestry is a significant natural resource in the rural setting because it "not only contributes in the subsistence living of the poor but also for a comfortable sufficiency of the rich" (Sharma, 1999a). However, the other side of the coin presents a gloomy picture. A recent study on community forestry reports:

> The calculation of variances shows a slight reduction of between-group inequality (i.e., rich and poor households) due to the community forestry. However, it increases 'within-group inequality' nearly to the same extent hence, the total inequality remains unchanged. Thus, despite a slight reduction of 'rich-poor' gap, community forestry simultaneously, increases 'within-group inequality' thereby failing to reduce total inequality (Sharma, 2000a, p. 12).

There is also an increasing concern that despite being a relatively successful programme, community forestry has failed to benefit the poor and disadvantage section of the society. This aspect is reflected in the following excerpt:

> There is also an increasing concern that the community forest management has failed to benefit more to the poor than the rich households (Graner, 1997; Neupane, 2000). Based on the case-studies from Sindhupalchok District, Graner (1997) concludes that community forestry based on FUG concept may not be a viable development strategy for securing the basic needs, mainly because of the dominance of elite and high caste people in the FUGs (as quoted in Sharma, 2003, p. 39).

A conclusion of this chapter is the relevance on the research in the context of community based resource management in Nepal. The research should give insights on the linkages between the micro and the macro levels of intervention in community forestry.

1.2.1 Statement of the Problem

The subsequent national plans have strong focus on poverty reduction. However, it still remains as a major challenge in the development context of Nepal. Moreover, poverty is identified as a root cause of Maoist insurgency in the country. As the problem spreads through out the country, the impact of development interventions on income distribution and poverty gets more focus.

> The problem of poverty is of complex nature and "to get a grip on the problems of poverty, one should also forget the idea of overcoming inequality by redistribution. Inequality may even grow at first as poverty declines. To lift the incomes of poor …increase …rates of investment, which in turn will tend to enlarge wealth, if not the consumption of rich" (Gilder 1981, p. 67).

Gilder's remark puts development workers in a 'growth or inequality' dilemma. However, it also links wealth with entrepreneurial development. Nonetheless, the statement emphasises on twined relationship among wealth, poverty, inequality and growth. Needless to say, development endeavours need to be focused on poverty reduction thereby maintaining societal tolerance and tranquillity. The latest Report released by UNDP (Upadhya, 2006. p. 230) also shows a concern for the widening 'poor-rich' gap with the poor getting poorer and rich even richer. It reports, the Gini coefficient calculated for 1996 was 0.342 on average (urban 0.43 and rural 0.31) while in 2004 the

Gini coefficient stood at 0.414 indicating a widening of income inequality. The share of bottom 20 percent of the population to total consumption reduced from 7.6 percent in 1996 to 6.2 percent in 2004.

The increased inequality is a direct threat to attain the Tenth Plan's community forestry related target for poverty reduction. The other important implication is on the need of higher growth rate for making poverty, a thing of past. Uneven distribution of income is also a challenge to realise the basic needs of rural people as aimed in the Master Plan for Forestry Sector. However, there is a dearth of studies on equity issues in community forestry. According to Bosma (1995) equity in community forestry should be perceived mainly on three aspects: equity in product distribution, decision making and fund-allocation. But most of the studies do not include the mentioned aspects.

Though there are researches on income inequality underlying the distribution aspects, the variations in methodology, spatial coverage and tools are also substantial.

Community forestry is heralded as one of the most successful initiative in Nepal. A joint report (HMG/NPC/MOPE, 2003) boosts "Today, community forest management in rural Nepal is a rare item in which Nepal has become a world leader…many areas in the middle hills, where community forest has been especially active have seen a re-growth of forest biomass" (HMG/NPC/MOPE, 2003:16). To what extent this re-growth of biomass has contributed to uplift the livelihood of Nepalese people still remains unknown. The contribution of community forestry on household income has not been properly valued and quantified. Moreover, it is still not clear how much financial resources is required to carry out poverty alleviation activities in community forestry (that encompass 1/3rd of the total Nepalese households). These all information gaps make the success of community forestry largely rhetorical.

1.2.2 Objectives of the Study

This research intends to assess the impact of community forestry on income distribution in regard to the income generated from the community forests, particularly on 'poor-rich' gap based on the case-study and contemporary literature. Moreover, it intends to

examine the present condition of inequality in community forest resource and income distribution in Nepal. In doing so, the research exclusively focuses on the consequence of large-scale transfer of forest resource to the local communities on inequality measurements.

The following are the specific objectives of the research:

1. To assess the impact of community forestry on income distribution in regard to the existing income inequality in Nepal,
2. To quantify the contribution of community forestry on farm-household income,
3. To measure the effect of increased farm-household income from community forest particularly on the existing 'poor-rich' gap.

The purpose of the research is to understand the resources owned by the local people and identify forest products gathered from the community forest. Furthermore, the participation of local people in community forestry activities, empowerment and their perceptions on community forestry depend largely on the institutional arrangements for decision-making.

The secondary objective of this research is also to explore the level of utilisation of forest products by wealth and caste in Nepal. The motive behind the research is to get insights on the issue of equity and accessibility in community forestry in Nepal.

1.2.3 Importance of the Study

A follow up study of Nepal Living Standards Survey 1996 was recently carried out and the report was finalised in July 2004. Utilising the latest data obtained from the mentioned survey, a macro level study on income inequality is justified. Moreover, there is a need to carry out a comprehensive research both at macro and micro level to ascertain the impact of community forestry on income distribution.

The outcome of the research can be very useful for the planners and policy makers,

especially to tune programmes and activities towards poverty reduction through community forestry in Nepal.

Finally, the review of literature of contemporary documents on community forestry and income distribution in the context of development paradigm also justifies the endeavour.

The problems of inequality in income distribution and poverty are multi-dimensional and complex in nature because these have many facets, connections and ramifications. The problems associated with unfair or unjust distribution create conditions where majority of the people lives under apathetic conditions. Besides, these problems retard the pace of development by creating complex problems in every field of the country. Therefore acute disparity in income distribution and poverty is not desirable and justifiable in modern welfare state. These are global phenomenon but chronic poverty is deeply-rooted in Nepal. The country has been facing the problem of unjust income distribution and poverty for a long time. The Government has lunched several programmes in different areas however the effectiveness of many of such programmes is questionable. Forestry programme is some of the few programmes in the country which is widely viewed as one of the successful programme. The Forest User Groups (FUGs) are carrying out activities for poverty alleviation within their groups by utilising their own fund. An assessment of such programmes would give policy makers insight on linking community forestry with other development initiatives.

Nepal is divided into three ecological belts (Terai, Hills and Mountain) and five development regions (Eastern, Central, Western, Mid-western and Far-western). The spread of community forestry is different in these regions while the problem of poverty and income distribution also varies widely. For this, the policy makers should have up to date information about various aspects of problems which is rather scantly in Nepal. No doubt, a few research works have been carried out on this field in various selected areas. But because of different reasons, previous studies and research might not be representative for the present situation so that the present research is justifiable because it provides information about the spread of community forestry through out the country, distribution pattern of cultivated land, distribution of forest resources, distribution of forest products from the community forests, income distribution pattern in the research

site and community forestry related institutional matters.

1.2.4 Limitations of the Study

The case-study constitutes an important part of the research and gives insight on change in inequality and income distribution with community forestry income. It is rather difficult to generalise the findings based on a case-study however, it provides opportunity to understand the micro and macro level linkages of the data. The findings of the study may not be generalised at the national level because of the small sample size.

The deterioration in the security situation during the research period posed serious threat to the field activities besides intimidating the respondents to answer income and wealth related questions honestly. The followings are the specific limitation of the present research.

1. This research work uses database from household survey and uses different methodology for gathering information. It is a major limitation of this research.

2. The research uses National FUG database of year 2004, hence it misses out recent information regarding community forestry development in Nepal.

3. This research is based on several studies and cross sectional data for a particular year therefore it is unable to indicate the trends of income distribution in Nepal.

The design of the research does not address the issue of 'exclusion' in community forestry and it remains as a major weakness of present endeavour. The research due to the methodological problem excludes the non-users of the community forests and considers only users as the population in field research.

1.2.5 Organisation of the book

The book covers two aspects: macro and micro perspective on resource and income distribution in Nepal. However, the chapters of the book do not differentiate between the

micro and macro components. The chapters deal with the income distribution and inequality especially in regard to land resource and hand over of community forests in different ecological belts and development regions of Nepal.

The second component includes the case-studies and cover identification, distribution of forest products, household income and distribution. It also includes discussion on poverty and the programmes for poverty alleviation carried out in the Forest User Groups. The division of chapter is as follows:

The first chapter begins with introduction, followed by statement of the problem, objectives of the research, research importance, and limitations of the research. In the beginning of this chapter an attempt has been made to present an overview of Nepalese economy.

The second chapter contains a review of literature. In this chapter, available relevant foreign and Nepalese literature has been reviewed in brief.

The third chapter consists of methodology of research and in this chapter there is discussion on different methodologies used in the research. The research includes desk work and field work. It also uses secondary data from previous studies.

The data analysis begins with the fourth chapter. This chapter examines land utilisation, pattern of land distribution, pressure of population on cultivated lands, forest resources of Nepal and community forestry in Nepal.

The fifth chapter deals with the production and distribution of forest products from the community forests and this chapter sheds light on whether the products from the community forests are fairly distributed or there is disparity in distribution. When analysing distribution, the households are categorised into groups by wealth class and caste.

The sixth chapter examines the pattern of household income and income distribution using a case-study in Nepal. An attempt has been made to identify the equalising and dis-

equalising sources of income in income distribution.

The seventh chapter includes the assessment of private trees income and its impact on income distribution. It also deals with the existence of ‘new strategy’ supposedly adopted by the Nepalese farmers in the wake of changing socio-economic context.

The eighth chapter provides the summary and conclusion of the research along with the suggestions and recommendations for improving income distribution from community forestry's income. It also includes recommendations for institutional strengthening and effectively carrying out poverty alleviation programmes at Forest User Group level. The chapter also tries to sketch out the direction for further research on income distribution related studies in community forestry in Nepal.

CHAPTER 2

LITERATURE REVIEW

2.1 Macroeconomic Perspective on Growth and Distribution

In this chapter attention is paid on literature related with the concept of income and its distribution, in a bid to understand why income distribution matters? Furthermore, various models and tools used for measuring income inequality and results obtained are also discussed. Important policy questions raised in previous works and conclusions in regard to the distribution are also dealt.

First of all, this review attempts to provide a glimpse of changes in the development philosophy - as a shift in development paradigm in the turn of twentieth century. The initial phase of development during 1950-60s emphasised much on industrialisation while the distributional aspect was over looked. "Government and dual economic structure impede benefit spread of industrialisation. During 1960s debate was not on distributional consequences but rather on the relative benefits of import substitution versus export promotion and fostering primary versus manufacturing goods" (Adelman and Robinson, 1989, p. 953). However, during the second phase (1970-75) failures of industrial model of development became quite clear. Actually development failures were identified by 1960s, when rapid growth lead to deteriorating employment. "The classical model of rapid industrialisation was based on siphoning labour and economic surplus from traditional agriculture sector, leading to capital accumulation" (Adelman and Robinson, 1989, p. 955). The failure of development model pointed to inappropriate factor prices. Contemporary development economists categorically explained the link between industrialisation and unemployment. "In contrast to Lewis model, wages in modern sector were raising despite continued existence of surplus labour in traditional sector. Subsidisation in physical capital lead to capital intensive technology while demography was the other villain; rural to urban migration continued despite urban unemployment… the problem was not unemployment with zero wage but low productivity and low income supply. Thus merging employment and poverty problem… distribution of income deteriorated with growth" (Adelman and Robinson, 1989, p. 955).

The third phase of development discourse is characterised by declining export and raising oil price from 1975 to present period. "The policies of developing countries aimed at maintaining growth even under declining exports and increasing oil prices, with developed countries policies aimed at fighting inflation through monetary restraint and increased lending to developing countries caused debt issue as the real interest rate rose" (Adelman and Robinson, 1989, p. 955).

Many multilateral lending agencies and development partners started to emphasise on Structural Adjustment Programme (SAP) to grab inflation and financial problems. "Structural adjustment got priority over other issues of developing countries. Less attention for poorer section…shift in policy away from poor" (Adelman and Robinson, 1989, p. 956). During this period, neoclassical model remained in full swing with market as resource allocator. There was focus on individual economic actors of market, while prices not only allocate resources between the economic actors but also determine the economic welfare between people. "The period 1973 afterwards was mangled with exogenous shocks and crisis that led to tolerance of greater inequality but that too erodes when absolute real income falls over time…Debt problem has become less acute due to decline in inflation, interest rate and rescheduling" (Adelman and Robinson, 1989, p. 956). Suddenly with a pause, development partners have "the realisation that poor and near poor borne the burnt of IMF inspired SAP" (Adelman and Robinson, 1989, p. 957). With growing realisation, distributional concerns and inequality again surfaced at the top of development agenda.

2.1.1 Why Inequality Matters?

According to Adelman and Robinson (1989, p. 950), "the social values and attitudes govern the social tolerance of inequality…Change is tolerable if it brings gain to all - if social inequality is due to exogenous events- tolerance is more". The opportunities of 'exit' provide safety valve. If inequality is inevitable for development - it leads to greater tolerance (Adelman and Robinson, 1989, p. 951). Inequality for accumulation (Rawls, 1971) suggests the tolerance of inequality to the extent that is necessary for raising income of the poorest (quoted in Adelman and Robinson, 1989).

Heerink and Folmer (1994) examine the relationship between income inequality to basic needs fulfilment. They cited different studies carried out by various agencies in regard to income distribution and fulfilment of basic needs. Seehan and Hopkins (1978) analyse inter-country differences in basic needs fulfilment in 1970s and improvements between 1960 and 1970 and concluded that income distribution is not an important determinant on average level of basic needs performance. They studied 11 basic need indicators as dependent variables (quoted in Heerink and Folmer 1994, p. 626). Similarly, Stewart (1979) in her analysis included country studies on basic needs carried out by the World Bank (Heerink and Folmer 1994, p. 626). Ram (1985) used multiple regression technique to study the impact of inequality on basic needs fulfilment in low and middle income countries (Heerink and Folmer 1994, p. 626).

During the late 1970s and '80s, there was again marked shift in the development discourse. Structural adjustment got priority over the basic needs approach. "Many Latin American, African and some Asian Countries in late 1970s and '80s pursued SAP comprising of macroeconomic and structural reforms for sustaining economic growth. They were suffering from deteriorating balance of payment, increasing budget deficit, rising inflation and falling economic growth" (Pinstrup-Andersen and Pandya-Lorch, 1994, p. 479). The measures that were undertaken under SAP included: devaluation of currency, revision of trade policy, cuts in government expenditure, change in price and subsidy policy, privatisation and liberalisation. "However, it is often claimed that the poor suffer the most from such reforms. SAP and Economic reform of 1980s and early 1990s - implication for poverty- and impact on poor is difficult to measure" (Pinstrup-Andersen and Pandya-Lorch, 1994, p. 479). The negative effect on poor has remained largely rhetorical and hence their paper focuses on poverty and income distribution aspects due to change in food and agriculture polices (Pinstrup-Andersen and Pandya-Lorch, 1994, p. 480).

According to Demery and Squire (1994), macroeconomic adjustments are more detrimental to poor is often argued against the World Bank-funded economic reform programs. Their six countries based study in Africa demonstrates that poverty decline with improved macroeconomic balance with high economic growth rate, change in real effective exchange rate, benefited poor directly and indirectly by favourably affecting

rural income. But the findings also highlighted three causes for policy concern namely; 1) African governments' commitment to economic reform are lacking 2) poorest of the poor are not benefited by the recent growth, and 3) there are no rosy prospects for poor - unless there are sufficient investment in human capital and better targeting of social spending (Demery and Squire, 1994, p. 39).

2.1.2 Concept of Income and Distributional Aspects

Income always remained as an important discourse in economic studies. Titmuss (1963, p. 21) defines it as the "…algebraic sum of (1) the market value of rights exercised in consumption, and (2) the change in the value of store of property rights between the beginning and the end of the period in question". Titmuss (1963, p. 34) in his definition of income focuses on two fundamental aspects of income. The first in terms of the individual's command over resources in a given time, the second is the 'net saving' in terms of change in the value of man's store of property rights, irrespective of the changes due to saving or accretions to the value of the property.

Titmuss (1963) also attempts to accrete it with the concept of 'wealth'. When he writes; "At the other extreme it is possible to conceive of a definition of income which would take account of all forms of income, personal to the individual, in kind as well as in cash; in some measure of all forms of saving from undistributed corporate profits to expected tax-free retirement lump sums and capital gains; all forms of reallocated or 'split' income, present and future, to other members of the family or kinship, born and unborn. One obvious objection is that such a definition of income begins to assume the properties of a definition of wealth (or accretions of wealth) applicable, not simply to an individual or an 'income unit', but to a family or kinship group embracing perhaps three generations. But that is the crux of the matter today. As more income passes or is transmuted into forms of wealth or capital on a kinship basis the conventions income statistics become less and less meaningful in terms of the notions commonly attributed to them" (Titmuss, 1963, p. 32).

Dasgupta (1993) regards real income as an important measure of living standard. According to him, "the most common measure of living standard is real income. Thus, in

quantitative empirical work economic development itself has often been identified with growth in real income per head, and the idea of inequality has been associated with one or other measure of income inequality[1]" (Dasgupta, 1993, p. 125). He gives reason for the use of real income in empirical studies in welfare economics. "A Person's real income is a measure of the command she has over marketed goods and services, for example food and clothing, shelter, transportation, and general amenities" (Dasgupta, 1993, p. 108). However, the income is regarded only as a coarse index of the mentioned command. "It is a coarse index of this command, because real income alone doesn't tell us how much each good on offer the person can and does procure. But with constant relative prices, an increase in real income reflects a widening in her command over marketed goods and services…a rise in real income reflects an increase in welfare" (Dasgupta, 1993, p. 108).

Income, despite being an important indicator cannot be regarded as the sole one. The 'hunger winter' in the Netherlands is often cited as an example. Sen (1997, p. 171) narrates, "Dutch in the hunger winter of 1944-5 found themselves suddenly in much reduced circumstances, their capability fulfilment did not go down in relativist account…nor it is a straight forward one that can be captured by simply looking at the average income, or even the current Lorenz curve of income distribution. ”

Sen's (1997) narration lead us to another important aspect of economic discourse-distribution and redistribution. Taxation has been instituted as an important mechanism of redistribution. "The Annual Reports of the Board of Inland Revenue…in October 1950…concluded that there had been 'a very considerable redistribution in incomes'" (Titmuss, 1963, p. 16). The claims of the Board gets defied when he writes, "Mr Lydall (1955 and 1959) and Professor Paish (1957)… concluded that there had been a continuous movement towards greater equality of incomes before tax… the effects of tax increases had been relatively unimportant" (Titmuss, 1963, p. 19).

[1] Of the vast literature, see Kuznets (1955, 1966), Dandekar and Rath (1971), Fishlow (1972), Paukert (1973), Atkinson (1975), Cline (1975), Jain (1975), Ahluwalia (1976 a, b), Kakwani (1980,1981), Glewwe (1986), S. Robinson (1976), Frank and Webb (1977), Sahota (1978), Adelman (1980), Fields (1980), Bigsten (1983), Lindert and Williamson (1985), Yotopoulos (1985,1988) and Papanek and Kyn (1986).

According to Adelman and Robinson (1978) in the 1950's and early 1960's economists and planners did not consider the distribution of income a major policy problem in developing countries. The prevailing view was that rapid growth would naturally lead (perhaps with a slight lag) to improved conditions for everyone. Though many might have preferred to see more relative equality and faster improvement in the absolute incomes of the poor, even radical critics of the market economy and existing institutional arrangements were at the time much more preoccupied with failure to achieve adequate growth than with distributional issues. Adelman and Robinson (1978) correctly pinpoints toward growing concern on income distribution among the developing countries as follows:

> There is certainly extensive support for the Kuznets U hypothesis that the relative distribution of income first becomes more unequal in the course of economic development and only at the later stages becomes more equal. In a cross-section study of 43 less-developed countries, Adelman and Morris (1973, p.181) found that on the average, for the longest part of the development process - corresponding to the transition from the state of development of sub-Saharan Africa to the state achieved in the least-developed Latin American countries - the primary effect of economic development on income distribution is to decrease both the absolute and the relative incomes of the poor. Though this view is still somewhat controversial, there is no question that the distribution of income - and especially the extent of poverty - has become a major policy issue both within the less-developed countries themselves and within the international community" (Adelman and Robinson, 1978, p. 1).

The complexity of income distribution in their words: "there is no satisfactory single theory of income distribution and development in less developed countries or, indeed, of income distribution in developed countries" (Adelman and Robinson, 1978, p. 6-8), in similarity with Titmuss (1963), try to link income distribution with the redistribution of wealth. The reduction of inequality in the ownership of primary factors of production is a fundamental goal of politics in many developing countries, however, the important influence is not due to inequality in income distribution but rather through unequal distribution of political powers that govern income redistributing instruments.

The issue of redistribution towards greater inequality is also debated. "To get a grip on the problems of poverty, one should also forget the idea of overcoming inequality by redistribution. Inequality may even grow at first as poverty declines. To lift the incomes

of the poor, it will be necessary to increase the rates of investment, which in turn will tend to enlarge the wealth, if not the consumption of rich" (Gilder, 1983, p. 67).

Disparity in productive assets such as land ownership is often regarded as a culprit of poverty. As Seddon (1987) puts it, "… as Ghai and Rahman observed in their study of rural poverty and the small farmers' development programme in Nepal, "since land is a major source of income in the rural areas…differences in land ownership translate directly into differences in income distribution. The structure of land ownership is, therefore, a major contributory cause of rural poverty" (Ghai and Rahman, 1979:3 quoted in Seddon, 1987, p. 118). The concentration of land mainly in the hands of affluent was reported in the USAID Mission Director's 1980-81 report. According to the report: "in Nepal, ownership of land, the overwhelming item of wealth, and thus receipt of income, is very concentrated. Two per cent of all rural households cultivate about 27 per cent of land. Three recent publication provide estimates for concentration of income which show Nepal as having one of the worst income concentration problems in Asia" (Butterfield, 1978, p. 2 quoted in Seddon, 1987).

In the 1980's the multilateral lending agencies emphasised on the structural adjustment with policy reform while the poverty issue remains overlooked. Domestic financing, expenditure cuts and liberalisation surfaced as development strategy. "Many Asian economies… raised taxes to finance public investment and have thereby raised savings and investment rates in the economy. The choices made in cutting expenditures or raising revenues also have wide-ranging effects on trade balances and income distribution. Who benefits and who loses from government expenditure and the manner in which the expenditure choices are financed are key factors in the ability of the government to undertake reforms and address poverty and the social costs of adjustment (Cornea, Jolly, and Stewart 1988 quoted in Chhibber and Shirazi, 1991, p. 27).

Gradually, distribution concerns began to surface again in the agenda of many governments. As Foroutan writes, " although income distribution was not an explicit objective of the government's 1980 policy reform package, the impact of the reforms on the distribution of income in Turkey was profound (Foroutan, 1991, p. 455). However, the issue was never explicit in the Structural Adjustment Lending (SAL) program of the

leading multilateral agencies. "Despite the importance of income redistribution to the sustainability of the adjustment policies, the issue was never explicitly addressed in Turkey's SAL program" (Foroutan, 1991, p. 455). The effect of decline in the real wage promoted capitalisation as Foroutan mentions, "The decline in real wages changed the factor distribution of income in favor of capital. In the manufacturing industry, for example, it was estimated that the share of interest, rents, and profits increased to 70 percent of manufacturing GDP from approximately 35 percent in the 1960s and 1970s". (Foroutan, 1991, p. 455). Foroutan (1991) also studies the impact of inflation on income distribution in Turkey: "In the absence of foreign borrowing and a lack of infrastructure to permit domestic borrowing, the budget deficit was financed almost exclusively by money creation. As a result, inflation soared to a peak of 141 percent in May 1980... Accelerating inflation had a negative impact on both the real exchange rate and pattern of income distribution (Foroutan, 1991, p. 441).

Dasgupta (1993) emphasises on economic growth for alleviating poverty. Moreover, he cautions against the excessive reliance on per capita income in explaining inequalities in resource allocation. "We observed that asset or consumption redistribution is one route towards the alleviation of malnutrition and involuntary employment. Growth is another" (Dasgupta, 1993, p. 125). He further elaborates, "A much-discussed theme in the interface of income inequality and economic growth has been the suggestion by Kuznets that there is an inverted U-shaped relationship between income inequality and the stage of economic development (as measured by income per head), in that income inequality increased in the early stages of development, and then falls when income per head is large. However, the definitive work of Anand and Kanbur (1989a,b) shows that there is nothing, after all, in this empirical claim. For a survey of the literature on income distribution and development see Adelman and Robinson (1989)… per capita income says nothing about the distribution of income. But infant mortality rates, life expectancy at birth, and the literacy rate says a good bit about inequalities in resource allocation within countries. We observed in the previous chapter that, provided the public delivery system is not overly tainted, public health measures relative to armaments and luxury durables are not expensive. Even among the poor countries, low figures for infant survival rates and life expectancy at birth are indicative of serious inequalities in the access to resources" (Dasgupta, 1993, p. 126).

Hossain (1995) also reports the improvement in the income receipts by the lowest quintile in Bangladesh. "The most important factor behind the moderation of rural income inequality is, however the income from non-agricultural sources. The bottom 40 percent in the land ownership scale earn nearly 32 percent of the non-agricultural incomes, while the top 10 per cent earns only 15 percent….the income distribution is found fairly unequal. The top 10 percent of the households in the income scale earn about 32 percent of the income, while the bottom 40 percent earn only 15 percent. The Gini concentration ratio of per capita income is estimated at 0.43" (Hossain, 1995a, p. 62).

The opportunity of non-farm employment created with economic growth may have increased prospects for the bottom decile of the population. "The distribution of income is however less unequal than the distribution of land. The top 10 percent of the households in the per capita land ownership scale, control about 45 percent of the total land while the bottom 40 per cent own only 3 percent. The Gini ratio for land ownership is estimated at 0.65" (Hossain, 1995a, p. 62).

2.1.3 Income Transfer and Basic Needs Fulfilment

The topic of income transfers has also attracted many researchers. Hossain (1995) gives an account of moderation of inequality through income transfers. "The inequality of agricultural income is moderated by several factors. In the agricultural sector, some of the income is transferred from the land-rich to the land-poor through the operation of the labour and tenancy markets" (Hossain, 1995, p. 62).

Sahn (1990) studies that change in price of cocoa and coffee in Côte d'Ivoire, the country's most important crops. The fluctuations in price would not change the relative income distribution among producers and increasing producer price of cotton and peanuts would benefit small farmers than larger ones (quoted in Andersen and Pandya-Lorch, 1994).

Sen (1997) explains the mechanism of transfer on income between the rich and the poor person and explain its consequences on income inequality. He used the term Weak

Transfer Axiom (WTA) to refer the mechanism. "There is a weak version of the transfer axiom, which I called the Weak Transfer Axiom (see Sen, 1977, p. 77; Sen, 1981, p. 186), which insists on the Pigou-Dalton condition being invariably satisfied whenever the transfer to the poor person from the richer person does not change the number below the poverty line, and this of course is fully consistent with the absolutist approach, and is indeed satisfied by the measure P and most of its variants" (quoted in Sen, 1997, p. 176)

The interdependence of poverty with income distribution in the context of various sub-groups is studied by Anand (1997) in Malaysia. He writes "my analysis of poverty is based on an examination of the lower end of the Malaysian income distribution. The precise truncation point depends on the definition of poverty, to which there are essentially two approaches, an *absolute* and a *relative* one. In the absolute approach a certain minimal living standard is specified in terms of nutritional level, clothing and the like, and the income required to support it is calculated. The relative approach interprets poverty in relation to the prevailing living standards of the society, recognising the interdependence between the poverty line and the entire income distribution" (Anand, 1997, p. 244).

In a keynote address to the conference of development economists on inequality and economic growth, Francois Bourguignon cautions against the tendency of using distributional aspect as the exogenous factor. "This view of a rather rigid distribution of income had important consequences on the subsequent analysis of the relationship between inequality, poverty and economic development, and in particular on the tendency to consider income distribution as fundamentally exogenous. It must now be realized that GDP growth and income distribution are two sets of endogenous variables that are part of a complex dynamic system still largely unexplored….that the distribution of income is not constant and is capable of changes in relatively short periods of time has been dramatically illustrated by the recent experience of United States and the United Kingdom in the 1980s and in Latin America by Argentina and Brazil during the same period. In all these countries, inequality-whateverway it is measured - increased enormously in a matter of a few years and reached levels unseen during several decades" (quoted in Burki, Aiyer and Hommes, 1998, p. 3)

Indira, Rajeev and Vyasulu (2002) distinguish absolute and relative approaches in evaluating poverty. "The absolute approach is concerned with a prespecified minimal standard of living defined objectively with reference to the physiological needs of human body, where as relative approach evaluates poverty in relation to the prevailing living standard taking into account the entire income distribution of population" (Indira, Rajeev and Vyasulu, 2002, p. 2173).

The relationship between income levels and fulfilment of basic needs is extensively studied and documented elsewhere. According to Leiptzier and Lewis (1980), "at low-income level, growth of income per head is necessary for basic-needs satisfaction" (quoted in Heerink and Folmer, 1994, p. 626)

"Using a 550 dollars per head GNP for delineating middle and low income countries and using simple correlation coefficients between basic need indicators and income inequality (measured by Gini coefficient), Leiptzier and Lewis (1980) concluded that level of GNP is important in low income countries whereas income inequality matter for middle income countries" (Heerink and Folmer, 1994, p. 626).

2.1.4 Issues of Distribution/Redistribution

Similarly, Adelman and Morris (1973) used ANOVA; U or J shaped. They found: 1) all less developed countries experience significant decrease in share of income accruing to the poorest section when development starts. 2) Share of income accruing to the poorest 60 percent of the population continues to decline albeit more slowly, for a substantial portion of developing process. 3) In the phase of development in developing counties policy choices determine whether an improvement in share in income to the poorest does or does not occur. Cross-country relationship can be either U-shaped or J-shaped (Adelman and Robinson, 1989, p. 958).

Analytical approach to understand, how income distribution changes with development (conceptual framework: variance decomposition) in two sector decomposition of Kuznets (1955) (using 2 sector economy); showed that even if within sector inequality is constant, the ratio of mean sectoral income is also constant, "the shift of population

between the sector at first produces a widening inequality and then a narrowing. In his model, the U arises because the sector with higher mean income into which the population is shifting (non-agriculture) is also the sector with a higher internal inequality" (Adelman and Robinson, 1989, p. 959).

There are various explanations regarding U-shaped development model. "Robinson (1976) believes that the existence of U-depends on intersector differences… Fields (1980) applies two sector- Lewis model; When mean income in modern sector increases, the proportion of population in that sector also increases and this brings increase in the average income of the traditional (rural) sector - traditional sector enrichment" (Adelman and Robinson, 1989, p. 959).

2.1.5 Concept of Income Distribution

The concept of income distribution has attracted many researchers. According to Lydall (1968, p. 3) personal income distribution has within and between factors. He writes, " Thus, if we are really interested in the distribution of income between *persons*, it is necessary to study the distribution *within* factor shares as well as *between* factors". He further writes on the shape of distribution, "At various times economists have suggested that the distribution of income conforms to one or another of three main types of distribution. These are: Pareto distribution, Normal distribution, and Lognormal distribution" (Lydall, 1968, p. 12).

Pareto distribution: "From a study of a number of distributions, drawn principally from various European countries and mainly from the nineteenth century, he [Pareto] found a regularity of pattern which struck him as remarkable. Pareto's 'Law', as it has been called, is as follows. Let N be the number of persons exceeding a given income level X. The following function provides an almost fit:

$$N=AX^{-\alpha}$$

Where A and α are the constants. Pareto estimated the value of α for each of his distributions and found that it was generally in the region of 1.5" (Lydall, 1968, p. 13). Lydall (1968) also incorporated Davis's suggestion in his study. "Davis (1941a, p. 435)

even went so far as to suggest that substantial deviations of α from its equilibrium value of 1.5 would lead to revolution or civil war." (Davis, 1941 quoted in Lydall, 1968, p. 14).

Normal distribution: "Some economists have suggested that, if reasonably homogeneous groups of employees are taken separately, the distribution of earnings *is* or *should be* normal" (Lydall, 1968, p. 25). However, regarding the empirical validity of normal distribution, he writes, "Thus, the normal hypothesis is not well supported by empirical tests. Moreover, a basic difficulty with the hypothesis is that there is, in fact, no good reason to assume that 'ability' is normally distributed" (Lydall, 1968, p. 36).

Lognormal distribution: "The Lognormal distribution is a distribution which is normal in the logarithm of the variable. If X is a positive variable and Y=log X is normally distributed, then X is said to be log-normally distributed. Clearly, in this case, Y will be symmetrical and X will be skewed. The Lognormal distribution has two tails asympotic to the X-axis, of which, in the usual case, the positive tail is more elongated" (Lydall, 1968, p. 37).

Adelman and Robinson (1989) divide income distribution in the following three categories:

1. Functional distribution,
2. Extended functional distribution and,
3. Size distribution.

Functional distribution - is the share of national income accruing to primary factors of production *i.e.,* land, labour and capital. We get Extended functional distribution by dissaggregating functional distribution by sector and mode of production *e.g.,* in developing country capitalist and workers in rural and urban areas, subsistence and commercial farmers, tenancy terms in agriculture and other workers in urban sectors. The extended functional distribution provides a better framework for analysing policy conflicts and is therefore the distributional concept that is most useful for understanding interactions between economics and politics in developing countries (Adelman and Robinson, 1989, p. 965). Size distribution is more relevant to welfare analysis. Size

distribution of income looks at sectoral aggregated by income level in a number of ways; households, total population (Adelman and Robinson, 1989, p. 965).

2.1.6 Applications of Distributional Theories

In this sub-section, the applications of various distributional concepts are included. Regarding the application of normal distribution, Lydall (1968, p. 32) sheds light on the fact that 'ability' is normally distributed and further assumptions are necessary to reconcile the theory with actual employment income distributions. The ability operates within occupations and here too after excluding the working hours. In all cases distributions within occupations are significantly less skew than distributions of employees in all occupations but there has been no convincing evidence that these distributions are normal.

Besides normal distribution, Pareto distribution has also been widely applied to understand the income distribution in various countries. Lydall (1968, p. 66) applies this method to get insights of income distribution in France, United States and Hungary, along with several other countries. He observes, "… a distribution with a Pareto tail would have an excess of frequencies in its upper tail in comparison with a lognormal distribution, since a Pareto tail is 'longer' - or dies away more slowly - than a lognormal tail. It is relevant to ask, therefore, whether our standard distribution tends to have a Pareto upper tail. A convenient way of answering this question is to plot the cumulative frequency distributions on double-logarithmatic paper". The three distributions studied by Lydall (1968) behave in different patterns. The main conclusion, in his own words: "So far as can be judged from the limited number of income classes in the upper tails of these distributions, the French distribution is a good Pareto fit for top 35 percent of earners, the United States distribution is a fairly good fit for the top 25 percent of earners, but the Hungarian distribution is concave towards the origin through out its length. Tests of many other distributions suggest, "the Pareto function generally provides a good fit for approximately the top 20 percent of earners at least in non-Communist countries" (Lydall, 1968, p. 66). Lange's conclusion regarding the application of Pareto function is also quoted in Lydall (1968) as: "Lange's conclusion is that the … Pareto

function might apply under capitalism, while incomes under socialism are more likely to be normally or lognormally distributed" (Lydall, 1968, p. 18).

Studies on employment, income distribution and consumption patterns in Nepal were carried out by the National Planning Commission in mid 1970s. The study also covers the extended functional distribution of income and reports, "In rural Nepal, the proportion of families receiving less than Rs 4000 is 75.5 percent of the total families in service occupations, 69.5 percent of those in production and labour occupations, 55.1 percent of those in farming and related occupations, 51.9 and 51.3 percent in clerical and sales occupations and 43.5 percent in professional/technical occupations. Taking all occupational categories together, 56.5 percent of rural families have income below Rs. 4,000" (NPC, 1977, p. 88). The study uses four categories of income, and reports, "… 3 percent of families fall in the income group above Rs 40,000. As against this 51.2 percent of families fall in income levels below Rs. 4,000. Families falling in the income levels between Rs. 4,000 and Rs. 15,000 are 38.9 percent and those with incomes between Rs. 15,000 and Rs. 40,000 are 6.7 percent' (NPC, 1977, p. 90). The study also reports on the highly unequal concentration of income, "The degree of concentration (Gini coefficient) of family income is 0.6 in rural areas and 0.5 in urban areas. These coefficients indicate, firstly, a fairly high degree of inequality and secondly a slightly greater inequality or concentration of income in the rural areas than in the urban areas" (NPC, 1977, p. 92). The study was probably the first of its kind in Nepal that covered the distribution aspect of income.

The scale of economies and intensification of production process are some of the established approaches in market mechanism. But still income distribution studies have been made to assess the successes of the intensification of production. Joan Hardjono (1983) after studying rice intensification in Indonesia concludes, "In actual fact the success of the rice-intensification programme has been attained through government patronage of large land-owners, many of whom are not themselves farmers. Policy-makers who once equated rural development with higher output are only now aware that income distribution in rural areas has become even less equitable than in former times, despite the large sums of government money expended on the various programmes" (Hardjono, 1983, p. 58).

The inverse relationship between development and inequality has been a focus of policy debate especially in regard to income distribution. "Kuznets (1955) in his famous article shows concern on income distribution and development relationships - his findings: after 1930s size distribution of income in developing countries narrowed down (U-hypothesis) early growth increased inequality" (quoted in Adelman and Robinson, 1989, p. 957). Adelman and Robinson (1989) also used macro closure and income distribution to study the distribution aspect in Korea. About the relationship between functional and size distribution of income, they conclude, "there is no stable relationship between the extended functional distribution and size distribution" (Adelman and Robinson, 1989, p. 971). They included three macro balance in SAM based models: 1) government deficit 2) balance of trade 3) savings investment balance (Adelman and Robinson, 1989, p. 979). The major important results of their study are as follows:

1) Extended functional distribution is sensitive to exogenous shocks and policy shocks

2) Size distribution is insensitive to exogenous and policy shocks

3) Initial effects of policy intervention rapidly dissipate through out the economy and programs targeted at specific groups are very expensive or unsuccessful, and

4) Quality adjustments have significant impacts on extended functional distribution (Adelman and Robinson, 1989, p. 981)

On the application of various theories and concepts of income distribution, they further write "Neoclassical model has to say least about distributional concerns. Marx and Ricardo confined themselves to functional distribution" (Adelman and Robinson, 1989). Regarding the sensitivity of extended functional and size distribution, they conclude, "extended functional distribution is sensitive to shocks and changes…Overall size distribution is insensitive to the shocks. In sensitivity of size distribution to shocks does not mean that policy does not matter" (Adelman and Robinson, 1989, p. 997).

Dreze and Sen (1993, p. 189) study the relationship between easiness in life (opulence) and income distribution. "At the simplest level, the effect of increased affluence on the quality of life can be expected to depend strongly on the *distribution* of income. The

twenty-five developing countries for which income distribution data are available in *the World Development Report* 1987 include Hong Kong and South Korea from the group of five growth-mediated successes; both have among the least inegalitarian distributions in the entire list of twenty-five countries. In contrast, Brazil emerges as the country where the share of the richest quintile is highest, and the share of the poorest quintile second lowest. It is hardly surprising, then, that rapidly increasing general opulence in Brazil seems to have yielded so little in terms of improvements in basic aspects of the quality of life".

Krinks (1993) apply size distribution of income to study the relationship between inequality and development in the Philippines. He observes, "the statistics on poverty become more significant in relation to overall income distribution. The surveys have shown that from 1956-7 to 1971 the share of total income received by the lowest quintile of rural recipients declined from 7 to 4 percent, while that of the top quintile rose from 46 to 51 percent. The 1975 data have not yet been presented in comparable form to continue the series, but rather as percentages of families and of incomes within specified income ranges. There is some indication of a slight improvement because the 18 percent of rural recipients in the bottom two income classes (up to 1999 pesos) received over 5 percent of the total income, while the 21 percent in the top six classes (over 6000 pesos) received 47 percent. The 1 percent in the two classes above 20,000 pesos received 9 percent of the total income" (NEDA, 1979: 544, 549 as cited in Krinks, 1993, p. 106).

Kuznets curve on inverted U-shaped relationship has so far remained in full swing in 'inequality and development' discussion. However, development economists now certainly believe that there are some other important mechanisms that govern the discourse. "The so called Kuznets curve hypothesis says there is an inverted U - shaped relationship between the degree of inequality of the distribution of income and the level of development… Kuznets had derived this hypothesis from the observation of long-run evolution of some proxy of the income distribution in the United States, the United Kingdom and Germany…Although such a relationship may exist for a given country, we are now convinced that their weight is very limited in comparison with many other mechanisms that may conceivably link the distribution of income and economic development" (Burki et al. 1998, p. 4-5).

2.1.7 Models of Income Distribution

While discussing the models of functional distribution, Adelman and Robinson (1989) writes: "In the time of Ricardo, main distributional issues of power and income were defined by the ownership of factor of production…Functional distribution… through two classical approaches; 1) Marx and Cambridge 2) Neoclassical general equilibrium theory" (Adelman and Robinson, 1989, p. 965).

Ricardo distinguished between market wage rate and natural wage rate, the latter being the subsistence. Moreover, population growth serves to keep market wage rate close to natural wage rate. Accumulation is surplus over wage payment and the last unit of land cultivated yields no rent (Adelman and Robinson, 1989, p. 966). "In labour surplus economy; Lewis updated classical model. Lewis believed that employment in modern sector is determined by marginal productivity of labour. Lewis (1954) argued that capitalists have interest in keeping agriculture productivity low and are against technological progress in agriculture" (Lewis, 1954 quoted in Adelman and Robinson, 1989, p. 967).

They also discuss the Marx model as follows: "Marx argued that return to capital as well as wages should belong to labour. In capitalist economy labour is not paid reflecting the marginal productivity. Labour is paid a wage around a socio-culturally defined subsistence level. Capital development is brought about by the "surplus value" which depends on the rate of exploitation of labour and is a grave unjust to the labour" (Adelman and Robinson, 1989, p. 968). While discussing Neo Keynesian model, they write: "Kalecki (1971) development is capital constructed…Kaldor combines Marxian assumption that all saving is out of profits with a Harrod-Domar dynamisation Keynesian model" (Adelman and Robinson, 1989, p. 969). The Neoclassical approaches: "Austrian school (Munger, Bohm-Bawerk); focused on the capital's role as a true factor of production, emphasising the role of time. Also added was role of entrepreneurship including risk-bearing, as a factor of production deserving remuneration" (Adelman and Robinson, 1989, p. 970). Moreover, on Neoclassical approaches, they elaborate: "Final fruition of Neoclassical model came from Walrasian model of competitive equilibrium; all factors are paid the value of their marginal products, all markets clear, and the result

is pareto optimal in which no one can be made better off without making someone else worse-off" (Adelman and Robinson, 1989, p. 970).

Economic policy models are also devised for better understanding of distribution. "Distributional concerns were incorporated in empirical models around 1970s (earlier in India)" (Adelman and Robinson, 1989, p. 973). Input-output model used Loeintif's inverse to calculate implied changes in production and employment but still there was no concern on the poor's ability to satisfy the basic needs (Adelman and Robinson, 1989, p. 974). Later Social Accounting Matrix (SAM) was developed to maintain accounting consistency between the patterns of production, institutional and household distributions of income and pattern of consumption (Adelman and Robinson, 1989). While multiplier models has been used to analyse impacts of larger investments, government expenditure and development strategy on distributional issues (Adelman and Robinson, 1989, p. 976). "Multiplier models are demand driven and no specific constraints on supply - so the models are in Keynesian spirit. The multipliers computed from a SAM overstate the adjustment to exogenous shocks because they do not allow substitution effect on production consumption and international trade. Secondly, there are no resource constraints on adjustment. Finally, linear model derived from SAM has no room for price effects and assumes marginal and average coefficients as same" (Adelman and Robinson, 1989, p. 977).

Nonlinear or non-market models are developed by the multilateral agencies. Among the World Bank's various models, Gupta's model incorporated income distribution (distribution phenomena) into input-output framework but endogenous market interactions are not included (Adelman and Robinson, 1989, p. 977). BACHU model of ILO included extended functional and size distribution of income (Adelman and Robinson, 1989). Computable general equilibrium model (CGE) incorporated neoclassical and structuralist features in CGE (Adelman and Robinson, 1989, p. 978).

The problems in asserting basic needs indicators have been studied. According to Heerink and Folmer (1994), "no generally accepted indicators exist, data on such indicators are poor or lacking and available data in the form of averages, without any indication over its distribution on population" (Heerink and Folmer, 1994, p. 633).

"Engel curve approach provides adequate representation of impact of HH income on consumption of goods and other necessities" (Heerink and Folmer, 1994, p. 636). They used the following regression models in their study:

$$BNI_i=c_1+c_2\log(YH_i)+c_3V_{\log}(YH)_i+c_4IS_i+\mu_i \text{ for } i = 1\ldots54 \text{ (or } 52)$$

Where,

BNI stands for the basic needs indicators EO, IMR, CAL, PRT, LIT, ENR1, ENR12.

EO =	Life expectancy at birth;
IMR =	Infant mortality rate;
CAL =	Supply of calories per capita per day (x100);
PRT =	Supply of proteins (in grams) per capita per day;
LIT =	Adult literacy rate (as a percentage of the population aged 15 and over);
ENR1 =	Primary school enrollment ratio (as a percentage of primary school age population)
ENR12 =	Combined primary and secondary school enrollment ratio (as a percentage of the primary and secondary school age population);
YH =	Real gross domestic product (in $1000 of 1975) per household;
$V_{\log}(YH)$ =	Measure of equality of total (available) household income as measured by $V_{\log}(X)$;
IS =	Percentage of population with Islam Religion;
μ =	Disturbance term with standard properties;
$c_1\ldots c_4$ =	Unknown parameters.

African experiences suggest close links between poverty on one hand and macroeconomic balance and economic growth on the other hand. The use of computable General Equilibrium (CGE) model can be an approach (Demery and Squire, 1996, p. 46). CGE model exercises convey 3 messages: 1) shocks are harder on poorest than the adjustment that followed, 2) diversity in shocks and policy response, and 3) Orthodox macroeconomic adjustment package favour outcome for poverty than alternative (heterodox) adjustments (Demery and Squire, 1996). Their finding shows, "CGE - model

highlights the processes through which macroeconomic adjustment can favourably affect the poor: real exchange rate depreciation influence income distribution and poverty through 3 channels. These are: 1) raising economic growth through export expansion 2) real exchange rate depreciation affect output structure, income distribution, favouring products of tradable goods and consumers of non-tradables. The real exchange depreciation leads resource allocation towards agriculture, raising income of rural households, and 3) depreciation in real exchange rate reduces rent derived from policy intervention e.g., import quota and exchange control" (Demery and Squire, 1996, p. 47).

Does deterioration of income distribution is inevitable for economic growth? is a question consistently raised during the development discourse. Krueger (1995) reports that in East Asian countries, the rise in real wage in 1980s did not deteriorate income distribution. "Indeed, most estimates suggest that income distribution in East Asia was and remained significantly less unequal (see Chenery, Ahluwalia *et al.* (1974)) than that in many developing countries where the stated purpose of import-substitution and relative policies was to improve the relative and absolute living standards of the poor" (Krueger, 1995, p. 2520)

2.1.8 Tools and Models in Poverty Measurement

Poverty measuring tools has always remained as a central issue among the development economists. As Titmuss (1963, p. 188) elaborates, tools that were forged in the past for measuring poverty and inequality are now too blunt, insensitive and inadequate. These also are the lessons of the study of distribution of incomes.

The use of percentile has been fairly consistent because " the use of percentiles is…'a convenient way' of comparing changes in the levels of incomes of persons at equivalent positions in the income distribution…" (Titmuss, 1963, p. 37). Titmuss (1963) also discusses on the use of graphic methods in comparing income distributions. He writes, there are graphic methods (Pareto, Lorenz curves etc) of comparing income size distributions. Some also use the Gini coefficient to summarize the shape of the Lorenz curve. To summarize the distribution as a whole, Lorenz curve tends to be too insensitive

as instrument instead I have used curves drawn on double-logarithmic paper (Titmuss, 1963, p. 37-38).

"The use of a single index of inequality is, therefore, not an ideal arrangement, except where one can be fairly confident that the essential shape of the distribution, *i.e.* its functional form, is constant. And in those circumstances it does not matter much which of the many alternative indexes or coefficients are used" (Lydall, 1968, p. 138). About Lorenz coefficient, he writes: "In order to compute the Lorenz coefficient one needs *both* the number of persons in each income class *and* the amount of income received" (Lydall, 1968).

Besides tools, percentile and graphic methods, various models are also developed to understand the dynamics of income distribution under policy and temporal contextual. Adelman and Robinson (1978) developed a model that was designed to provide a laboratory for investigating the potential impact of standard policy instruments and programs intended to improve the relative and absolute income of the poor. The model traced out both the direct and the indirect influences on the distribution of income. Its structure was set by the nature both of the major economic forces determining the distribution of income in the relative short term and of the major policy instruments that could affect in a reformist environment. One important finding was real-world experience, theoretical considerations, and the failure of partial or correlation approaches to provide useful answers to policy purposes all suggest the need for a 'system' approach to policy formulation. They emphasise on the need of models "because of the multiplicity of interdependent influences that impinge on the distribution of income-with no particular influence dominant-one cannot readily pick out through non-modelling empirical studies the critical areas of intervention or predict the probable impact of specific programs" (Adelman and Robinson, 1978, p. 2).

Dasgupta (1993) introduces his model as "the model I have developed here is a good laboratory in which to ask how long it takes for increases in aggregate wealth to trickle down to the poorest of the poor" (Dasgupta, 1993, p. 517). He is sceptical in the use of tools and measures used for measuring poverty and income distribution. He further illustrates, "these measures have varied in sophistication: from those that look at only

one portion of distribution (*e.g*., percentage share of household income going to the poorest 20 or 40 percent of households, or percentage share of income accruing to the richest 5 percent of households, as in Kuznets, 1955; Adelman and Morris, 1973: Ahluwalia, 1976a,b; Lecaillon et al. 1984; Yotopoulos, 1988), through summary measures (*e.g*., the Gini coefficient, as in Atkinson, 1970, 1975; Lyndall, 1979; Yotopoulos, 1988) to the very refined (e.g., measures that feed the entire income distribution into a social evaluation function, as in Kolm, 1969; Atkinson, 1970)" (Dasgupta, 1993, p. 125).

Ravallion and Sen (1995) highlight the importance of survey methodology in poverty measurements. "The comparison of the 1981/82 and 83/84 surveys showing a (substantial) decrease in poverty could well be due in large part to these differences in survey methodology… survey methodology has stabilized since 1983/84". They use the following measures in their study:

> … three poverty measures are used in this study, attempting to capture three aspects of poverty: its incidence, its depth, and its severity. The specific measures are: (1) The head count index (H), given by the percentage of population who live in households with a consumption per capita, less than the poverty line. This can be interpreted as a measure of "incidence" of poverty. The measure has advantage that it is easy to interpret, but it tells nothing about the depth or severity of poverty. (2) The poverty gap index (PG): defined by the mean distance below poverty line as a proportion of that line (where mean is formed over the entire population, counting the non-poor as having zero poverty gap) one can interpret as a measure of poverty "depth". (3) The squared poverty gap index (SPG): of Foster, Greek and Thorbecke (1984) defined as the mean of the squared proportionate poverty gaps (again the mean is formed over the entire population, counting the non-poor as having zero poverty gap). This reflects the "severity" of poverty, in that it will be sensitive to inequality among the poor.
>
> All three measures (like amongst all measures found in practice) are functions of both the mean consumption (μ) of each sub group normalized by the *poverty line* and the Lorenz curve for the distribution of consumption (Ravallion and Sen, 1995, p. 12).

Foster and Sen (1997) revisit the complexities of poverty measurement and inequality measures with an attempt to make them simple and palatable to the general readers. According to them, "the measures of inequality that have been proposed in the economic

literature fall broadly into two categories. On the one hand there are measures that try to catch the extent of inequality in some *objective* sense, usually employing some statistical measure of relative variation of income[2] (1) and on the other there are indices that try to measure inequality in terms of some *normative* notion of social welfare so that a higher degree of inequality corresponds to a lower level of social welfare for a given total of income[3] (Foster and Sen, 1997, p. 2).

Foster and Sen (1997) include ANOVA as an important tool for measuring poverty. "The main idea behind decomposability of inequality measures can be traced to the analysis of variance (or ANOVA) a traditional method of evaluation 'how much' of the variance in a variable (such as income) can be 'explained' by relevant characteristics (such as age, sex, race, schooling or work experience). The key formula of ANOVA links overall income variance to 'between-group' and 'within-group' variances. The 'Between-group'' term B is the variance that would exist if each observation were replaced by the mean income of the group sharing the same characteristics, so that we concentrate only on the variations between these groups. The 'Within group' term W, on the other hand, is the weighted average of the variance *within* each group, where the weight is the 'population share' or the share of total observations in the respective groups as follows:

$$\nu\,(x,y) = [W] + [B]$$

$$= [w_x\,\nu\,(x) + w_y\,\nu\,(x)] + [\nu\,(\tilde{x},\tilde{y})]$$

Where $w_x = nx/n$ and $w_y = ny/n$ are population share weights (the share of total observations in the respective groups), $\nu_{(.)}$ the variance of respective vector, while $\tilde{x}$ and $\tilde{y}$ are the 'smoothened' group distributions (with each member of the respective group having the mean income of that group). The ratio of the between group term to the total variance, B/ν, is then interpreted as the contribution of that group classification (or the characteristic on which the classification is based) to total variance; W/ν is similarly

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[2] the usual measures include variance, coefficient of variation, the Gini coefficient of the Lorenz curve etc.

[3] For example of normative approach to the measurement of income distribution see Dalton (1920), Champernowne (1952), Aigner and Heins (1967), Atkinson (1970a), Tinbergen (1970) and Bentzel (1970).

interpreted as the within group contribution" (Foster and Sen, 1997, p. 23 also see Anand 1983 p. 222-3).

Bhatt, N and T. Slayter (1994) studied the changing dynamics of gender, caste and ethnicity in Ghusel village, Lalitpur, Nepal in the context of credit flow for livestock production. They used 'Sari index' to compare the changes in the economic condition of women due to the credit programme (Bhatt and Slayter, 1994).

Anand (1997) used special type of dress in measuring poverty level in Malaysia.[4] He uses the term 'Sharongs poverty index' to denote the tool. He writes, there is one index convenient for measuring poverty among Malays in any Kampong. This is per capita sarong index obtained by the number of sarongs in a household and divide it by the number of persons (age above one year). One sarong per capita indicates 'extreme poverty' while the wealthy Kampong dweller have 7-15 sarongs per capita. The effect of a rural development programme can be measured by using this sarong index before and after implementation of programme (Aziz 1964, p. 79-80 quoted by Anand, 1997, p. 80).

2.2 Results and Findings of Previous Studies

Adelman and Robinson (1978) consider the relationship between size and functional distribution of income and report as follows:

> Empirically, there seems to be very little connection between the distribution of income by deciles (the size distribution of income) and the distribution of income by classes of recipients (the functional distribution of income). Even though the size distribution in our model is generated from the functional distribution, our experiments indicate that the size distribution is extremely stable whereas the functional distribution varies rather widely….Second, since the relations among socioeconomic groups are of immense political concern, the ability to manipulate the functional distribution of income is more politically significant than the inability to change the more socially neutral size distribution.
>
> Finally, because of the sensitivity of the functional distribution of income to policy interventions, such programs are likely to cause substantial social unrest" (Adelman and Robinson, 1978, p. 191).

[4] Originally the research was carried out in Malaysia, in 1983.

They also experiment the effect of increase in income of the poorest section of the society and the result is: "The bottom decile's income is higher by 15 percent or more; the percentage of households in poverty is more than 3 percentage points lower; the Gini coefficient is more than .022 lower". (Adelman and Robinson, 1978, p. 194).

In summary, their study reinforces the view that the distribution of income is firmly rooted in the structure of the economy, and that its path over time depends on the fundamental development strategy chosen by the society (Adelman and Robinson, 1978, p. 198-9). They also emphasise much on human resource development and write: "A necessary condition for the success of this strategy in improving the income distribution and alleviating poverty is that a large proportion of the labor force is educated or skilled workers".

A policy question that has become the nightmare for policy makers is which comes first - 'growth or distribution'? According to Adelman and Robinson (1978) "growth should be stressed now, and later, when the nation can afford it, the emphasis can be shifted to the necessary attack on poverty…". Such an attitude has the precedent of having been adopted in most of the developed countries during their early growth phases. The authors, however, find this view unacceptable on at least two counts. First, it took a very long time (two to three generations) for the industrial revolution to begin to furnish substantial benefits to the poor. The poor in modern less- developed countries are justifiably more impatient. And second, the vast majority of poor in developing countries are very poor indeed, with ubiquitous malnutrition, actually approaching the point of starvation in many areas" (Adelman and Robinson, 1978, p. 210).

What should be the role of government in less developed countries? "Government cannot significantly affect real aggregate demand through policies of taxing and spending-taking money from one man and giving it to another, whether in government or out. All this shifting of wealth is a zero sum game and the net effect on incomes is usually zero, or even negative" (Gilder, 1981, p. 45). He also blames economic structure for greater inequality. "In addition, inequality may be favored by the structure of a modern economy as it interacts with demographic change" (Gilder, 1981, p. 67). He emphasises mainly on the production aspect for poverty reduction and wealth accumulation. "In fact, nearly all

the programs that are advocated by economists to promote equality and combat poverty-and are often rationalized in terms of stimulating consumption-in actuality reduce demand by undermining the production from which all real demand derives. Buying power does not essentially "trickle down" as wages or "flow up" and away as profits and savings. It originates with productive work at any level. This is the simple and homely first truth about wealth and poverty" (Gilder, 1981).

Gilder (1981, p. 111) also highlights on moral hazards associated with welfare programs carried out by the state. He concludes "Aid for Families with Dependent Children (AFDC) makes more families dependent and fatherless. Disability insurance in its multiple forms encourages the promotion of small ills into temporary disabilities and partial disabilities into total and permanent ones…All means-tested programs (designed exclusively for the poor) promote the value of being "poor" (the credential of poverty), and thus perpetuate poverty. To the degree that moral hazards exceed the welfare effects, all these programs should be modified, usually by reducing the benefits".

While emphasis is placed on increasing production for poverty reduction, massive unemployment and underemployment is reported elsewhere in the developing countries. A study in Nepal reports, "An estimate by the FAO in 1974 suggested that production farm labour was underemployed 52 per cent of time; while the National Planning Commission survey of employment, income distribution and consumption patterns in the late 1970's suggest that 63 per cent of family labour days per household in rural areas are underemployed" (quoted in Seddon, 1987, p. 126).

Zuckerman (1991, p. 264) emphasises on the need to disaggregate households into different occupational groups for poverty analysis. "A prerequisite to an analysis of the impact of adjustment on the poor in any country is an understanding of its poverty groups. Kanbur (1988a) used LSMS data for Côte d'Ivoire to desegregate households into five occupational types, for each of which he constructed a poverty profile. According to his results, growers of the crop had the highest incidence of poverty (49.5 percent of them were poor), followed by export croppers (households that devote at least half their area to major export crops; 36.4 percent), those employed in the informal sector (19.3 percent), those in the formal sector (6.1 percent), and finally those in the

government sector (3 percent). Conversely, government employees had the highest percapita expenditures and food croppers the lowest". He also quotes Kanbur (1988) on the pattern of income distribution in Côte d'Ivoire. He writes: "Next, Kanbur examined the three Côte d'Ivoire structural adjustment loans to 1981, 1983, and 1986 to analyze the effects on poverty of macroeconomic adjustments during the 1980s….After analyzing patterns of income distribution from 1980 to 1985, Kanbur found that real per capita income fell by 2.6 percent a year. This dramatic decline understates the corresponding increase in poverty, which rose by 4.8 percent a year, and in hard-core poverty, which rose by 7.9 percent a year." (Zuckerman, 1991, p. 265).

Zuckerman (1991) also refer Glewwe's observation in his paper in connection to the fate of the poor under SAP. He writes: "to assess how the poor have fared without adjustment in Peru, Glewwe (1988b) first identified the Peruvian poor…Although this was true in most Latin American countries as a result of the depression of the early 1980s (World Bank 1986), regardless of whether adjustment was undertaken, extreme poverty and inequality were particularly widespread in Peru. Of twelve countries examined in Latin America, Asia, and Africa during the 1960s and 1970s, Glewwe found that Peru had the highest Gini Coefficient (that is, the most unequal per capita income distribution)" (Zuckerman, 1991, p. 267)

Dreze and Sen (1993) analyse the relationship between growth (in terms of GNP) and livelihood amenities (such as life expectancy, reduced child mortality, literacy rates etc.). The relationship is expected to be positive but "the contrast is much sharper in the case of Sri Lanka, with its GNP per capita of only $400 and a life expectancy of 70 years". (Dreze and Sen, 1993, p. 226). "The case of Sri Lanka was singled out earlier as one of remarkable achievement despite of its low GNP. Judged in terms of life expectancy, child mortality, literacy rates, and similar criteria, Sri Lanka does indeed stand out among the poor countries in the world … Sri Lanka was altogether exceptional in having an astonishingly higher life expectancy at birth than any other country among the low-income developing countries" (Dreze and Sen, 1993, p. 227).

Dasgupta's (1993) findings on multiplier effect of sector growth and income suggest close link between primary production and its effect on non-farm goods and services.

"Haggblade, Hazell, and Brown (1989) have estimated that in sub-Saharan Africa the multiplier associated with agricultural growth is of the order of 1.5; which is to say that a $1.00 increase in agricultural income can be expected to generate about $0.50 additional income, primarily among suppliers of non-farm goods and services. Estimates for India and Malaysia are higher, the growth multiplier being of the order of 2.5. Employment multipliers are also significant. Data from the Philippines and India suggest that agriculture-non farm employment elasticities are between 1.0 and 1.3 (see Krishna, 1976)…" (quoted in Dasgupta, 1993, p. 526).

However, Dasgupta (1993, p. 518) presents a gloom picture on eliminating poverty from the trickle-down mechanism of growth. "To draw out the answer in a sharp form, I shall consider extreme circumstances. For example when studying the efficacy of redistributive measures, I shall suppose that they can be implemented instantaneously and costlessly. When discussing the speed of the 'trickle-down' phenomenon, I shall take it that the distribution of land remains unchanged during the process of growth…. Thus, if unassisted 'trickle-down' is to be relied upon, assets have to grow by a factor of 300 percent in order that malnutrition is eliminated. This means that, were capital to grow at, say, 3 percent per year, it would take about 37 years before destitution was a thing of the past".

Heerink and Folmer (1994) study the role of equality in fulfilling the basic needs. Revealing the relationship between nutrition and inequality, they write: "Ram (1985) reports only two measures of nutrition *viz*. Calorie and protein intake per capita was significantly affected by degree of inequality" (quoted in Heerink and Folmer, 1994, p. 626).

What role income plays in fulfilling the basic needs? "HH income could have both direct and indirect effect on fulfilling basic needs because more HH income means more expenditure on health and education services, cheap food programmes" (Heerink and Folmer, 1994, p. 638). Moreover, "impact of average income and income inequality on basic needs fulfilment is positive. For infant mortality IMF coefficient of two variables negative, other basic need indicators positive as expected. Religion coefficient has negative effect on all equations except for infant mortality. Average HH income if

increases by $ 2127 then LE (life expectancy) increases by 8.2 years while number of infant mortality decreases by 39. Calorific supply increases by 433 grams and protein supply increases by 15 grams. Adult literacy increases by 18.8 % while combined schooling increases by 15.5 %" (Heerink and Folmer, 1994, p. 643).

According to Andersen and Pandya-Lorch (1994), "many African and Latin American rural poor do not produce sufficient to feed their families. Higher producer price will have limited positive effects on poverty alleviation among small farmers and could even have detrimental effect" (Andersen and Pandya-Lorch, 1994, p. 485).

The detrimental effect is mainly due to the lack of land resources among the poor, constituting the agricultural labour force. "The agricultural wage labourers belong mostly to households owning less than 1.5 acres of land. In the tenancy market, land is transferred from large to small and marginal owners. Thus, although the bottom 40 per cent of the households in the land ownership scale own 3 per cent of the total land, they earn 16 per cent of total agricultural income" (Hossain, 1995a, p. 62)

Demery and Squire (1996) report the results regarding their study of growth and inequality relationship. "Change in mean income consistently principal agent of change in poverty. Change in mean income and change in inequality generally operates in opposite directions (reciprocity) as far as the effect on poverty is concerned" (Demery and Squire, 1996, p. 42). The result of their study shows "Poverty declined in 5 countries with improvements in fiscal monetary and exchange rate policies". But where poverty deteriorated? They conclude that failure to implement SAP lead to an increase in poverty level (Demery and Squire, 1996, p. 46).

2.2.1 Antipoverty Policies

Antipoverty policies are being promulgated in every state with an egalitarian objective. However, the effect of such policies has so far remained either mixed or disappointing. "We find that most anti-poverty policies eventually help the rich and middle income groups more than they help the poor…a wide range of policies indicates that it is much

easier to make the income distribution worse than to improve it" (Adelman and Robinson, 1978, p. 191).

Policy designed to assist poor has also remained helpless in case of developed countries. "The crucial goal of all anti-poverty policy must be to lift the incomes of males providing for families and to release the current poor from the honeyed snares of government jobs and subsidies. The policies, unfortunately, are the opposite of the ones now favored by both government and the academy, which is one reason why poverty amid American riches is unlikely to end soon" (Gilder, 1981, p. 152).

According to Adelman and Robinson (1989, p. 982), "Anti poverty policy don't depend on macro paradigm for two reasons: 1) Households diversify their income source to reduce income risk often decreasing exposure to market induced price fluctuations. 2) Agriculture sector is seen as adjusting to macro shocks only by alleviating its marketable surplus without changes in institutions and technology. In developing countries poorer section is engaged in agriculture pursuits and those working in manufactural sector are part of richest 20-40% of population while unskilled labour is largely poor's assets".

Ravallion and Sen (1995) attempt to understand the relationship between the growth of national economy and absolute poverty to ascertain policy regarding growth rate. They report, "However, a continuation of the 1980s trend of rising inequality in both urban and rural areas will make it considerably more difficult to prevent rising absolute numbers of poor in Bangladesh. For example, at population growth rates around 2-2.5 percent per year national income would have to grow at around 3-4 percent per year to prevent increase in the number of poor if inequality neither increases or decreases. However, the recent pattern of rising inequality in both urban and rural areas would mean that a growth rate in national income of 5-6 percent per year would be needed before the number of poor stops rising" (Ravallion and Sen, 1995, p. 25).

2.2.2 Policy Question in Poverty

Adelman and Robinson (1978) raise the dilemma faced by the policy makers and analysts regarding growth and equality. "The major policy question for policy analysts

has been whether or not there is a basic conflict between the goal of greater distributional equality and the goal of faster growth…(Stewart and Streeten 1971; and Chenery et al. 1974) … suggest that certain changes in emphasis - for example, a shift to more labour-intensive technologies, to export promotion in trade policy, to rural rather than industrial development, or to a broad-based, skill-intensive growth strategy might favour more equality and need not hinder rapid growth. An even more fundamental question is raised by the genuine possibility that the distribution of income is so embedded in the structure of an economy and society that it can only be affected by a major, and presumably violent, upheaval" (Adelman and Robinson, 1978, p. 2).

Most of the equality related arguments stem from the political philosophy of the 'social justice'. However, the Gilder (1981, p. 98) reckons right at the foundation of such belief by asking, "How much easier it is - rather than learning the hard lessons of the world-merely to rage at the rich and even to steal from them. How much simpler than diligence and study are the formulas of expropriation! Property is thift. Hate is community. Violence is freedom. Reality is oppression". He laments, "Yet every where these ideas prevail, poverty persists and spreads. Rather than wealth causing poverty, it is far more true to say that what causes poverty is the widespread belief that wealth does" (Gilder, 1981, p. 99).

Seddon (1987) brings another dimension - environment, in wealth and poverty discussion. He refers Lohani's observation in this context. "Inability to initiate people's participation in the economic development of the country is most obvious in the case of forest management. During the last two decades or so large areas under forest cover in the hilly and terai region of the country have been destroyed without any consideration for ecological balance. The damage has been done mostly by the people themselves. In order to support an increasing population, they have converted forest land and pasture land into grain fields with the result that erosion has increased and energy for domestic purposes is now decreasing rapidly. Based on this experience are we to suppose that the people are responsible for their own destruction?". Perhaps the Lohani's question has already been answered with the invention of community forestry in Nepal.

Dreze and Sen (1993, p. 230-1) cites example of a Chilean case regarding reduced government intervention and increased civic participation in delivering health services. By 1960s Chile had comprehensive social insurance system besides the unified National Health Service, nutrition programmes and free education. Today, Chile is the only country where health service besides monitoring all young children has provision of food supplements. Following military coup in 1973, the government 'liberalised' economy reducing the scope of government intervention in economic affairs, macroeconomic balance and devaluation, and other tenets of the 'Chicago school'. The experiment lasted until 1982 and had been controversial with a few claimed it as a success.

One important lesson of Chilean experience is that despite intervention, inequality remains as an inevitable event. Initially development effort is characterised by increased inequality but decrease in inequality with development is inevitable (U-hypothesis) or It is a matter of policy choice (J-shaped) (Adelman and Robinson, 1989).

If inequality is a matter of 'policy choice' then policy analysis, particularly how it affects the poor and deprived section of the society? becomes an important discourse in development. It is even more important to avoid possible double marking on poor and deprived section. Demery and Squire (1996, p. 45) study the impact of World Bank funded SAP on different aspects: "What happened to the poorest of the poor? What implication of the reciprocity (mean income versus inequality) on poorest of the poor?" After careful analysis, they report, "... Improvements in macroeconomic regime associated with SAP are consistent with a decline in the incidence of overall poverty" (Demery and Squire, 1996).

Is poverty, the only policy question faced by the policy makers? According to Sen (1997, p. 177), "… Poverty removal is not the only object of social policy and inequality removal has a status of its own, taking an absolutist view of poverty must not be confused with being indifferent to inequality as such. While poverty may be seen as a failure to reach some absolute levels of capability, the issue of inequality of capabilities is an important one- in its own right - for public policy" (see Sen 1980; 1982b).

To this end, we conclude that failure to attain a minimal level of capability matter the most, then what aspects the research should essentially cover particularly in the context of data collection. Indira et al. (2002) quote Kaushik Basu as saying, "one should collect more detail data especially for the poorest 20 per cent of households, as most polices relating to poverty alleviation target this group" (Indira et al. 2002, p. 2175).

2.3 Discussion on Poverty and Distribution

Distribution of assets and productive resources has always been advocated to ensure more equal distribution. According to Adelman and Robinson (1989), "with better distribution of asset while production increases, negative change on poor avoided". Some economists advocate for 'redistribution before growth' (RBG) approach. "The RBG rationale has two folds; before improvements in productivity; redistributed asset is not valuable as it is there after. So redistribution with full compensation is therefore possible. A third of GNP be devoted to investment in assets owned by poor e.g., nutrition, health, education, irrigation in poor areas, credit programmes in input subsidy directed for subsistence poor" (Adelman and Robinson, 1989).

Adelman and Robinson (1989, p. 985) enlist the following productivity increasing approaches: 1) increase quantity of poor asset (human capital) 2) complementary assets - access 3) technological change enhancing productivity.

Many programmes are designed with novice intentions of assisting the poor. However, the outcome remains grossly unsatisfactory. "A study for food-for-work…even wage insufficient to purchase the required amount of food to replace calories used up in earning that wage. In this case, wage labour resulted in exposing poor to higher morbidity and mortality rates and to higher health hazards than they would have had, had they remained unemployed (Rodgers, 1975)" (quoted in Adelman and Robinson, 1989, p. 986).

The programmes that deliver increased services, which are of inelastic nature in demand, may not serve well for the poor. "The more precise inelasticity demand, less the poor will gain from any increase in supply *e.g.*, education... Investment in education through adult

literacy, facilities for education, … can raise the well being of poor" (Adelman and Robinson, 1989, p. 986). According to them, the following types of broad policy interventions are propoor:

1. Market intervention changing relative prices favouring poor
2. Institutional reforms changing rules of game, and
3. Distributional implication of different development interventions.

1. *Market intervention or price increasing strategy*: food subsidy probably a bad idea in market economy but food subsidy is successfully implemented in socialist economies, where government have direct control over rural as well as urban income (Adelman and Robinson, 1989, p. 988).

2. Institutional and economic barriers for the poor:

The following are the main institutional and economic barriers for the poor:

- Labour and credit market; Labour market in developing countries does not function in Neo-classical manner. Bardhan (1989) links labour market with credit market and prevalence of wage rate lower than undistorted market wage rate (Adelman and Robinson, 1989, p. 989).

- Land market: Land redistribution decreased inequality e.g., land reforms in 1950s in East Asian Countries, however, the Latin American agrarian reform in Bolivia, Chile, Mexico, Peru and Venezuela have more varied economic outcomes (Adelman and Robinson, 1989, p. 991).

3. *Distributional implications of different development interventions (alternative development strategies):* Strategic choice of absorbing labour into modern sector the extent of income gap between modern and traditional sector by fostering labour-intensive growth in modern sectors. Poor's asset is unskilled labour, development strategies increasing the absolute or relative demand for unskilled labour, coupled with institutions enhancing labour mobility and access to jobs by the poor will benefit the poor most (Adelman and Robinson, 1989, p. 992).

Landless agriculture labour constitute large class in Asia and Latin America, these labour workers gain from increased demand for labour but lose from higher price of food. Low elasticity of labour demands leads to a situation where workers in tradable sector benefit whereas workers in nontradable sectors face declining labour demand (Andersen and Pandya-Lorch, 1994, p. 486). "Self employed benefit from higher income due to the removal of price distortions. Urban poor are the big losers from changing food and agricultural policies during adjustment" (Andersen and Pandya-Lorch, 1994, p. 486). Increased consumer food price due to the removal of subsidy may result in change in income gap. "Narrowing of income gap between the urban wage earner and rural household due to the transfers brought by increased consumer food price (World Bank, 1986; Jamal and Weeks, 1988)" (quoted in Andersen and Pandya-Lorch, 1994, p. 487).

Economists also argue on the removal of food subsidy for various reasons. "Consumer food price increase is not due to increased producer price but due to decreased explicit food subsidy" (Andersen and Pandya-Lorch, 1994, p. 487). There are three reasons for removing food subsidy: 1. benefits to non poor 2. limited quantity 3. low food price tend to keep wages low (Pinstrup-Andersen, 1988) (quoted in Andersen and Pandya-Lorch, 1994, p. 487).

When, there is much debate on poor focus, identification of poor itself is a problem. "Poor do not form a homogeneous group, they include groups of different categories" (Andersen and Pandya-Lorch, 1994, p. 484). While discussing the impact of SAP on poor, they argue, "Poor, -not integrated into market economy, is bypassed by SAP. With varying effects of change in food and agriculture polices. Large number of African and small majority of Latin American poor live in rural areas and are semi-subsistence food producers or small market oriented farmers" (Andersen and Pandya-Lorch, 1994, p. 484).

Poor households diversify their income sources and probably it is one of the best strategy to cope with uncertain risk. Even exporting crop may not be lucrative for the poor while it may have disequalising effect on income distribution. "Agriculture sale is not important source of income for many poor farm households. In Ghana among the Cocoa farmers 32 percent capture 94 percent of income while 68 percent of the farmers share only 6 percent income" (Andersen and Pandya-Lorch, 1994, p. 484). While export crops

fetch higher prices and seems lucrative, lesser area may be availed for subsistence crops and consequently the poorer section may suffer. Hence, positive discrimination surfaces as a genuine development-agenda.

Policy reform for positive discrimination is a recent public discourse. "How policy reform affects poverty is vigorously debated in Africa" (Demery and Squire, 1996, p. 39). The relationship between per capita GDP and consumption has been studied to assess the impact of economic reform on the poorest of the poor. "The GDP/Capita remained stagnant in second half of 1980s and 1990s. Out of 41 sub-Saharan African countries, in 23 countries real per capita consumption fell by 1 percent, and observers conclude; failed economic reforms have damaged the well being of poor" (Demery and Squire, 1996, p. 40). Demery and Squire (1996) caution against over-simplified statement. They write: "However, the above remark is flawed by treating implicitly sub-Saharan Africa as a whole" (Demery and Squire, 1996, p. 40). Their find is "economic reforms in wrong direction measured in terms of changes in extent of poverty have been diverse…The most striking finding, however, is the systematic link between policy implication and outcomes for the poor - effective reform… reduced poverty while inadequate reform worsened poverty" (Demery and Squire, 1996, p. 40).

In order to reinforce their statement, they argue, "Household sample survey evidence from six African countries concludes that the well being of poor is not uniform… Some experienced dramatic increase in poverty, others have seen significant decline…These variations in outcome are important for assessing policies associated with declining or worsening poverty" (Demery and Squire, 1996, p. 40).

They made a thorough comparison between the African states in a pursuit to assess the impact of economic reform on the level of poverty in those countries. "Cote d'Ivoire's failure to adjust effectively to external shocks is counterfactual to Ghana's reform as a success. There is a pivoting role of exchange rate in ensuring equitable adjustment" (Demery and Squire, 1996, p. 40). After, groping the results of their experiment, they conclude, "The results of the study reveal three things:

1. Diverse change in poverty: reduced in four countries, increased in one country and remained constant in one country.

2. Economic growth or decline principally influences poverty while inequalities in income plays a secondary role, and

3. Poorest among the poor have not benefited even when poor on average gained (Demery and Squire, 1996, p. 41).

Their main lessons are: "Increase in poverty in Cote d'Ivoire by 16% in 3 years (1985-1988) Ghana experienced a decline in poverty (1988-1992) and in Kenya poverty remained almost constant in a decade (1981-1991)" (Demery and Squire, 1996, p. 42).

2.4 Conclusion

After studying poverty and distribution aspects in Nepal, Seddon (1987) concludes as follows:

> The need to press for social and political reforms is great; in particular for reforms which permit the open recognition of differing and conflicting interests in landownership, in employment and in political representation - that is, for land reform (including the possibility of collective forms of landownership) for reforms in the law which outlaws trade unions, and for reforms in the structure of political representation which would allow a greater direct representation, for example of the interests of women, the so-called, 'untouchables', landless labourers and other particularly vulnerable groups, at all levels (Seddon, 1987, p. 274).

He emphasise on participation and governance aspect while Adelman and Robinson (1989, p. 960) call for meticulous analysis of the factors determining the distributional trends. They conclude, "whether income inequality declines with development in long run depends on policies. Avoiding gap within sector requires; 1) policies targeted at increasing overall farm productivity 2) agrarian reform leading to redistribution of land etc 3) increase in non agriculture opportunities in rural areas. Above 1) and 2) depend on policy choice -- heavy industry versus cottage industries, import substitution and capital accumulation increases urban inequality".

They also emphasis on migration and consequent effect on income gap. "Increase in population in modern high income and increased gap between the high and low income, inequality increases till 'half of the population is in high income sector'. However, the existence of such a turning point is not guaranteed" (Adelman and Robinson, 1989, p. 961).

"The J-shaped curve in Brazil during 1960s-1970s. Korea, Japan, Taiwan U- shaped due to policies… Transfer of resources from agriculture to industrial sector fostering labour intensive growth and stressing on human resource development" (Adelman and Robinson, 1989, p. 961).

One question that may grill even the most competent policy makers is: what should be the main components of antipoverty policy? Adelman and Robinson (1989, p. 983) propose the following strategies:

1. increase quantity and productivity of assets owned by poor
2. increase sale price of the services of the assets sold by the poor
3. increase volume of market sales by the poor, and
4. perhaps, stabilising the prices of goods and services comprising basic needs basket.

What are the conclusive lessons that we learnt in context of income distribution for poverty alleviation? Adelman and Robinson (1989, p. 995) narrate as follows:

1. Strategies, policies and program for poverty alleviation exists: Between 1960s-80s population living in poverty decreased even in non-socialist countries, despite the fact that income distribution has become less equal.
2. Poverty alleviation requires implementation of mutually consistent, reinforcing multiface program packages.
3. Approaches to poverty alleviation vary and tailored as per the need of the specified country, and

4. Sequences of policy interventions are important. Sequence of asset oriented policies and institutional changes giving access to high productivity.

After a frugal analysis of poverty and distribution, They conclude their study in the form of a few lessons from post-war experience of developing countries, as follows (Adelman and Robinson, 1989, p. 996):

1. Inevitable initial deterioration of distribution

2. Persistence of deterioration into middle and later phases of development is a matter of policy choice. There are some spectacular success in marrying rapid industrialisation with no deterioration in distribution and overall reduction in poverty but also failures-combining successful growth with increase in inequality, and others failing in both fronts.

As the conclusive remarks, on the factors with which poverty is strongly affected, they enlist as follows (Adelman and Robinson, 1989, p. 997):

1. Asset oriented policy
2. Productivity enhancing policy
3. Institutional reforms in factor market, and
4. Overall development strategy

Zuckerman (1991, p. 267) writes about the hypothesis postulated by Glewwe (1988c) regarding effects of adjustment policies on poor in Peru. He estimated that currency devaluation would raise producer prices for exports by poor farmers and the price of imported food, reductions in social service expenditures hit the poor's education and health care, and increased charges for the utilities (electricity and water), public transport would be regressive (through poor have less access they spent larger proportion of budget). Even if Peru were to take adjustment the poor would suffer from the cutbacks in expenditure. Glewwe recommended targeted program to protect the poor.

When there is debate regarding the effect of adjustment policies on poor, there is also a simultaneous discourse on the role of market mechanism to trickle the fruits of economic

growth under moderate growth scenario. According to Dasgupta (1993), "Now 3 per cent per year is a generous figure to assume for a typical poor country. I conclude that the fruits of economic growth trickle down slowly under the market mechanism". (Dasgupta, 1993, p. 518).

Seehan and Hopkins (1978) observe GNP/head is important for basic needs fulfilment (quoted in Heerink and Folmer, 1994, p. 626). Stewart concludes, "the average income level and skewness of income distribution are important in explaining achievements in meeting basic needs. There is negative relationship between income inequality and basic needs fulfilment" (Stewart, 1979 quoted in Heerink and Folmer, 1994, p. 626). Leiptzier and Lewis (1980) also conclude that at higher level of income, once the critical level of development is achieved then the distributional factors become crucial for further raising of basic needs…Ram (1985) found that the impact of income inequality was limited in both groups of countries (quoted in Heerink and Folmer, 1994). "Poor households spend large portion of income on basic needs so relationship between satisfaction and household income is concave" (Heerink and Folmer, 1994, p. 632). The main conclusion of Heerink and Folmer (1994) study is as follows:

> Concave form of Engel's curve of necessity. When households income are equalised, low income households will consume more and high income HH less goods and services that satisfy their basic needs. But strict concavity of Engel curve implies that the gains of poor households exceed the losses of rich households as a result, the average level of basic needs satisfaction increases….Income equality has positive impact on health and nutrition but not on education. Average income is important only for education and health in low-income countries (Heerink and Folmer, 1994, p. 647).

Andersen and Pandya-Lorch (1994) after studying adjustment in Latin American, Asian and African countries conclude, " negative effects on African poor are less wide spread than expected - reason being large share of food they consumed is produced by themselves" (Andersen and Pandya-Lorch, 1994, p. 490). Moreover, their conclusions with regard to market reform and macroeconomic policy included different facets. Urban poor in Latin America are negatively affected. Poverty increased in urban areas while rural poverty remained the same during the 1980s. Compensatory measures for urban poor should complement and not substitute rural poor. SAP should incorporate income

generation among poor to alleviate poverty. More emphasis should be placed on input output market reform benefiting rural poor. Macroeconomic policy reform has strong effect on agriculture and poverty (Andersen and Pandya-Lorch, 1994, p. 490).

However, the rural poor in Bangladesh didn't have the same fate as their Latin American counterparts. Ravallion and Sen (1995, p. 13) reports, "the sizable increase in the squared poverty-gap index in rural areas from the mid 1980s suggests that poorest of the poor were also suffering falling living standards, as well as those near the poverty line (as indicated by the less dramatic rise in the head count index). The overall drop in poverty incidence between the end points was not sufficient to prevent rising number of poor; the national head count ratio fall at 0.6 percent per year compounded over the entire period, implying that the total number of poor increased at about 1.5 to 2 percent per year. All three poverty measures indicate greater poverty in rural than urban areas".

Demery and Squire (1996) while comparing of Côte d'Ivoire and Ghana observe, "deterioration of living in Côte d'Ivoire from internal adjustment affected all groups but in Ghana exchange rate policy induced recovery leading to economic growth and resulting reduction in poverty" (Demery and Squire, 1996, p. 50). Their study also included effect of export on rural economy and they write, "... In Ghana, growth in real export - profound effect on rural economy. With increased export by 22 percent net payment to Cocoa farmers dramatically increased by 3 fold, logging and mining also benefited - log export grew. Share of export in GDP grew from 2 percent to 16 percent due to real exchange rate depreciation - strong export response from rural economy" (Demery and Squire, 1996, p. 52). The plight of urban poor gets attention in their study, as they report, "... urban poor in both countries experienced difficult times (Demery and Squire, 1996, p. 53). Actually, employee in the formal sector constituted new poor due to adjustment programme… employee of urban formal sector became new poor" (Demery and Squire, 1996, p. 52). A specific comparison of two countries is included in their study to understand the effect of SAP on the mentioned economies. During 1988-92, standard of living in Accra deteriorated in contrast to the improvements elsewhere in the country. The middle group suffered greater losses than the poor. The losses are linked to high inflation and occurred to wage employers. Ghana made recovery in output and income that accelerated growth while devaluation of currency renewed prospects for

Côte d'Ivoire. Demery and Squire (1996, p. 53) inquire, will the poor benefit from future economic growth ? According to them two conditions must apply: Labour intensive growth and the poor must have access to human capital- education, health etc for ensuring their benefit from growth.

Demery and Squire (1996, p. 51) also attempt to understand the meaning of different policies for the well being of poor. They emphasise on the need of adjustment in right direction for economic recovery and benefiting the poor. The rural poor benefited in Ghana in contrast to that of Côte d'Ivoire. Macro economic policies resulted into positive contribution in Ghana while negative contribution in Côte d'Ivoire. The latter's internal adjustment had repercussions for production of tradable and non-tradable goods. Côte d'Ivoire experienced poverty among self-employed that raised with deteriorating economy. While in Ghana, recovery lead to increase in non-farming trading activities, rural poverty declined and because of income diversification and increased non-farm activities (Demery and Squire, 1996, p. 51).

How important were expenditures switching effects influencing rural poverty in Côte d'Ivoire and Ghana? "Appreciation in real exchange rate and decline in trade terms - increased poverty among the export crop farmers in Côte d'Ivoire" (Demery and Squire, 1996, p. 52). "The ERP (exchange rate policy) induced an inflow of net transfers from abroad (on the capital account of the balance of payments), which caused the exchange rate to stabilize (Young 1992). In preventing further depreciation in real exchange rate, these inflows had a "Dutch Disease" effect, adversely affecting the returns to the production of exportable and importable goods" (quoted in Demery and Squire, 1996).

They are also not successful to manifest the wider claim that the poor bear the brunt of adjustment. "Earlier fear that poor share the burden of adjustments in Africa is not well founded…The poorest of the poor are dislocated from market and infrastructure - economic recovery has little to offer them (Lipton, 1988)" (quoted in Demery and Squire, 1996, p. 55). Instead, they report failure in implementing adjustment programme further deteriorated fragile economy. "Côte d'Ivoire unable to follow an expenditure switching policy and introduce market liberalisation did internal adjustment strategy to work - and the country experienced negative growth and increased poverty… Message

from Ivorian experience is that delayed adjustment worsens matter for poor" (Demery and Squire, 1996, p. 56).

When, there are concerns being expressed on spatial poverty and deprivation, there are also concerns on absolute and relative poverty or deprivations. In *'Poor relatively speaking'*, Sen (1997, p. 160) distinguishes between the absolute and relative deprivation terms. "I shall argue that ultimately poverty must be seen to be primarily an absolute notion, even though the specification of the absolute levels has to be done quite differently from the way it used to be done in the older tradition. More importantly, the contrast between the absolute and relative features has often been confused, and I shall argue that a more general question about ascertaining the absolute standard of living lies at the root of the difficulty. In particular, it will be claimed that *absolute* deprivation in terms of a person's *capabilities* relates to *relative* deprivation in terms of commodities, incomes and resources".

There have been efforts in studying inequality from the schools of welfare economics however, Foster and Sen (1997) conclude, "we don't get much help in studying inequality from the schools of welfare economics" (Foster and Sen, 1997, p. 23). "Pareto optimality only guarantees that no change is possible such that some one would become better off without making anyone worse off. If the lot of the poor cannot be made any better without cutting into the affluence of the rich, the situation would be Pareto-optimal despite the disparity between the rich and the poor" (Foster and Sen, 1997, p. 7).

In his concluding statement to the Annual Conference of World Bank, Shahid Javed Burki calls for greater political commitment and efficient service delivery. "It was also underscored that poverty does respond to policy; that the resource requirements for success in fighting poverty are not impossibly high - certainly not when compared with vast sums that some governments have poured into supporting bankrupt banking systems. The main issues are ones of political will to undertake the targeting, and to more efficiently deliver public services….Let me now turn to the subject of poverty. The heart of poverty strategy is generally agreed. There is consensus about it. It is steady, sustainable, less volatile growth in a policy environment that generates increased

employment and rising labour productivity, coupled with a social safety net for marginal groups and those caught in transition".

Measurement of poverty or inequality in any form require the use of survey and questionnaires, as the latter has proved itself as a most commonly used method. "Thus brings into question the validity of simple statistical measures…" (Indira et al. 2002, p. 2174). However, most of the questionnaires used in standard of living survey are ambitious with overloaded quest for information with room for potential sampling errors. "There is a need there for reducing sampling error - especially originating from the "questionnaire overload". Currently, the NSSO questionnaire takes about two to two and a half hour per household and this shows the genuine need to bring down the size of the questionnaire" (Indira et al. 2002, p. 2175).

2.5 Poverty Related Strategies

What should be the strategy for redistribution and poverty reduction? Adelman and Robinson (1989, p. 984) regards redistribution of land - as an asset oriented strategy. The access to asset accumulation is so far governed by two slogans (Adelman and Robinson, 1989, p. 984): 1) redistribution before growth (RBG), and 2) redistribution with growth (RWG). Chenery et al. (1974) recommend for RWG while Adelman (1978) recommends the first one for land and the second one for education.

What are the broad strategies that contribute to reduce poverty? "The prominent strategies entail either 1) export oriented labour intensive manufacturers, or 2) Reliance on ADLI (Agriculture Development Led Industrialisation) Both strategies have implications on policies; trade oriented strategy require a policy of not discriminating against export by means of over-valued exchange rate and tariffs" (Adelman and Robinson, 1989, p. 993). "Agriculture strategy require that farmer could capture benefits from improvements in agriculture productivity…Manufacturers tend to be excessively protected while agriculture suffers from negative effective protection" (Adelman and Robinson, 1989, p. 994).

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research Levels: Macro and Micro

The research was carried out at two levels: macro and micro respectively. The first one involved mainly deskwork and it extensively used the data and information of the National FUG database available at the Department of Forest (DoF). The database contained information about 13,791 FUGs, covering 1.14 million hectares of community forests and 1.58 million households in Nepal. While at micro level, one case-study was carried out to test the empirical validity of the statements as outlined in Chapter one. The case study involved a detailed household survey questionnaire covering 42 households and was mainly carried out to understand the linkages with macro level data. The case study involved a detailed study of Kumariban community forest at Badikhel, Lalitpur. This methodology was used in preparing Chapters 6 and 7 of this dissertation. The methodology of chapter 5 regarding the distribution of forest products involved research works in Lalitpur and Kabhrepalanchok districts. The study on the distribution of forest products from the community forests was carried out to ascertain whether there was disparity in products distribution by wealth class and caste.

3.2 Research Set up

The research site comprised of various community forests in the Mid-Hill districts of Nepal. Kumariban community forest, Badikhel, Lalitpur was mainly used for undertaking a comprehensive micro level field research. This site was selected due to its convenient location, rapid socio-economic transformation, unique settlement and advantage of previous works. This study site comprised of Pahari households representing one of the disadvantaged group of Nepal. The households were grouped by wealth class and caste to understand and measure impact on income distribution. Various Participatory Rural Appraisal tools were supplemented by conventional household survey techniques to generate primary data. Wherever available, previous works and database were also used in this research. Some of the research work had already been

published in national and the proceedings of international symposium.

3.3 Research Method

The research employed secondary information, informal interview and focus group meeting, wealth ranking, household survey etc for data collection and gathering information. Tribhuvan University Central Library, and Forest Research Library and Information Centre had been mainly used for searching literature. Biophysical and demographic information had been obtained from sources such as National Planning Commission, Central Bureau of Statistics, United Nations Development Programme, Ministry of Finance and several other International and Bilateral Agencies. The information on group membership, minute of FUG meetings, revenues obtained from forest products and expenditure on forestry related employment, etc., had been obtained from the FUG secretariat of Kumariban community forest. Households that were selected randomly (stratified) for surveying were located with the help of local informants. All the 112 households, which were the members of Kumariban community forest, were categorised as the rich and the poor groups. The number of households required to be sampled was determined by using the formula given in page number 86. From each of the group, 21 households were selected randomly for household survey using structured questionnaire.

Informal interview: Meetings with the local people had been carried out involving key informants to understand poverty and income distribution. The informants comprised mainly the members of FUG committee. Such discussions and information collected at FUG level were important in understanding the socio-economic stratification, wealth ranking in particular and local initiatives for poverty alleviation. Household interviews on the contribution of community forestry on farm-household income were held to understand the contribution of community forest on village economy. The informal interview with the executive members of the FUG was very fruitful in designing household survey questionnaire.

Focus group meeting: Focus group meetings with local members of the FUG, especially the women members were carried out to prepare this report. Such meetings mainly

focused on gathering information about the forest products gathered from the community forest. Women member of the FUG were also asked about the pricing of the forest products using contingency valuation methods. Information on biophysical, socio-economic and institutional aspects was gathered. Knowledgeable members of the FUG committee and other interested villagers enthusiastically participated in the group discussions.

Wealth ranking: Economic stratification was carried out to ensure proper representation by wealth class to understand socio-economic structure of the community. Wealth ranking had been used as a valid tool for the purpose and details are available (Adams et al. 1997; Gallordo et al. 1995; Scoones, 1995; Sharma and Filius, 1999). The wealth ranking tool is being used by development partners in Nepal. Many of the development projects working at community level are found using this tool. This tool is being used widely in Livelihoods and Forestry Programme even in community forestry user groups to identify poorest of the poor households. However, the empirical validity of the tool was lacking. In this research, attempt had been made to analyse the validity of wealth ranking with income ranking and for that purpose Spearmen's rank correlation had been used.

Household level survey using questionnaire: Household level survey previously administered in Kumariban FUG in Badikhel, Lalitpur district had been maintained as a database. The same database was analysed to generate required information for writing chapter 6 regarding impact of community forestry on household income. The households were stratified into rich and poor households by wealth ranking of appropriate sample size. The sample size was determined as follows:

$$\text{Sample size} = \frac{\chi^2 P.H.(1-H)}{L^2(P-1) + \chi^2 H.(1-H)}$$

Where, χ^2 = Chi-square value for 1 degree of freedom at 90 percent confidence level, P= Population size (total number of FUG households), L= Confidence interval 10 percent, H= Population parameter of the maximum heterogeneity of income (0.5)

The sample size of 42 households had been selected for the purpose of case study for this research. The sample was based on the total 112 households of the Kumariban community forest. It was quite obvious that the sample cannot be a representative of 1.58 million households of Nepal. However, it had been already mentioned that a macro level study comprising of desk work that involved the analysis of FUG database comprising of almost 14,000 FUGs records had been carried out. The micro level study based on a single case Kumariban community forest was undertaken to understand the linkages of household income with poverty and exploring the relationship of community forest with other resource endowment.

The questionnaire covered housing, food security, literacy, landholding, livestock, private trees, household income, forest utilisation, participation and perception. The questionnaire was pre-tested in the field to incorporate local terms to measure land, grains etc. The household questionnaire included information about education, occupation of the main household head, main activities of household members, besides information on the ownership of land resource and tenureship. The questionnaire also included questions about the production of agricultural crops like paddy, maize, wheat, mustard, soyabean etc that were locally grown. The questionnaire also covered questions on monthly income from sources like farming, salary and remittances, self employment including bamboo and saddler works, wage labour including community forest employment, and household income from community forest products and other sources. The questionnaire also included questions regarding trees in private lands such as Khet and Bari. Information regarding animal husbandry was also collected. The household members were also asked to provide information regarding the type of fuel used in their household. The questionnaire also included question regarding the chemical fertilisers that were used by them. The questionnaire used in this research is given in Annex 7B.

3.4 Distribution of Forest Products from Community Forests

Altogether ninety-two households were surveyed for quantifying the amount of forest products being distributed from community forests. Kumariban FUG, Badikhel was selected for Lalitpur District while FUGs of Taukhel, Basdole, Jyalachiti, Senagal, Adhikarigaun and Mahendra Jyoti represented Kabhrepalanchok district.

The survey area in Kumariban comprised of 112 households, located at ward no. 3 and 4 of Badikhel village development committee (VDC) in Lalitpur district. The Paharis, a Tibeto-Burmese group was the main inhabitant followed by the Brahmins - an Indo-Aryan group. The survey was administered in randomly selected forty-two households, stratified into rich and poor groups by wealth ranking. The household survey questionnaire included questions on forest products for subsistence uses, purposes and patterns of uses by wealth and caste. After pre-testing, the questionnaire was designed in MS Access database form. The survey information was probed at *prima facie* using MS Access software and later analyzed by SPSS, mainly Chi-square tests. Pearson's Chi-square test was employed mainly to determine significance of differences but the validation rule often required other tests such as Fisher's exact test. Chi-square test had been widely used in this research as it was a test of independence, to see if two attributes are associated or not. It was also a test of goodness of fit and test of homogeneity. The tool was easy to compute but definitely inherits misuses such as the violation of assumptions due to small theoretical frequencies, negligence of non-occurrence events, failure to equalize sum of observed frequencies with the theoretical one, incorrect categorization, non frequency data and incorrect determination of the degree of freedom. Analysis of variance (ANOVA) was mainly done in Excel. ANOVA was used for determining the significance of differences regarding the distribution of forest products by wealth class and caste. ANOVA was selected because the distribution of forest products related data were assumed to be in normality, there was homogeneity in distribution and the independence of error. The basic assumption was that the underlying distributions were not very skewed and F-test was valid.

The crux of the research was to quantify the amount of forest products being distributed from the community forests by wealth and caste. For the sake of convenience, two categories of caste: higher and lower, were used. Similarly, the terms rich and poor were used for denoting the respective economic standings. Wealth ranking was used to delineate poor and rich households and was regarded as a valid tool for that purpose (Sharma and Filius, 1999).

Two separate research teams conducted the research. One team worked in the selected FUGs of Panauti, Ugratara and Mahendra Jyoti Village Development Committees

(VDCs) in Kabhrepalanchok District while a separate work was carried out in Kumariban FUG, Badikhel in Lalitpur District.

The questionnaire mainly included questions:

- What were the forest products of subsistence uses?
- Which and how were these products being used?
- What were the use-patterns of these products by wealth and caste?

3.5 Assessing Income from Private Trees in its Distribution

Chapter 7 was based on the analysis of a database from the research site in Lalitpur District. Wealth ranking was carried out to determine the economic standings of the settlement by using card-sorting method. At the initial stage of card sorting, three different colours were introduced for categorizing households as per the respective economic standings. A detail description of the procedure was available in Sharma and Filius (1999). The household survey questionnaire covered mainly on the private trees and its income and household income, the practice of voluntary exchange of labour (Parma), purchase of chemical fertiliser, etc. The questionnaire also included questions on landholdings, number and type of private trees by land-type. Statistical tools mainly Chi-square test was applied to determine the significance of difference. Pearson's Chi-square test was employed mainly to determine the significance of the differences but the validation rule often required other tests such as the Fisher's exact test. Gini coefficient of income with and without private trees was used to determine the impact on income distribution.

3.6 Analysing National FUG Database

National FUG database maintained in MS Access was analysed to determine the status of community forests in Nepal. The database contained information on biophysical variables and information of income and expenditure of the community forests however the database lacked sufficient information of institutional aspect and socioeconomic

information was also lacking. The database consists of information on 13791 community forests in Nepal.

3.7 Recording and Analysis of Data

Questionnaire, diary and field notes were used to record the fieldwork. The information collected through interview and discussion were qualitative in nature while some, obtained by household survey, were also of quantitative nature. Household survey data were probed at *prima facie*, using MS Access for consistency and reliability. MS Access database were analysed by Statistical Software for Social Sciences (SPSS) and EXCEL using tools such as Chi-square test, Multivariate analysis (ANOVA, multiple regression, correlation matrix etc). Inequality indices Gini Coefficient, and Income Variance Method (Anand, 1983; Foster and Sen, 1997; Heerink, 1997; Kanel and Sharma, 2003) had been primarily used to measure the inequality. Where applicable, for computing Gini Coefficient, Kanel's reduction method was used for the sake of convenience (Kanel, 1993; 1995).

3.8 Inequality Measurement (Income Variance Method)

Symbolically, $V(\mathbf{x},\mathbf{y}) = [W] + [B]$ ---------- (1)

$= [Wx\ V(\mathbf{x}) + Wy\ V(\mathbf{y})]_i + [V(\bar{\mathbf{x}},\bar{\mathbf{y}})]$

Where $Wx = n_x/n$ and $Wy = n_y/n$ are population share weights, V(.) the variance of respective vector, while $\bar{\mathbf{x}}$ and $\bar{\mathbf{y}}$ are 'smoothed' group distribution (with each member of the respective group having the mean income of that group).

Since, the crux of the research was to find out the impact of community forestry income on 'poor-rich' gap, equation (1) had been written as below:

$V_{(X)} = W + B$ ---------- (2)

Where, W= within-group inequality, B= between-group inequality and $V_{(X)}$= total income variance or total income inequality.

W and B are determined in the following way:

$$W = \sum N_j / N * V_{(Xj)} \text{ ----------(3)}$$

$$B = \sum N_j / N * (X_j - \bar{X})^2 \text{ ----------(4)}$$

Where, X_j was the average income of the j^{th} population group. The term $V_{(Xj)}$ reflected the degree of inequality within the j^{th} population group.

Rearranging equation (2), (3) and (4) as per the research interest on two wealth groups, namely the rich and poor households:

$$V_{(X)} = N_p/N * V_{(Xp)} + N_r/N * V_{(Xr)} + N_p/N (X_p - \bar{X})^2 + N_r/N (X_r - \bar{X})^2 \text{ ---------(5)}$$

Where, N_p/N, N_r/N = the respective 'population-share' weights of poor (p) and rich (r) households within the FUG (value ranging from 0 to 1).

Var (X_p), Var (X_r) = the income inequalities within the poor and the rich groups respectively, X_p, X_r = average income for the poor and the rich households and, $\bar{X}$ = average income of the FUG.

Equation (5) had been used under two scenarios, namely with and without community forestry situation.

3.9 Gini Coefficient

Grouped data

$$G = \sum X_i Y_{i+1} - \sum X_{i+1} Y_i$$

Where X_i denoted the cumulative proportion of the population in the ith class interval, and

Yi denoted the cumulative proportion of the population in the ith class interval.

When the variables were measured as percentages, then both of them had to be divided

by 100, in this case the above equation was written as:

$$G = 1/ (100)^2 [\sum X_i Y_{i+1} - \sum X_{i+1} Y_i]$$

Ungrouped data

$$G= (1+1/n) - 2/n^2 \mu [Y_n + 2Y_{n-1} +\ldots + nY_1]$$

For $Y1 \leq Y2 \leq \ldots \leq Yn$

Where, n= number of observations, and μ = mean value of Y.

Kanel's reduction method

The above mentioned formula for the calculation had been reduced to a much simpler form by Kanel (1993; 1995) and Kanel's reduction was applicable in cases where the group size is equal.

When the groups were of same size, the above formula could be reduced to the following form:

$G = 1/n (1+n-2 \sum y_i)$

Here, yi is in proportion but not in percentage. If it were in percentage it had to be divided by 100 to convert into proportion.

CHAPTER 4

LAND, FORESTS AND COMMUNITY FORESTRY

4.1 Land Utilization Pattern in Nepal

Nepal has a great variety of topography and the major portions of the country are covered by forest, shrub, and snow peaked mountain. The latest estimate for land use in Nepal is only available for agricultural lands, nonetheless, the estimates for different categories of land was done in the year 1981 under Land Resource Mapping Project (LRMP). The land utilization pattern in Nepal by ecological belts is given in Table 4.1.

Table 4.1

Land utilization pattern in Nepal by ecological belts

(In thousand hectares)

Category	Cultivated	Grazing	Forest	Non-cultivated Inclusions	Others	Total
Mountain	252.5 (4%)	1394.3 (22.1%)	2034.6 (32.3%)	148.6 (2.4%)	2478.6 (39.3%)	**6308.6 (42.8%)**
Hills	1481.2 (23.5%)	313.5 (5.0%)	3679 (58.1%)	720.7 (11.4%)	134.9 (2.1%)	**6329.3 (42.9%)**
Terai	1234.3 (58.5%)	49.7 (2.4%)	592.9 (28.1%)	117.5 (5.6%)	116 (5.5%)	**2110.4 (14.3%)**
Nepal	**2968 (20.1%)**	**1757.5 (11.9%)**	**6306.5 (42.8%)**	**986.8 (6.7%)**	**2729.5 (18.5%)**	**14748.3 (100%)**

Mountain includes High Himalaya and High Mountain, Hills includes Siwalik and Middle Mountain, and Terai also includes Inner Terai.

Source: Land Resource Mapping Project: Economic Report, 1986.

Table 4.1 shows that the area covered by Mountains and Hills is almost equal (43 percent) while the Terai covers nearly 14 percent of the country's area. However, the cultivated area lies mostly in the Hills and the Terai region of the country. Forest constitutes highest percentage of area coverage, followed by the cultivated land and others category (rock and snow covered areas). Grazing areas cover 11.9 percent while

non-cultivated inclusions is 6.7 percent. However, the latest estimate published by the Department of Forest Resource and Survey (DFRS, 1999) puts the figure for forest and shrub covered area in the country at 39.6 percent of the total land area.

Table 4.2

Land utilization pattern in Nepal by development regions

(In thousand hectares)

Development Region	Cultivated	Grazing	Forest	Non-cultivated Inclusions	Others	Total
Eastern	838.5 (29.4%)	178.1 (6.2%)	1140.8 (40%)	236.6 (8.3%)	460.1 (16.1%)	**2854.1 (19.4%)**
Central	790.7 (28.9%)	142.5 (5.2%)	1327.7 (48.6%)	235 (8.6%)	238.2 (8.7%)	**2734.1 (18.5%)**
Western	591.7 (20.2%)	437.9 (14.9%)	1061 (36.1%)	226.5 (7.7%)	618.4 (21.1%)	**2935.5 (19.9%)**
Mid-Western	453.9 (10.6%)	783.8 (18.3%)	1727 (40.3%)	177 (4.1%)	1138.4 (26.6%)	**4280.2 (29.0%)**
Far-Western	293.3 (15.1%)	215.1 (11.1%)	1049.9 (54%)	111.7 (5.7%)	274.4 (14.1%)	**1944.3 (13.2%)**
Nepal	**2968 (20.1%)**	**1757.5 (11.9%)**	**6306.5 (42.8%)**	**986.8 (6.7%)**	**2729.5 (18.5%)**	**14748.3 (100%)**

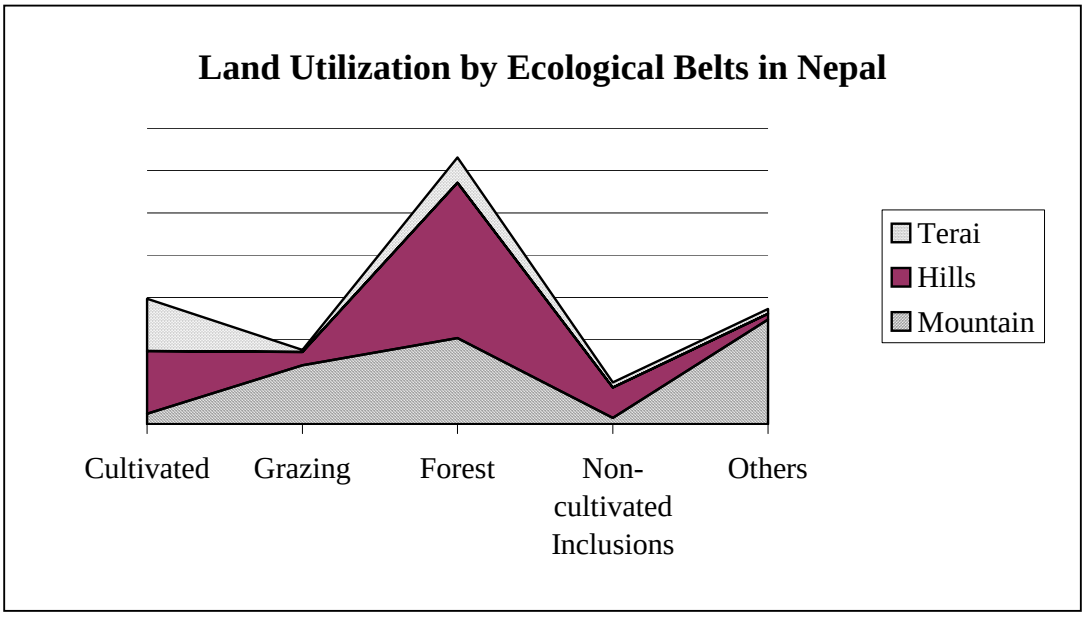
Source: Land Resource Mapping Project: Economic Report, 1986.

Mid-Western Region is the largest region on the basis of area (29 percent) while Far-Western Region is the smallest region (13.2 percent). It is clear from the Table 4.2 that there is dissimilarity in the pattern of land use among the different development regions of Nepal. The areas covered by the forests forms the major land use in Nepal. The areas occupied by the crops in different regions ranges from 10.6 percent to 29.4 percent. The lowest figure is for Mid-Western Region while the highest one is for the Eastern Region. Similarly, the areas occupied by pasture and others also shows that there is no similarity in the pattern of land use in different development regions of the country. Table 4.2 also indicates that the distribution of cultivated land, forest land and other land is uneven among the development regions. The Mid-Western region has the highest percentage of

forest land followed by the Central, Eastern, Western and Far-Western regions. The data presented in Table 4.2 shows that there is great diversity in land use pattern in Nepal.

Figure 4.1

Land under different uses by Ecological belts in Nepal



A comparison of land utilization by ecological belts is given in Figure 4.1. It is evident that cultivated lands are located mainly in the Terai and the Hills while the forests are located mostly in the Hills and Mountain areas. Grazing lands and lands under other categories (snow and rock) are also located mainly in the Mountain region of the country.

The information on utilization of agricultural land (see Table 4.3) corroborates the statement that agriculture land is limited in Nepal. A comparison of various years shows that though there has been 54 percent increase in the agricultural land in last four decades, the increase is less than 6 percent from the year 1981 to 2004. It shows that agricultural land area is stagnant in the country.

Table 4.3

Utilization of agriculture land in Nepal from 1961 - 2001

(In thousand hectares)

Land use	1961/62	1971/72	1981/82	1991/91	2001/02
Total area of holding, Nepal	1685.4	1654	2463.7	2597.4	2654
Agriculture land	1626.4	1592.3	2359.2	2392.9	2497.7
Arable land	1591.9	1567	2287.5	2324.3	2357
Land under temporary crop	1550.5	1537.1	2250.2	2284.7	2326.1
Other arable land	41.4	29.9	37.3	39.7	30.9
Land under permanent crops	12.2	15	29.2	29.4	117.5
Land under perm. Pastures	22.3	10.3	42.5	36.9	19.8
Ponds	n/a	n/a	n/a	3.9	3.5
Non Agricultural land	59	61.8	104.5	205	156.4
Woodland and forest	13.8	4.7	15	108.8	37.2
Other land	45.2	57.1	89.5	96.2	119.2

Source: CBS (2003) National Sample Census of Agriculture, 2002. Kathmandu, CBS.

Land tenure

Land tenure refers to arrangements or rights under which the holder holds or uses holding land. Land tenure relates to: area held in owner like possession, area rented from others, area operated on a squatter basis, etc. Land rented out does not constitute a part of holding. About 93 percent of the agricultural households own land and 7 percent rent out some or all of their land to others. On the other hand, 31 percent rented-in some land from others. And 7 percent do not own any land but operate land owned by others on contractual basis. The share of the owned and operated land in total operated land in Nepal is dominant, which exceeds 79 percent leaving 21 percent for rented-in from other households (CBS, 2004).

There has been almost 23 percent increase in total number of holdings from 1991/92 to 2001/02. There has been 25 percent decrease in land rented from others during the mentioned period moreover, other forms of tenureship also decreased by 54 percent. The information regarding land tenure in Nepal is included in the Annex 4N.

Landlessness

Landlessness in Nepal is not a prominent problem. Only 0.79 percent of the total holdings is regarded as complete landless that do not own land even for dwellings. By ecological belts, landlessness is highest in the Terai region (1.4 percent), followed by Mountains (0.33 percent) and least in the Hills (0.31 percent). The Eastern Development region has the highest landlessness (1.28 percent) while it is least in the Far-Western Development region (0.39 percent). The data on landlessness in Nepal is given in the Annex 4O.

Land fragmentation

Land fragmentation has remained as a major problem regarding land management in Nepal. The average parcel or holding has decreased from 6.8 to 3.3 from 1961/62 to 2001/02. The average size has also reduced from 1.09 to 0.79 during the mentioned period. There has been 28 percent decrease in average parcel while 51 percent decrease in the average size. See Annex 4P for details.

Land rent

The direction of land renting works significantly in reducing inequality in land distribution. Sharing of agriculture produce in the land (72 percent) is a prominent type of land renting. The other forms are: fixed amount of money, fixed quantity of produce, exchange for service and mortgages.

4.1.1 Distribution of Landholding in Nepal

In 1980s it was difficult even to get comparable data on the distribution of landholding in Nepal. However, the situation has definitely improved with Nepal Standard of Living Survey (NLSS) and Agricultural census in the mid and late 1990s. Since the mid 1990s, two comparable national censuses have been carried out. For information regarding land distribution in 1960s and 70s, we have to rely on two important sources from which roughly comparable data can be obtained. These are the national sample census of agriculture, 1961, and the sample survey conducted by M.A. Zaman in 1970/71 (Islam, Khan and Lee, 1982). The details regarding the number and area of holdings by size of holding is given in the Annex 4R. The detail on the landholdings by regions is also given in the Annex 4T.

National sample census of Agriculture 2001/02 carried of by the Central Bureau of Statistics also presents a comparable data on land distribution. Similarly, NLSS I and NLSS II also provide opportunity to make a comparable estimate of land inequality in Nepal. The findings regarding land inequality in the country are presented in Table 4.4. Data presented in the Table indicate that there has been a substantial improvement in the distribution of holdings between the years 1971 and 2004. The number of holdings below one hectare increased significantly and the average size of such holdings increased. On the other hand the number of large holdings (those above ten hectares) and their average size decreased sharply. The Gini coefficient of the distribution of landholding decreased from 0.683 in the year 1971 to 0.383 in the year 2004. (For calculations of Gini Coefficient please refer Annex 4A).

Data on the distribution of landholding on a nationwide basis are not available for the late 1970s. Smaller surveys, however, indicate a high degree of inequality even during that period. It indicates that despite the Land Reform Programme in the 1960s there had been no reduction in the degree of inequality in the distribution of landholdings in Nepal. Nonetheless, there has been a gradual improvement of the situation during the last three decades particularly after mid-1990s when the government adopted liberalized fiscal policy.

Even though landless problem is not an acute problem in the country, one should not overlook the fact that the problem of marginal farmers, holding very small pieces of land, can be nearly as acute as that of the landless. Thus, in an analysis of income distribution from community forestry in Nepal, the marginal farmers should also be considered as a vulnerable group. According to the Agricultural census 2001/02, only 0.79 percent of households were complete landless (not owning land even for dwellings).

In a situation, where the average size of land holding is quite low (about 98 percent households holding less than 3 ha of land), the policy of handing over forests to the local communities for sustainable management by them can significantly ameliorate land related problem.

Table 4.4

A comparison of landholding in Nepal between 1971 to 2004

Landholding group	Year 1971		Year 2004	
	% of HH	% of cultivated area	% of HH	% of cultivated area
<1ha	63.5	10.5	72.9	37.3
1 - 3 ha	19.5	18	24.4	46.7
3 - 5 ha	7.1	12	1.9	8.4
5 - 10 ha	5.8	21	0.7	5.7
>10 ha	4.1	38.5	0.1	1.9
Gini Coefficient		0.683		0.383

Source: Islam, Khan and Lee (1982) and CBS, 2004. Nepal Living Standards Survey 2003/04. Kathmandu, CBS.

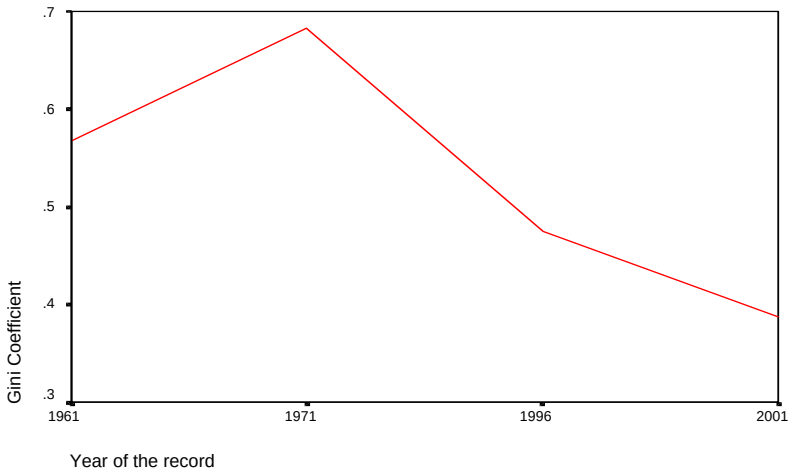
The trend analysis of Gini coefficient of land distribution in Nepal exhibits an encouraging sign of improvement in the situation (Figure 4.2). The land concentration, which used to be high in the 1970s suddenly changed by the year 2000, but what is the impetus for such a change can give a query for research scholars. Whether market forces acted as a magic stick or the present political conflict yields the situation, remains

unanswered. Nonetheless, the outcome can be regarded as a significant step towards improving agriculture based income distribution in Nepal.

Comparison of landholding of farm size greater than 10 hectares in Table 4.4 shows significant change in percentage of households owning such farms and also the percentages of cultivated area. It implies that the larger landowners bear the brunt of the political conflict, and in an effort to salvage their assets during their internal displacement, the system of mortgage might have led to a loss of land even for the indebted large farmers. This argument gets further support from the fact (noted in Table 4.4) that the top 10 percent of the larger farmer (owning more than 5 ha land) controlled nearly 60% of the cultivated area in the year 1971 while the same group represent less than 1 percent and control less than 8 per cent of the cultivated area in the year 2004.

Figure 4.2

Trend of Gini coefficient for land distribution in Nepal



4.1.2 Land Gini Coefficient in Nepal

The calculation of land Gini coefficient in Nepal is 0.478 and is given in Table 4.5.

Table 4.5

Land Gini Coefficient in Nepal, 2004

Nepal	% of HH	% of cultivated area
Less than 0.1 ha	7.3	0.4
0.1-0.25 ha	15.7	3.2
0.25-0.50 ha	21.8	9.6
0.50-1.0 ha	28.1	24.1
1.0 - 2.0 ha	19.1	31.3
2.0 ha and above	8	31.4
Gini Coefficient		0.478

Source: Author's computation from Nepal Living Standards Survey, 2003/04.

Land Gini Coefficient for the ecological belts, urban and rural areas and development region is given in Table 4.6. The details of the calculation of Gini Coefficient of land are given in the Annex 4T. Land inequality is highest in the Terai region. In comparison to urban areas, rural areas have lower Gini Coefficient. Among the development regions, Mid-Western region has the highest value of Gini Coefficient.

Previously, it was difficult to imagine that such a small proportion of farmers (i.e., 10 percent) could manage such a large proportion of the cultivated area (i.e., 60 percent) without resorting to the use of a substantial number of landless or near-landless agricultural labourers. But in recent years there is a surge of out-migration of labour and it must have constrained farm works of larger farmers. One possibility to cope with the situation is increased mechanization. However the statistics of energy profile in the country do not support this version.

Table 4.6

Gini coefficient of land distribution by regions, 2004

Mountain	0.449
Hills	0.429
Terai	0.501
Urban area	0.538
Urban Kathmandu	0.331
Urban Others	0.507
Rural	0.47
East Mountain/Hills	0.448
West Mountain/Hills	0.338
East Terai	0.494
West Terai	0.501
EDR	0.481
CDR	0.451
WDR	0.437
MWDR	0.505
FWDR	0.461

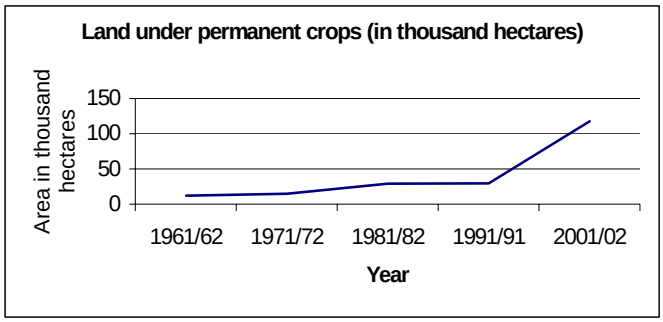
Source: Author's computation from Nepal Living Standards Survey, 2004.

The agricultural sector consumption of energy is far less than 1 percent and it exhibits low mechanization in agriculture sector. It is possible that larger farmers must have resorted to two options to cope with labour scarcity. Either it must have compelled them to get rid of their farm lands or shift towards more permanent type of cropping in their farm land. Figure 4.3 presents evidence of latter option while the sharp decrease in large landholding (Table 4.4) suggests the role of market forces in bringing about this change in landholding.

According to NLSS II report 2004, nearly 73 percent of households owned less than one hectare land and such land comprise of 38 percent of the cultivated area. While only 0.1 percent households owned more than 10 hectare of land. Such large farms constitute less than two percent of the cultivated area.

Figure 4.3

Land under permanent cropping over the years



One important aspect of population is its pressure on cultivated land measured in terms of persons per hectare. The measure gives idea not only on the intensity of farming but also on other aspects such as migration. Table 4.7 presents changes in population pressure on cultivated land by ecological belts. A close scrutiny of the data reveals that there has been 142 percent increase in population pressure in the Terai over a span of three decades while there is only 16 percent increase in Mountain areas. The increase in Hills is 53 percent over the years. Moreover, it indicates substantial migration from Mountains and Hills to the Terai belt of the country.

Table 4.7

Changes in population pressure (persons/ha) on cultivated land by ecological belts

Ecological belt	Year[1]			
	1971	1981	1991	2001[2]
Mountain	7.0	8.0	8.8	8.1
Hills	6.9	8.2	9.6	10.6
Terai	3.3	5.0	6.6	8.0

Sources [1]: B.P. Niroula, "Internal Migration", Population Monograph of Nepal, CBS/HMG, 1995 cited in Deo, 1997. [2]: Computed from National Sample Census of Agriculture, 2002. Kathmandu, CBS.

Like ecological belts, the pressure of population on cultivated land is high in all development regions but it is the highest in the Central Development Region, closely followed by the Western Development Region. The population pressure is lowest in the Eastern Development Region (Table 4.8).

Table 4.8

Changes in population pressure on cultivated land (persons/ha) by Development Regions

Development Regions	Year[1]		
	1981	1992	2001[2]
Eastern	4.4	5.3	6.6
Central	6.2	7.8	10.6
Western	5.3	6.4	8.9
Mid-Western	4.3	5.3	7.3
Far-Western	4.5	5.7	9.7
Nepal	5.1	6.2	8.6

Sources 1: Deo, 1997, 2: Computed from National Sample Census of Agriculture, 2002. Kathmandu, CBS

Thus, population pressure on cultivated land has grown in Nepal by 69 percent over the last two decades. The main reason for this is high rate of population growth with more or less limited cultivated land. The growth pressure on cultivate land requires increased agricultural productivity while it simultaneously requires the availability of more lands to sustain the productivity. Perhaps the growth of non-agriculture sector is an option for relieving such pressures.

4.2 Forest Resources of Nepal

Nepal's forest resource constitutes 39.6 percent of the total land area. The area of the forest is about 4.3 million hectares while shrubland measures 1.6 million hectares (Table 4.9). The forests together with agriculture and fishery contribute to 32.7 percent of the

GDP of the nation. The forest resource continues to decline at a rate of 1.3 percent annually which is even higher in the case of the Hills and the Mountain. The annual rate of deforestation in the Hills between 1978/79 and 1994 stood at 2.3 percent per annum while deforestation in the Terai for the comparable period remained 1.3 percent. The Terai region of the country experienced a sharp reduction in deforestation in the late 1990s (Table 4.10).

Table 4.9

Forests and Shrublands of Nepal

Region	Total land area (ha)	Forest area (ha)	Forest % of total land area	Shrub area (ha)	Shrub % of total land area	Forest and shrub total (%)
FWDR	1953900	687400	35.2	263900	13.5	48.7
MWDR	4237800	1192400	28.1	442000	10.4	38.6
WDR	2939800	734300	25.0	256900	8.7	33.7
CDR	2741000	918600	33.5	233800	8.5	42.0
EDR	2845600	736100	25.9	362600	12.7	38.6
Total	**14718100**	**4268800**	**29.0**	**1559200**	**10.6**	**39.6**

Source: Forest Resources of Nepal (1987-1998)

Table 4.10

Annual rate of deforestation by regions

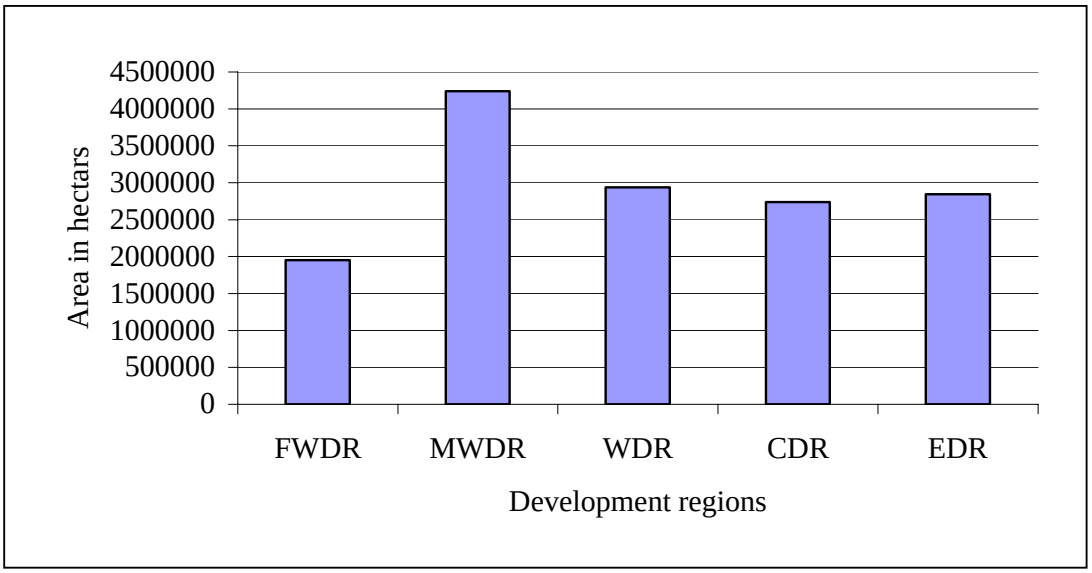
Period	Deforestation rate (%)	Region[1]
1978/79 - 1990/91	1.3	Terai
1978/79 - 1994	2.3	Hills
1978/79 - 1994	1.7	Nepal
1990/91 - 2000/01	-0.06	Terai[2]

Sources: 1: DFRS, 1999

2: DoF, 2005.

Figure 4.4

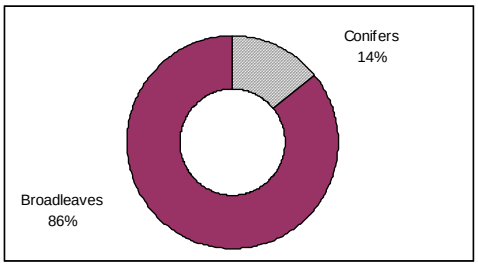
Forest area (ha) by Development region in Nepal



The distribution of forests by Development Region is given in Figure 4.4. All the regions except the Mid-Western have around 1 million hectares of the forests while the Mid-Western Region has 1.73 million hectares (See Annex 4M for details).

Figure 4.5

Proportion of conifers and broadleaves in Nepal



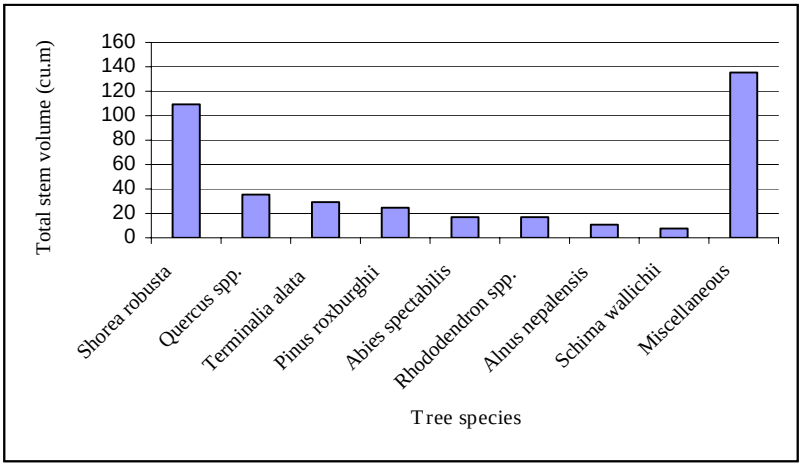
Forest Resource of Nepal (1987-1998) is a comprehensive survey of the forestry situation in Nepal. However, the study does not rely on a single methodology and uses the results of four different inventories carried out from the year 1987 to 1998. The study differentiates forests into reachable and non-reachable category.

> A forest is non-reachable if it is located on a slope more than 100% (45 degrees), or if it is surrounded by steep slopes, landslides or other physical obstacles… About 51.5% of the forest of Nepal are reachable. In case of non-reachable forest, growing stock can only be assumed to be similar to reachable forest. Therefore, for the whole country the projection of the total volume is estimated at 795 million m^3, and the total biomass about 873 million ton (DFRS, 1999).

It is rather obvious from the above statement that only half of the forest area was included in the sample for the inventory purpose and terrain of more than 45 percent slope was omitted. It demands that the finding of the survey has to be treated with caution as the definition of reachable forest itself has creeped biasness in favor of lowland and accessible areas. Consequently, broadleaf species such as Sal (Shorea *robusta*) is overestimated while the conifers (Pinus *roxburghii,* Pinus *wallichiana,* Abies *spectabilis*) are under estimated (Figure 4.5 and Figure 4.6 and Annex 4C for details).

Figure 4.6

Total stem volume in million m^3 by tree species in Nepal

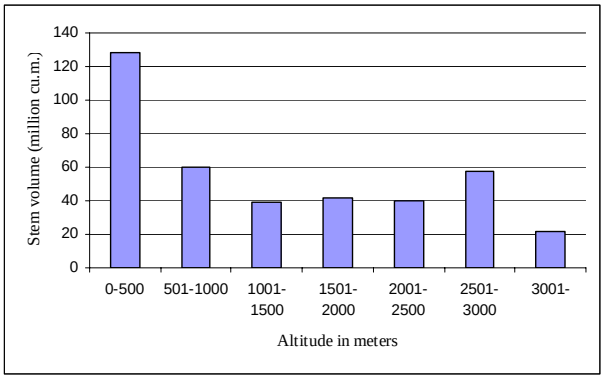


The proportion of broadleaf forest is estimated to be around 86 percent while that of conifers is only 14 percent. As most of the high mountain forests in Nepal mainly comprise of conifers, it is quite obvious that conifers forests are underestimated in the mentioned survey. Sal forest represents about 28 percent (109.4 million m^3) of the total stem volume, which is the highest estimate for any single tree species in Nepal (Annex 4D).

Total stem volume (million m^3) by altitude in meters is shown in Figure 4.7. The Figure clearly shows that major amount of stem volume (128.5 million m^3) lies in altitude less than 500 meters while 21.7million m^3 in high altitude (more than 3000 meters). The details of total stem volume by altitude and development regions is included as Annex 4E.

Figure 4.7

Total stem volume (million m^3) by altitude in meters



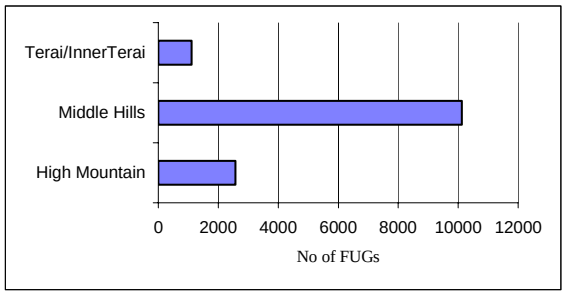
4.3 Pattern of Community Forestry Distribution in Nepal

The present chapter deals with pattern of distribution of community forestry by ecological and development regions of Nepal. It also deals with different forest types, forest condition and inequality regarding the distribution of community forests among households. The income from the community forests is also included in this chapter.

Nepal has achieved exemplary success in participatory management of natural resource in the world. Management of nearly 1.14 million ha of forests by more than 13,791 local forest user groups has helped recover the denuded hills and ease supply of basic commodities required on daily basis. Nearly 29.8 percent of households in the Mountains, 34.9 percent in Hills and 26 percent in the Terai collect fuel wood from the community managed forest.

Figure 4.8

Number of FUGs by ecological belts



As already stated the total area of community forests in the country is about 1.14 million hectare from which a total of 1.58 million households are directly benefited. These forests are managed by the groups of local inhabitants assembled into organization widely known as Forest User Groups (FUGs). There are altogether 13,791 FUGs through out the country[1]. The distribution of community forests and beneficiary households by ecological regions is summarized in Table 4.11. The highest numbers of FUGs (73.3 percent) are concentrated in the Middle Hills, followed by High Mountain (18.6 percent) and least in the Terai and Inner Terai (8.1 percent) (Figure 4.8). Similarly, the area of community forests in the Middle Hills is 761,678 ha (66.9 percent) while it is 225,739 ha (19.8 percent) in the High Mountain (Figure 4.10). The spread of community forestry in the Terai and Inner Terai is comparatively quite low (151,817 ha or 13.3 percent). The highest number of beneficiary households of community forestry are also located in the Middle Hills (1.07 million HHs or 67.9 percent). High Mountain represents 16.7 percent of beneficiary households (264 thousand households) and the Terai and Inner Terai has 15.4 percent (242,106 HH) of them (Figure 4.9). The Gini coefficient of community forest distribution by ecological regions is 0.044 (see Annex 4H).

[1] Computed from National FUG database, 2004.

Figure 4.9

Number of beneficiary households by ecological belts

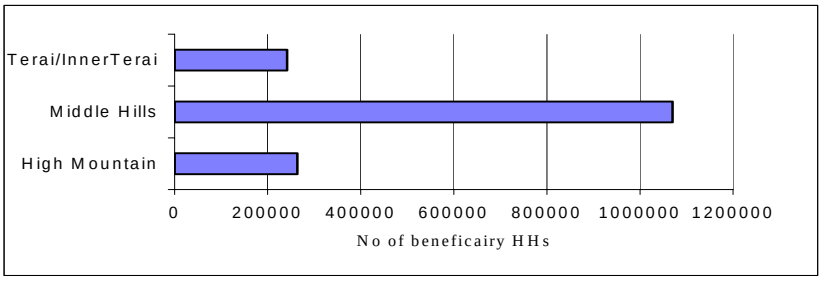


Table 4.11

Community forests and beneficiary households by ecological regions

Ecological regions	No of districts	No of FUG	Community forest (ha)	No of Beneficiary households
High Mountain	16	2,569 (18.6%)	225,739 (19.8%)	263,878 (16.7%)
Middle Hills	39	10,115 (73.3%)	761,678 (66.9%)	1,069,528 (67.9%)
Terai/InnerTerai	20	1,107 (8.1%)	151,817 (13.3%)	242,106 (15.4%)
All Nepal	**75**	**13,791**	**1,139,233**	**1,575,512**

Source: Computed from National FUG database, DoF, 2004.

Figure 4.10

Area of Community Forests (ha) by ecological belts

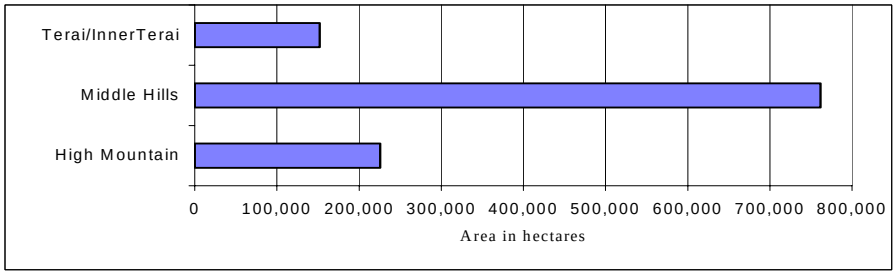
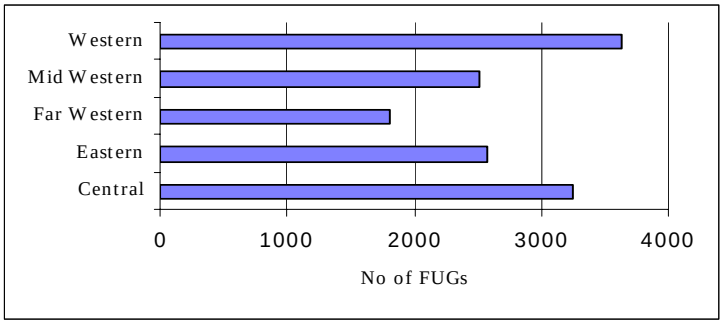


Figure 4.11

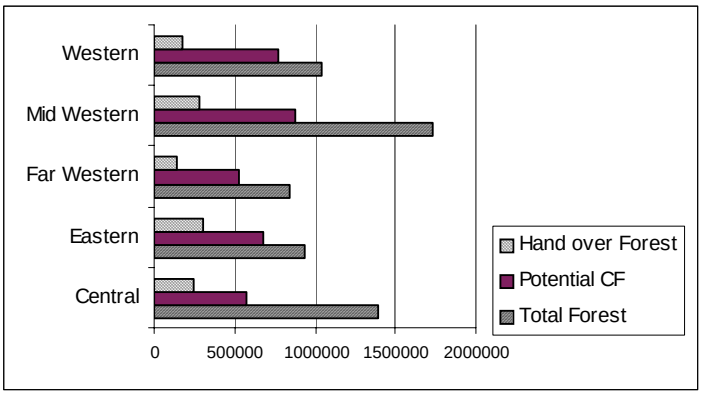
The distribution of FUGs by development regions



A comparison of beneficiary households by forest type is given in Table 4.12. The forest land has highest number of beneficiaries (965 thousand HH or 62 percent) while 23 percent or 369 thousand households are benefited from the shrublands. The plantation forest has benefited only 10 percent of the households while the forest type of benefit accruing to 3 percent of households has not been specified. The details regarding type of forest and beneficiary households in the community forests of Nepal is given in the Annex 4S.

Figure 4.12

A comparison of total forest, potential CF and handed over CF by development regions



The distribution of FUGs by development region is given in Figure 4.11. The Figure shows that the Western Region has highest number of FUGs followed by the Central Region. The Far Western Region has the least number of FUGs.

Figure 4.12 compares different regions by forest area, potential community forest and handed over forest area as community forests. The Figure shows that the Mid Western Region has the largest forest area, followed by the Central and Western Region. Mid Western Region also has the highest potential community forest area, followed by the Western and Eastern Regions. The hand over is highest in Eastern Region (44 percent of the potential), closely seconded by Central (43 percent) and Mid Western Region (32 percent). The Western Region has only 22 percent of its potential forest area handed over as the community forests. The details of the potential CF area are included as Annex 4M.

An analysis of hand over of community forests by ecological regions shows that almost 70 percent of the potential CF area in the Terai is handed over while the figures for the Hills and the Mountains are 40 percent and 17 percent respectively. The hand over process in the Terai is expedited partly due to accessibility. However, the main reason being very little (only 15 percent) of the total forest area is designated as potential community forest. About 58 percent of the forest area in the Hills and almost all the forest areas in the Mountains are designated as potential community forests. For a comparison of hand over of community forests by ecological regions see Figure 4.13.

Figure 4.13

A comparison of total forest, potential CF and handed over CF by ecological regions

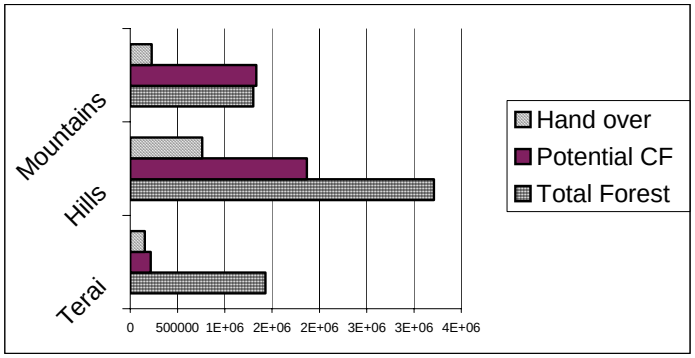


Figure 4.14

Forest condition by ecological belts in Nepal

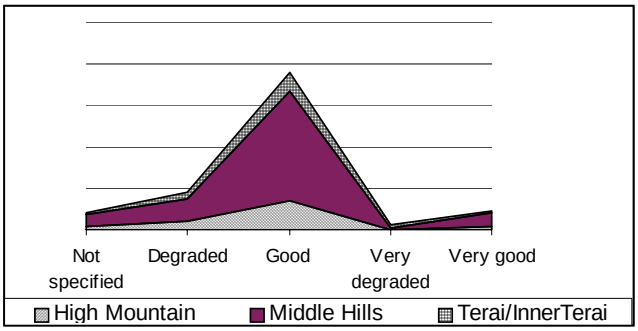


Table 4.12

Beneficiary households by forest type

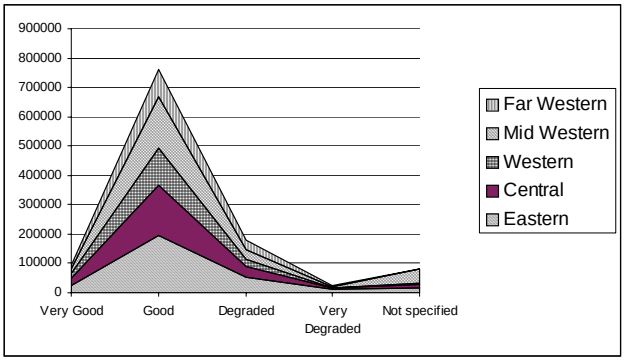
Forest type	Area (ha)	No of Beneficiary HH
Forest	777432 (68%)	965305 (62%)
Shrub	253614 (22%)	368697 (23%)
Grassland	23060 (2%)	34600 (2%)
Plantation	43927 (4%)	161276 (10%)
Not specified	41014 (4%)	45634 (3%)
Total	1139048	1575512

Source: Computed from National FUG database, DoF, 2004.

An analysis of forest condition by the ecological belts shows that the forests under good condition mainly lie in the Middle Hills and High Mountain (Figure 4.14). Similar analysis by development region shows that very good and good condition forest occurs mainly in the Eastern and Central Development Regions. The non specified condition of the forest lies mostly in the Mid Western Region (Figure 4.15). The details of the forest condition of community forests by ecological belts and development regions are given the Annex 4G.

Figure 4.15

Forest Condition by Development Regions in Nepal



A comparison of forest area by forest type is presented in Figure 4.16. The forest constitutes almost 68% of the community forest followed by the shrubland (22%). The rests (plantation, grassland and not specified) constitutes the remaining 10 percent area.

A summary on the area of community forests in hectares by tree species is presented in Table 4.13 and Figure 4.17. Table 4.13 shows that 33 percent of the community forests comprise mainly of Sal forest while the conifers constitute 23.7 percent. This estimate again shows that either DFRS survey report 1999 overestimates Sal forest or there is some policy constraint or reluctance in the part of District Forest Offices (DFOs) regarding handing over of Sal forests to the community as community forests. In order to get answer of the latter question, it becomes necessary to analyze the trend of hand over of Sal forest and compare with some hilly tree species such as Pinus *roxburghii.*

Figure 4.16

Community forests by type of forest

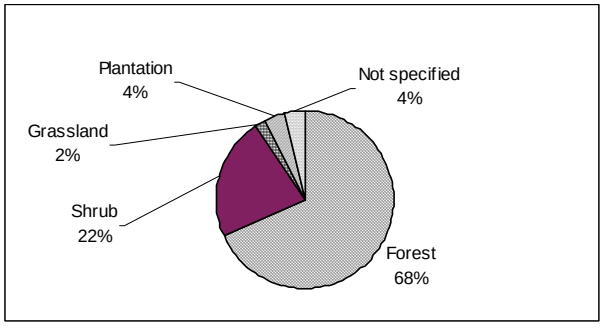


Figure 4.18 and Figure 4.19 presents such a comparison. The two Figures compare the areas of hand over of community forests of the respective tree species over one decade

(For detail information on hand over of community forests by tree species or forest type refer Annex 4I).

Table 4.13

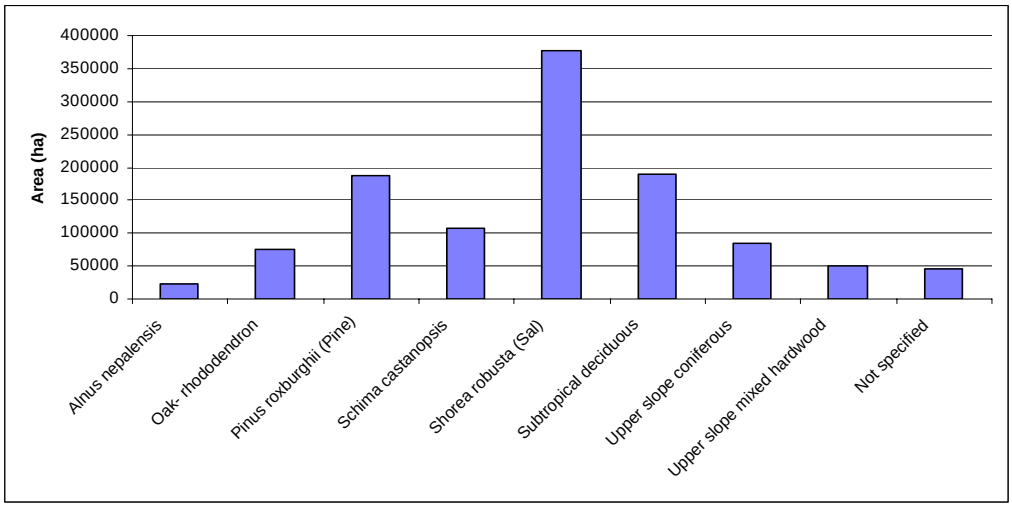
Community Forests (ha) by tree species in Nepal

Forest type	Ecological belts			
	Mountain	Hills	Terai	Total (%)
Alnus nepalensis	4688	17144		21832 (1.9)
Oak- rhododendron	27736	47440		75176 (6.6)
Pinus roxburghii (Pine)	31506	156008	366	187880 (16.5)
Schima castanopsis	23654	82810		106464 (9.3)
Shorea robusta (Sal)	23657	265968	86556	376181 (33.0)
Subtropical deciduous	7534	125927	57056	190516 (16.7)
Upper slope coniferous	71902	12042	328	84273 (7.4)
Upper slope mixed hardwood	24300	23877	2161	50338 (4.4)
Not specified	10761	30462	5349	465729 (4.1)
Total	225739	761678	151817	1139233 (100)

Source: Computed from National FUG database, DoF, 2004.

Figure 4.17

Area of community forests (ha) by tree species in Nepal



If we compare Figures 4.18 and 4.19, we can clearly see that the DFOs were at first reluctant to hand over the Sal forest (with gentle slope of the curve in the beginning) however the curve peaked only in the late 1990s. Whereas, the hand over trend of Pinus *roxburghii* remained enthusiastic in the beginning as suggested by the steep slope of the curve and peaked early in the mid 1990s. The curve suggests that in hilly areas the hand over slowed down as early as the late 1990s. Nonetheless, despite initial reluctance as evident in Table 4.13, Sal forest constitutes 33 percent or the highest percentage of hand over followed by Pine and Subtropical-deciduous forests.

Figure 4.18

The trend of hand over of Sal forest (ha) as community forest

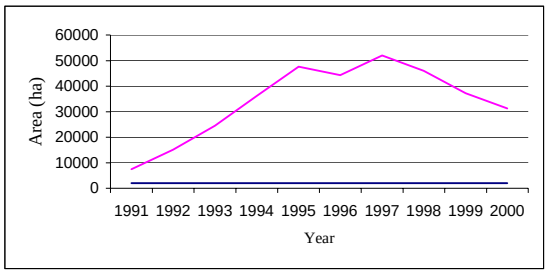
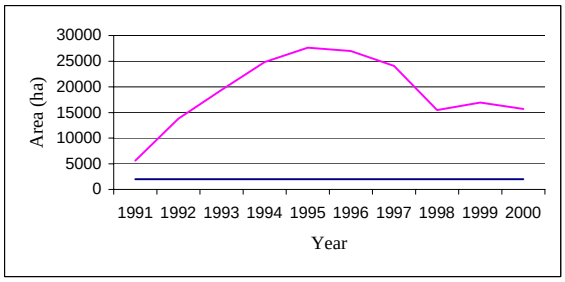


Figure 4.19

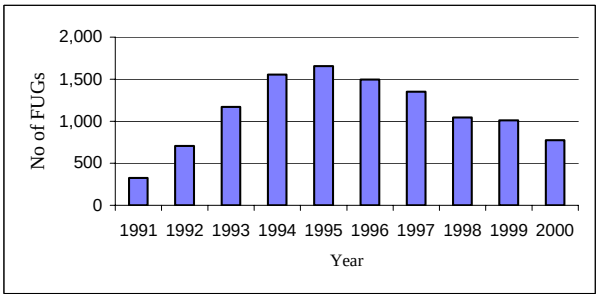
The trend of hand over Pinus *roxburghii* forest as community forest



Community forests are handed over to the local communities for sustainable management. The hand over process expedited during mid 1990s when annually 1500 FUGs were formed. Only 2700 FUGs are formed after year 2000 however, altogether 11092 FUGs were formed between the year 1991 and 2000 and the trend of formation is given in Figure 4.20.

Figure 4.20

Formation of Forest User Groups in Nepal from year 1991 to 2000



Handing over of community forests peaked during the year 1995 with the annual hand over of 150 thousand hectares of community forests. However, the pace of hand over gradually slowed down as most of the accessible forests were already converted into community forests. The policy decision regarding Terai and Inner Terai forests in May 2000 is also held responsible for delayed hand over of community forests. Only 229 thousand hectares of community forests have been handed over after 2000 where as annually 120 thousand hectares of forests were handed over during mid 1990s for community level management (Figure 4.21).

Area of the community forest: The average size of a community forest is 82.7 hectare with a range from 0.08 to 5697.9 ha. The statistics of CF size is given in Table 4.14.

Figure 4.21

Hand over of community forests (ha) in Nepal from 1991 to 2000

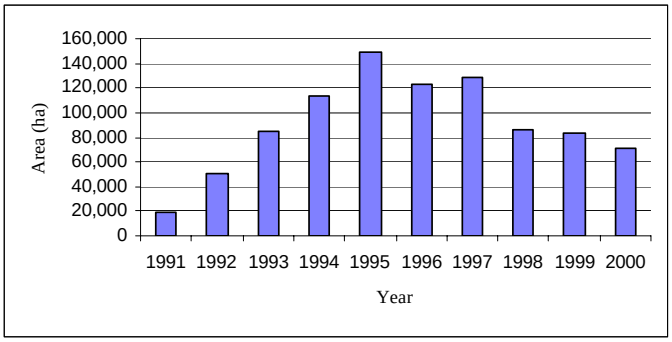


Table 4.14

Descriptive Statistics on Community Forests area in hectares in Nepal

CF_AREA

N	Valid	13764
	Missing	26
Mean	-	82.7690
Median	-	37.1800
Mode	-	10.00
Std. Deviation	-	157.6475
Variance	-	24852.7426
Range	-	5697.92
Minimum	-	.08
Maximum	-	5698.00
Sum	-	1139233.07

Source: Computed from National FUG database, DoF, 2004.

Beneficiary households: The total beneficiary households are 1.57 million with an average of 116 households per community forest. The statistics on beneficiary households is given in Table 4.15.

Table 4.15

Statistics on beneficiary households of Community Forests in Nepal

HH_NO

N	Valid	13531
	Missing	259
Mean	-	116.4372
Median	-	86.0000
Mode	-	60.00
Std. Deviation	-	130.3343
Variance	-	16987.0313
Range	-	4744.00
Minimum	-	6.00
Maximum	-	4750.00
Sum	-	1575512.00

Source: Computed from National FUG database, DoF, 2004.

4.3.1 Gini Coefficient of Community Forest Distribution

The Gini coefficient of community forest distribution by size of the community forest is given in Table 4.16 which shows that 63 percent of the households have community forests less than 100 hectares and it constitutes only 29 percent of the total area of the community forest. The remaining 37 percent households have community forests larger than 100 hectares and such forests constitute 71 percent of the total area of the community forest. This suggests high inequality in the handing over of community forests to the local Forest User Groups and consequently the Gini coefficient is 0.445. The larger sized community forests are in the hand of fewer households in comparison to smaller sized community forests in which a larger number of households are accommodated in the FUGs. The calculation of Gini coefficient of community forest

distribution by size for year 2007 is given in the Annex 4L. The calculated Gini coefficient is 0.458 that means CF distribution in 2007 has become even more unequal than it was in year 2004. However, the Gini coefficient for year 2009 was 0.451. The details of the calculation of Gini coefficient of community forest distribution are given in the Annex 4L.

Table 4.16

Gini coefficient of community forest distribution by size of the forest

Community forest	No of FUGs	Total CF (ha)	Total HH	Total area (%)	Total HH (%)
< 10 ha	2736	13,932.70	185,261	1.2	11.8
10.01 to 50 ha	5227	135,069.23	489,733	11.9	31.1
50.01 to 100 ha	2553	179,912.03	314,356	15.8	20.0
100.01 to 200 ha	1882	260,911.95	272,579	22.9	17.3
200.01 to 500 ha	1099	321,340.64	233,304	28.2	14.8
500.01 to 1000 ha	210	141,362.74	58,195	12.4	3.7
> 1000.01 ha	51	86,683.71	21,883	7.6	1.4
Total	**13758**	**1139213**	**1304614**	**100.0**	**100.0**
Gini coefficient					**0.445**

Source: Author's computation from National FUG database, DoF, 2004.

4.3.2 Participation of Women in Community Forestry

Community forestry provides an important platform for emancipation of women. The overall participation of women in FUG committee is 24.9 percent as there are about 38 thousand women members among 155 thousand Committee members. Moreover, there

are 695 all women community forests in the country. The level of participation of women in community forestry is summarized in Table 4.17. The details of districtwise participation are given in Annex 4K.

Table 4.17

Women's participation in community forestry in Nepal

No of FUGs	13791
Total Number of Committee Members	155120
No of all Women FUGs	695
No of Women in Committee	38542
Average percent of Women in Committee	24.9

Source: Computed from National FUG database, DoF, 2004.

4.3.3 Income and Expenditure from Community Forests

Community Forest User Groups (FUGs) are legally authorized to sale the forest products and expend the revenue on various forest and community related development works. There was a government decision to impose a tax of 40 percent on the sale of forest products outside the FUGs. The provision was severely criticized in every nook and corner of the country and the amended provision requires only 15 percent of the sale proceeds to be deposited in the government treasury in the commercial sale.

As per the stated provision, an amount of NRs 320 million was deposited in the government treasury in the year 2000 from the sale of 255 thousand cubic feet (cft) timber, 871 stacks of firewood and 3,003 tons of Khair. The amount deposited in the treasury represents only 40 percent of the total income accrued to the FUGs from outside the FUG sale. In the year 2001, the amount deposited in the treasury increased to NRs 517 million with the commercial sale of 578 thousand cft timber, 511 stacks of firewood and 5,282 tons of khair. In the year 2002, about 565 thousand cft of timber, 1,073 stacks of firewood and 1,816 tons of khair were sold for commercial purpose from the

community forests in Terai, Inner Terai and Churia regions of the country. The total revenue accrued to the government treasury was about NRs 500 million.

Sal species (Shorea *robusta*) alone constitutes 43 percent of the timber sold outside the FUG for commercial purpose. Sal and Khair species (Acacia *catechu*) constitute 47 and 34 percents of the total revenue accrued to the government. Almost 31 percent (285 out of 932 FUGs) of the FUGs in Terai, Inner Terai and Churia are involved in the commercial sale of forest products. A few districts: Makwanpur, Udayapur, Ilam and Dang alone constitute 60 percent of the revenue accrued from the community forests. The name of districts with excessive income from the community forests is given in Table 4.18.

Table 4.18

Three districts generating excessive income with commercial sale from the community forests in three fiscal years

Year 2000		2001		2002	
District	Amount (NRs in '000)	District	Amount (NRs in '000)	District	Amount (NRs in '000)
Dang	36,406	Ilam	40,165	Makwanpur	24,758
Makwanpur	10,950	Makwanpur	22,705	Dadeldhura	19,616
Ilam	8,285	Udayapur	17,977	Udayapur	15,476

Source: DoF.

Table 4.19

Amount of timber sold outside the CFUG by species (all in thousand cft except khair in tons)

Species	Year 2000	2001	2002	Total
Sal	200.7	324.9	245.1	770.7
Other spp	54.7	253.1	320.5	628.3
Total	255.4	578.0	565.6	1,399.0
Khair	3,0003	5282	1816	10,101

Source: DoF.

The Table 4.18 shows districts with excessive income from commercial sale of timber from the community forests outside the FUG. In the mentioned districts, area of plantation is almost nil and it shows that despite lucrative income from the commercial sale, the FUG's investment in development and management of the community forest remains negligible. Hence, the sustainability in long term is questionable.

Table 4.19 shows that Sal species constitutes bulk of the traded volume threatening its existence. The government attempted to clarify the situation with the promulgation of

Fiscal Ordinance 2060 with regard to the deposition of 40 percent of the income accrued from the commercial sale of timber outside the group. Clause 19 of the Ordinance and a notice published by the Ministry of Finance in the Nepal Gazette, dated 2060/5/11, made a mandatory provision to deposit 40 percent of the income accrued from the commercial sale of timber (sold outside the FUG) in the government treasury. However, after severe criticism, the ordinance was reviewed and scaled down to 15 percent of the income accrued from the commercial sale.

An estimate of annual income and expenditure of community forestry income and expenditure in the respective FUGs Projectwise summary is given in Table 4.20. This Table shows that the total income of the FUG in the country is NRs 246 million while the expenditure is NRs 166 million. The average annual income of a community forest is NRs 17887 while the average expenditure is NRs 12038. The share of Terai in total income in 1998 was 93 percent while it was 83 percent in 1999 and 76% in 2000. Similarly, the share of Hills was 5.7, 15.2 and 21.3 percentages respectively for the mentioned years. The share of Mountain was 0.91, 2.2 and 2 percents respectively for the mentioned years.

Kanel and Niraula (2004) appraised income and expenditure of FUGs in 12 districts from Hills and the Terai and extrapolated the estimate for Nepal. The total annual income is about Rs 747 million using the market value of forest products, and estimated the annual income of the FUGs to be NRs 913 million while the total expenditure is NRs 457 million. The highest expenditure is on silvicultural operations (18.4 percent) followed by other infrastructure (16.6 percent). The total annual budget of the Department of Forest was about Rs 680 million, and the annual income of the Department was about Rs 550

million in 2002. Kanel and Niraula's (2004) estimation is based on the Terai and Mid-Hill districts where large scale harvesting of forest products took place during the period. Hence, their estimation for the country far exceeds my estimation of CF income and expenditure.

Table 4.20

Project-wise summary of CF income and expenditure

Project	CF Income	CF Expenditure
BISEP-ST	61286748	46863686
ChFDP	5559733	3818385
LFP	30810132	21702994
NACRMLP	8360998	5178499
NARMSAP/CFD	71887981	37298161
NSCFP	13541430	5923314
SAGUN	32283329	22085411
Terai (without Projects)	22946696	23151792
All Nepal	**246677047**	**166022242**

Source: Computed from National FUG database, DoF, 2004.

CHAPTER 5

DISTRIBUTION OF PRODUCTS FROM THE COMMUNITY FORESTS

The concerns of poor have been always at the top of agenda for development discourse in community forestry. Maharjan (1993) recommends an equal access to safeguard the economic interests of the poor in the community forest. The returns from the common resources are crucial for the survival of the poorest households. Jodha's (1986) findings from the drylands of India show that up to one-fifth income of the poor comes from the commons, mostly the low value products….The richer households, due to higher opportunity cost of gathering time, are interested only in the high value products (1986, p. 1173-4).

There is a need of research to find out whether any significant difference in the preference of low and high value products by wealth and caste exists, because the preference may affect the return from the common resources. Many researchers believe that the rich households derive more benefit than the poor households from the uses of products from the community forests. They suspect households differ significantly regarding the use of domestic fuel by wealth and caste. Whether the consumption of firewood is significantly related with economic standings and the caste system has a bearing on the utilisation of forest products from the community forests gives query to many researchers.

This chapter dwells on the question that whether the poorest households use the forest products in a lesser quantity than their rich neighbours. The next part of the question is whether there is any manifestation of the difference between the rich and the poor households regarding the use of low and high value forest products. And if there is any variation then whether Multiple regression is useful in explaining such variations observed in the use of forest products. In case of substantial variation in the use of forest products then despite an equal access, the poorer households use forest products in a lesser amount and the issue of equal access obviously becomes meaningless.

The opportunity cost of time in rural context may have gender dimension and not solely depend on wealth class. As women's opportunity cost of time can be substantially lower than their male counterparts, hence they may get involved in gathering the low value products and so does the children in their off-school hours or drop-out children. In this perspective, the rich and poor households may not differ regarding the collection of low and high value forest products due to the indifferent opportunity cost of time of the collectors involved in gathering low forest products.

There is rhetoric that there should be equal access in the community forests but despite an equal access, if the poor households uses less forest products then, the rhetoric becomes meaningless. That is why, this research intends to analyse the distribution of forest products by wealth and caste and test the empirical validity of the so-called a difference in the preferences of high and low value products by wealth class.

This research assesses the validity of the blame on community forestry about the discrimination against lower caste and economically disadvantaged people in Nepal. For the purpose of analysis, two sets of database are used involving research sites in Kabhrepalanchok and Lalitpur districts of Nepal. The crux of the research is to reveal whether people have benefited from the community forests regardless of wealth and caste through augmented supply of forest products for farm-household activities. The research outcome is expected to recommend policy measures regarding community forestry in Nepal.

5.1 Introduction

Community forestry is poised as a great success in Nepal, with the latest statistics (released on May 7, 2009)[1] showing: 14,439 Forest User groups managing 1,229,669 hectares of community forests with 1,659,775 beneficiary-households. However, it is also feared that benefits of community forestry trickles more to the rural rich, aggravating inequality in a non-egalitarian context. The issue of equity in community

[1] Earlier in this book a different figure was stated. The difference in figures regarding the FUGs in Nepal is due to regular update of database maintained by the DoF. For the analysis purpose, I have used a 2004 version of the database that is why the figures regarding community forest development in Nepal may not exactly match with the figures stated in this book.

forestry is mainly perceived in three aspects: equity in product distribution, decision making, and fund-allocation (Bosma, 1995).

Some researchers often blame community forestry for discriminating against the lower caste and economically oppressed people. There is also an increasing concern that the community forest management has failed to benefit more to the poor than the rich households (Malla, Neupane and Branney, 2003). Graner (1997) carried out extensive studies in Sindhupalchok District, and concludes that community forestry based on FUG concept may not be a viable development strategy for securing the basic needs mainly because of the dominance of elite and high caste people in the FUGs. She gives three reasons to justify her argument:

I. members of FUGs are predominantly from economically advantaged group;

II. economically disadvantaged groups are often excluded from membership; and

III. economically disadvantaged group may lose access to VITAL resources.

Based on those findings, Graner validates Goldsmith's criticism of Social Forestry of being little help to the poor, actually, on contrary, contributing to their further impoverishment (Goldsmith, 1985 as quoted in Graner, 1997).

Graner compares inconsistent sets of data (that do not overlap for example VDC and FUG data) to validate her claim that the "lower caste and economically disadvantaged people are excluded in the FUG formation process". In this research, we attempt to verify the mentioned statement. But the magnitude of exclusion cannot be determined due to the lack of reliable methodology and appropriate tools. Nevertheless, sharing of benefits from the community forests can be quantified and compared. Hence, this research attempts to examine the validity of Graner's statement particularly in the context of sharing forest products within the FUGs.

Firewood, timber, fodder, grass and leaf-litter are the essential forest products of households in Nepal where seventy-eight percent of the total energy consumption and eighty-five percent of the residential sector energy consumption is met through the fuel wood. Various studies report an average per capita consumption of firewood in rural Nepal of about 700 kg: a World Bank (1989) study reported 708 kg; Thapa (1989) reported a figure of 640 kg for the Middle hills; and Sharma (1999a) recorded 703 kg in another survey (cited in Richards, Maharjan and Kanel, 2003). About thirty-eight percent of the annual firewood demands are supplied through private trees, and the remaining from cow dung and agriculture residues. The per capita timber consumption is 0.07 m^3/year, mainly for housing, agriculture implement and furniture needs.

The forests play an important role supplying sixty percent of the total timber and the remaining is supplied from the private trees. The total digestible nutrient (TDN) requirement for cattle on average is 519 kg/year and the same for goat is 57 kg/year. The estimated fodder supply, from the natural forests and the private farms, is about thirty-six and forty-four percentages respectively (HMG, 1988). It is obvious from these figures that forest plays a significant role in satisfying the household needs of people of Nepal.

In earlier chapter we noticed that the land distribution is still highly skewed favouring rich people in rural areas of Nepal. The rich families have larger family sizes, own big houses and maintain large herds of livestock as the latter is integrated in the farming system. Eventually, those families not only use larger quantities of forest products but also an Indian experience (Jodha, 1986) shows that the products are mostly of high value. The higher opportunity cost of time for gathering such products makes the rich households interested only in high value products (Jodha, 1986). Hence, it is logical to speculate that benefits from the community forestry trickles in favour of the rich households. There are studies on sharing of benefits in the community forests of Nepal (Maharjan, 1993; Mortensen, 1997, Malla, Neupane and Branney, 2003 etc). Various costs and benefits associated with community forests are dealt in these studies. The Maharjan's study concludes "poor are not disadvantaged provided an equal access to the community forests". While Mortensen (1997) evaluates the economic performance of forest user groups in managing the community forests, using three case-studies. The

general observation is "community forests are under utilised" (Mortensen, 1997). Why aren't the poor people benefiting more from community forestry ? is explored by Malla, Neupane and Branney (2003). They report a major cause of this inequity is that FUG committees are dominated by wealthier households. In addition, awareness levels of a range of community forestry and FUG institutional issue is low, particularly amongst the poorest group. Forests are being managed below their productive potential and only a limited proportion of members' forest products need come from community forests. There is a dearth of studies on the issue of equity in community forestry (Chhetri and Nurse, 1992). Hence, this research is expected to shed light on the distributional dimension of community forestry.

This controversy regarding community forestry's role as a viable strategy for development necessitates a serious research work as the outcome can give significant policy feedback. For this purpose, the present research exclusively focuses on the issues by keeping a track on sharing of benefits from community forests by wealth and caste. The benefit is quantified in terms of forest products being distributed within the FUGs. Thus, it helps in getting an insight on the issue of discrimination in community forestry against the people of lower caste and economically disadvantaged group. A limitation of this research is the issue regarding the exclusion of lower caste and economically disadvantaged people in the formation process itself.

The issue of equal distribution of forest products is an important aspect in community forestry. The use-pattern of forest products from the community forests is perceived by comparing with private sources, depending on average landholding, availability of trees on private land and other factors (Chhetri and Nurse, 1992). In this chapter, the use-pattern of forest products is analysed by using various statistical tools: Chi-square test, multiple regression and Pearson's correlation matrix etc. The relationship between utilisation of forest products and wealth-rank is depicted for getting insights into prevailing uses.

5.2 Results and Discussion

The pattern of distribution of forest products by wealth and caste in the research sites of Kabhrepalanchok and Lalitpur Districts are studied. Kabrepalanchok research site includes fifty households while Lalitpur comprises forty-two households. The findings are summarised in Table 5.1. The number of households belonging to each of the wealth and caste categories is given in the parenthesis. On average, poor households in Lalitpur District use more firewood than their rich neighbours while at Kabhrepalanchok there is no such distinct manifestation. In contrast to Kabhrepalanchok, the lower caste households of Lalitpur research site use more firewood than their higher caste neighbours. Average utilisation of grass by poor and lower caste households in Lalitpur, is also comparatively higher than the rich and higher caste households. While Kabhrepalanchok research fails to reveal any such differences. The lower caste households use more leaf-litters than the higher caste in Lalitpur while such differences neither exist by wealth nor by caste in the research sites of Kabhrepalanchok District.

Table 5.1

Statistics regarding the use of forest products from the community forests by wealth and caste (all except timber in bhari[1] while the number of households is in parenthesis)

Households		Kabhrepalanchok				Lalitpur			
		Rich (15)	**Poor (35)**	**Higher (43)**	**Lower (7)**	**Rich (21)**	**Poor (21)**	**Higher (16)**	**Lower (26)**
Total amount of forest product used	Firewood	344.0	806.0	1022.0	128.0	182.0	521.0	51.0	652.0
	Timber (cft)					362.0*	304.0	162.0*	504.0
	Grasses	304.0	627.0	817.0	135.0	356.0*	725.0	188.0	893.0*
	Leaf-litters	445.0	1213.0	1368.0	290.0	483.0	566.0	255.0	794.0
Average amount of forest products	Firewood	22.9	23.0	23.8	18.3	8.7	24.8	3.2	25.1
	Timber (cft)					18.1	14.5	10.8	19.4
	Grasses	20.3	17.9	19.0	19.3	17.8	34.5	11.8	35.7
	Leaf-litters	29.7	34.7	31.8	41.4	23.0	27.0	15.9	30.5
Variances	Firewood	445.6	547.4	528.4	412.6	152.6	676.7	81.2	534.3
	Timber (cft)					189.0	144.8	242.5	101.1
	Grasses	567.4	362.3	445.8	389.6	537.5	2029.4	431.3	1733.0
	Leaf-litters	182.0	256.4	179.4	572.6	835.7	880.3	427.4	1038.5

Source: Sharma (2003).

*: One household missing

1: bhari is a backload. The estimated mean weight for one bhari firewood = 34.5 kg, and for grass and leaf-litter is about 20 kg.

The research outcome focuses on the discrepancies in distribution of forest products from wealth and caste perspectives. The main results of the research (based on Lalitpur site) are: 1. Firewood, grasses and leaf-litters are important forest products for subsistence uses. However, due to the lack of complementary resources, the poorest of the poor uses lesser quantities of grasses and leaf-litters. 2. There is no significant

difference between the rich and the poor regarding use of forest products 3. The Pahari households use significantly more forest products than the rest households except for the leaf-litter. 4. Multiple regression fails to explain variations regarding use of forest products by wealth-rank. Hence, either the relations are not linear or another factor e.g., caste-structure is more important.

Kumariban community forest in Badikhel plays a laudable role in supplying the local demand of forest products. The total demand is calculated on the basis of per capita consumption while the supply amount is obtained from the survey. The findings on demand and supply situation are summarised in Table 5.2. Twenty-eight percent of the households are using Kerosene as the main domestic fuel hence they are excluded from the annual firewood consumption list. Kumariban community forest supplies seventy percent of the firewood demand and the rest is met either through agriculture substitutes, private trees or near by government forest. This figure is relatively higher than the national estimate. Based on the NLSS II data it is estimated that only 30.6 percent of the households collect firewood from the community forests (see Annex 5A). About ninety-eight percent of the timber demand is fulfilled from the community forest. Only sixty-two percent of annual demand for grass is fulfilled from Kumariban community forest and the rest is collected from the farm land (calculated from Table 5.2).

Table 5.2

The demand and supply situations of forest products from Kumariban community forest based on forty-two household surveyed

Forest products	Demand of forest products	Supply from the private farmlands	Amount to be supplied from Kumariban-	Supply from Kumariban-
Firewood (bhari)	2691	1420 - Private trees 262 - Crop residue and cow-dung	1009	703
Timber (cu.ft.)	383	157	226	222
Grasses (bhari)	4981	3251	1730	1081
Leaf-litters (bhari)	-	-	-	1049

Source: Sharma (2000b).

As we all know livestock is an integral component of farming system in rural Nepal. The forest user group prohibited free grazing in Kumariban, abolishing free ride for animal grazing. The grasses from Kumariban are used by all, regardless of wealth and caste and even Chi-square tests fail to show significant difference between the rich and the poor households. However, the poorest of the poor lack livestock resources hence, are deprived of the benefit mainly in terms of fodder and grasses from the community forest. A Cross-tabulation of forest products with wealth and caste with subsequent chi-square tests helped understand significant differences in product use. The findings and the results of the tests are summarised in Table 5.3. The Pahari households significantly differ from Brahmins regarding the uses of grasses from Kumariban community forest.

Table 5.3

Utilisation of forest products from Kumariban community forest by wealth and caste (Pearson's chi-square value within parenthesis)

Variables	Forest products from Kumariban community forest										
	Firewood (bhari)		Timber (cu.ft.)		Grasses (bhari) no yes				Leaf-litters (bhari)		
	<10	>10	<15	>15	missing	<36	>36 missing		no	yes	
	Wealth class				*% of households*						
Rich	33.3	16.7	16.7	30.9	2.4	21.4	19.1	7.1	2.4	16.7	33.3
Poor	21.4	28.6	23.8	26.2	-	21.4	11.9	16.7	-	19.0	31.0
	(2.403)		(0.672)			(2.269)				(0.104)	
Caste Brahmin	31.6	2.6	26.2	11.9	2.4	21.1	13.1			19.0	21.5
Pahari	21.1	44.7	14.3	45.2		18.4	44.8		2.6	16.6	42.9
	(12.477)***		(8.050)**			(3.666)*				(1.601)	

Source: Sharma (2000b).

Significance levels * <0.05 ** <0.01 *** <0.001

A large amount of manure is applied on the infertile and sloping lands in the research site of Lalitpur District. Even, the pine needles are used along with cow-dung for preparing the compost manure that is applied in the agriculture land. Thus, gathering of leaf litters is an important farming activity pursued by most of the households. However, one third

of the surveyed households, some of them the poorest, are not collecting the leaf litters as they owned no or very little land. The tradition of using leaf litters is common among Paharis than the rests, may be due to their close cultural resemblance with the low-caste farming community of Newar. But there is no significant difference between Paharis and the rests regarding the use of leaf litters from Kumariban community forest. Similarly, the use of leaf litters does not differ by wealth class as summarised in Table 5.3.

The information, on utilisation of forest products, is obtained by interviewing the collectors, mainly women, who are primarily responsible for gathering such products. The finding is summarised in Table 5.4. The one-third poorest households consume half of the firewood gathered from the community forest whereas the share of the richest households is less than one-tenth. The timber distribution is regulated by the FUG committee, with a limit of 25 cubic feet per household. Even, such a regulated timber distribution by the Committee by fixing a limit for timber distribution fails to ensure equity (on average the poor households take less timber than the other households do) because the poorest households are taking only a part of their quota. However, one-third poorest households obtain only 30 percent of the timber availed that too, only by the Pahari households. The reason for this is that some of the poorest households are taking only a part of their quota. One-third poorest households gather nearly half of the grasses from Kumariban community forest.

Table 5.4

Average utilisation of forest products (per household) from Kumariban community forest by wealth and caste

Wealth class	Forest Products (all except timber: in bhari[1])			
	Firewood	Timber[2] (cu.ft)	Grasses	Leaf litters
1/3 rd poorest				
Brahmin	4.0	0.0	11.0	22.5
Pahari	31.9	20.0	49.0	31.4
Others	25.0	0.0	0.0	0.0
1/3 rd average				
Brahmin	0.33	4.0	0.0	11.7
Pahari	21.0	20.8	31.4	36.2
1/3 rd richest				
Brahmin	5.0	12.5	14.8	15.4
Pahari	13.5	18.8	14.5	20.5
Others	0.0	25.0	24.0	26.0
Average for all Households	16.7	15.9	25.7	25.0

Source: Sharma (2000b).

1- bhari is a back-load. The estimated mean weight for firewood = 34.5 kg, for grasses and litters = about 20 kg.

2- timber is distributed in large quantities, only once in 1994.

The richest households gather comparatively less leaf-litters and grasses than their poor neighbours do. May be because they have ample land resource from where they can collect grasses easily and conveniently. The Chi-square tests on the utilisation of forest products, by wealth and caste shows that the rich households do not differ from the poor regarding consumption of firewood for cooking. However, Brahmins households are using significantly less firewood than the Paharis or vice versa. Similarly, the rich

households are not different significantly from their poor neighbours regarding the use of timber and grasses. But Paharis differ significantly from the rests regarding timber-utilisation. In comparison to Brahmin households, the Pahari households gather significantly larger quantities of grasses. However, the gathering of leaf-litters neither differ significantly by wealth and nor by the caste in the research site.

Lalitpur research also reveals that timber is an important product of Kumariban community forest but still one-third of the sampled households do not bring it from the community forest. More than a half of those not using timber from Kumariban community forest are poor households. This figure at *prima facie* may give the impression that poor households prefer to use low value products than the high value ones. This is again justified by the figure regarding the distribution of timber (the forest user group makes a decision, in 1994, to distribute a maximum of 25 cubic feet of timber per household at a much subsidised rate). However, on average the rich households get more timber as compared to the poor (see Table 5.4). Subsequent Chi-square tests on the difference between the rich and the poor households, regarding timber-use, fails to show any statistical significance. However, there is a relationship between the caste and timber-use, as Paharis are found using significantly more timber than the rests households do (see Table 5.3).

Lalitpur research reveals that firewood is used by all, regardless of wealth and caste, however, one-third of surveyed households, mostly Brahmins, did not bring even a single bhari of firewood from Kumariban community forest. Therefore, a logical assumption: the affluent households might have substituted firewood for kerosene as domestic fuel, is also supported by an inverse-relationship between firewood-consumption and wealth rank (see Table 5.7). The increased ownership of private trees along with substitution-effect could be the reason for diminishing trend of firewood-consumption among the richer group. However, field-data on domestic fuel fails to manifest any significant difference between the rich and the poor households and also between Brahmin and Pahari, proving the use of firewood as domestic fuel even by the affluent households. Hence, substitution-effect may not be the sole reason for diminishing trend of firewood-use, from Kumariban community forest, by the rich households. Among one-third

households, using kerosene as domestic fuel, about sixty percent are rich and the rests are poor. Some of the orthodox Brahmins regard kerosene as impure and have taboo against eating the cereals cooked on it or they are simply preferring to eat firewood cooked food. The use of firewood, from Kumariban community forest, is not different significantly in Chi-square tests by wealth class. The figure pinpoints that the rich households are not using firewood, alone, is not sufficient to prove statistically the difference in firewood consumption. However, there is significant difference between Brahmin and Pahari in the consumption of firewood (see Table 5.3). More than ninety percent of Brahmins either do not gather or gather only up to ten bhari of firewood from Kumariban community forest. Where as nearly seventy percent of Pahari households gather more than ten bhari of firewood. Some households, mostly Brahmins, acknowledge the use of sawdust and husk to reduce the consumption of firewood.

In contrast to the preferential forest products by wealth class due to the difference in the opportunity cost of gathering time as observed by Jodha (1986), the findings of this research suggest "preference for forest products is independent of wealth and caste" (Table 5.5). One possible explanation is that the opportunity cost of time of women, mainly responsible for the gatherings, remains the same regardless of wealth and caste. Hence, the return unattractive to the rich-men can still be attractive to the women as the latter are mostly involved in the gathering of the forest products in the community forests.

Table 5.5

Preference of forest products by wealth and caste in Kumariban (Pearson's chi-square value within the parenthesis).

Forest product type	Wealth class		Caste	
	Rich	Poor	Brahmin	Pahari
	% of households			
Low value product[1]	26.2	21.4	19.0	28.6
High value product[2]	21.4	23.8	19.0	26.2
Missing	2.4	4.8	2.4	4.8
	(0.227)		(0.018)	

Source: Sharma (2000b).

1: leaf-litters, grasses and firewood

2: timber

The relationship between the use of forest products by wealth-rank is subjected to multiple regression. However, the regression fails to explain the variations observed. The relationship between the use of forest products by wealth rank is presented in Table 5.6. However, the regression fails to explain even fourteen percent of the variations observed. There could be two eminent reasons: either all the relationships are not linear or the factor e.g., caste structure is more important, as the use of leaf-litters can also be culturally determined.

Table 5.6

Multiple regression of wealth rank and utilisation of forest products from Kumariban community forest

		Predictor variables			
		Firewood	Timber	Grasses	Leaf litters
Wealth rank Constant/ Coefficients	49.625	0.395	0.317	0.300	0.200
T-value	6.229***	-2.384*	1.756	-1.042	0.712
R^2	0.220				
Adjusted R^2	0.131				
F-ratio	2.468				

Source: Sharma (2000b).

Significance level *<0.05 **<0.01 ***<0.001

Hence, other factors e.g., incomes, caste, farm-size, household-size are also included in the regression. The result as is presented in Table 5.7, shows that the caste significantly explains utilisation of forest products from Kumariban community forest. However, non-of these relations explained more than thirty percent of variations. Furthermore, correlation matrix is used to explore the relationship between use of forest products and wealth rank and its outcome is presented in Table 5.8. The matrix gives an insight into use-pattern and relations among the products gathered from Kumariban community forest. The only significant relationship between wealth rank and use of forest products is for firewood, reinforcing earlier contextual findings. Firewood-use is positively and significantly correlated with the use of timber and grasses from Kumariban community forest but not with that of leaf litters.

Table 5.7

Multiple regression of income, caste, farm-size, and household size etc., on the utilisation of forest products from Kumariban community forest

Predictor variables	Dependent variables			
	Firewood	Timber	Grasses	Leaf-litters
Income	(0.303)	(1.566)	(-0.030)	(-0.736)
Caste	(-2.574)*	(-4.082)***	(-2.631)**	(-2.882)**
Farm-size	(-0.549)	(1.488)	(1.747)	(3.205)**
Household size	(1.565)	(0.119)	(-1.217)	(-0.869)
Constant	(8.202)	(10.289)	(42.778)	(31.775)
t-value	(0.886)	(2.020)*	(2.707)**	(2.606)**
R^2	(0.233)	(0.375)	(0.204)	(0.296)
Adjusted R^2	(0.148)	(0.303)	(0.113)	(0.218)
F-ratio	(2.738)*	(5.241)**	(2.244)	(3.792)**

Source: Sharma (2000b).

Significance level *<0.05 **<0.01 ***<0.001

Table 5.8

Pearson's correlation matrix between the wealth rank and the utilisation of various forest products from Kumariban community forest

	Wealth rank	Firewood	Timber	Grasses	Leaf-litters
Wealth rank		-0.361*	0.136	-0.119	0.002
Firewood	-0.361*		0.318*	0.353*	0.234
Timber	0.136	0.318*		0.505***	0.483***
Grasses	-0.119	0.353*	0.505***		0.835***
Leaf-litters	0.002	0.234	0.483***	0.835***	

Source: Sharma (2000b).

Significance level * <0.05 **<0.01 ***<0.001

The utilisation of timber is unrelated with the wealth rank but is positively correlated with the use of grasses. Hence, timber users are also the collectors of grasses and leaf litters or the other-way round. Most of the users gather firewood, simultaneously, with grasses and for that reason, a significant positive correlation has been observed. Both of the products, being of temporary nature, are required on regular basis. The gathering of leaf litters, however, is not significantly correlated with firewood, as the process is highly seasonal.

The results of ANOVA for the utilisation of forest products in Lalitpur and Kabhrepalanchok are presented in Table 5.9 and 5.10 respectively. Table 5.9 shows that variations in the distribution of forest products are manifested in terms of caste than the wealth class. While ANOVA on the distribution of forest products by wealth is significant only in case of firewood. This variation in firewood distribution is still significant while considering all together as a group. However, Table 5.10 fails to reveal any significant variations in the distribution of forest products by wealth and caste.

Table 5.9

Analysis of variances (ANOVA) for the utilisation of forest products from the community forest in Lalitpur

Forest Product	Sources of variation	SS	MS	F	p value
1. *Considering all groups together (α=0.05, df=3, 80 F critical=2.72)*					
Firewood	Between group	7482	2494	6.4	**0.001**
	Within group	31162	390		
Timber	Between group	836	279	1.75	0.164
	Within group	12408	159		
Grasses	Between group	8471	2824	2.23	**0.092**
	Within group	98861	1267		
Leaf-litters	Between group	2276	759	0.91	0.44
	Within group	66694	834		
2. *Poor - Rich as groups (α=0.05, df=1, 40 F critical=4.09*)					
Firewood	Between group	2736	2736	6.6	**0.014**
	Within group	16586	415		
Timber	Between group	135	135	0.81	0.374
	Within group	6487	166		
Grasses	Between group	2865	2865	2.2	0.146
	Within group	50800	1303		
Leaf-litters	Between group	164	164	0.19	0.664
	Within group	34321	858		
3. *Lower and higher caste as groups (α=0.05, df=1, 40 F critical=4.09)*					
Firewood	Between group	4746	4746	13.02	**0.001**
	Within group	14576	364		
Timber	Between group	701	701	4.62	**0.038**
	Within group	5921	152		
Grasses	Between group	5606	5606	4.55	**0.039**
	Within group	48060	1232		
Leaf-litters	Between group	2112	2112	2.61	0.114
	Within group	32373	809		

Source: Sharma (2003).

Table 5.10

Analysis of variances (ANOVA) for the utilisation of forest products from the community forests in Kabhrepalanchok

Forest Product	Sources of variation	SS	MS	F	p value
1. *Considering all groups together (α=0.05, df=3, 96 F critical=2.70)*					
Firewood	Between group	181	60	0.12	0.950
	Within group	49519	516		
Grasses	Between group	63	21	0.05	0.986
	Within group	41449	432		
Leaf-litters	Between group	818	273	1.18	0.323
	Within group	22235	232		
2. *Poor - Rich as groups (α=0.05, df=1, 48 F critical=4.04)*					
Firewood	Between group	0.01	0.01	0.0002	0.986
	Within group	24850	518		
Grasses	Between group	58	58	0.14	0.713
	Within group	20388	425		
Leaf-litters	Between group	262	262	1.11	0.296
	Within group	11265	235		
3. *Lower and higher caste as groups (α=0.05, df=1, 48 F critical=4.04)*					
Firewood	Between group	181	181	0.35	0.556
	Within group	24669	514		
Grasses	Between group	0.5	0.5	0.001	0.973
	Within group	21061	439		
Leaf-litters	Between group	557	557	2.44	0.125
	Within group	10970	229		

Source: Sharma (2003)

CHAPTER 6

IMPACT OF COMMUNITY FORESTRY ON HOUSEHOLD INCOME AND INCOME DISTRIBUTION

6.1 Impact of Community Forestry

6.1.1 Impact on Household Income

The analysis of household income is done by using 1998 datasets obtained for Kumariban Community Forest User Group, Badikhel, Lalitpur. The analysis shows the following pattern of income distribution. Out of 42 households, 21 households (50 percent) have total annual income below NRs 50,000. Their share in total income is 30.3 percent. Nearly 40 percent of the households have income in the range of NRs 50,000 to 100,000. This group has the highest share (47.6 percent) in the total income. About 7 percent of the household fall under the income range of NRs 100,000 to 150,000 and this group's share in the total income is 14.7 percent. Only one household has annual income in excess to NRs 150,000 and the households share in the total income is 7.3 percent. The Gini coefficient of income distribution is 0.242 which suggests that there is not much inequality in the distribution of income (Table 6.1). The different sources of monthly income of households in Badikhel are given in Annex 6A.

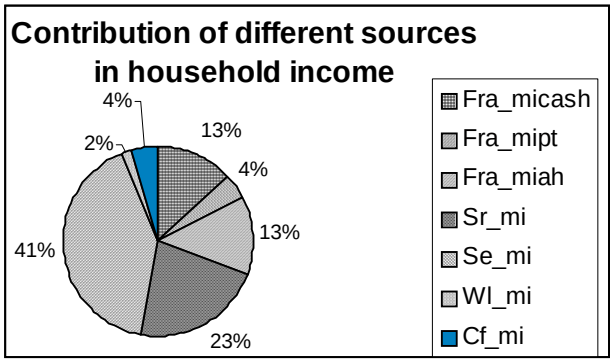
Table 6.1

Household income by income group in Kumariban, Badikhel, Lalitpur

Income group (NRs)	% of total Income	% of total Household
Up to 50,000	30.3	50.0
50,000.01-1,00,000	47.6	40.5
1,00,000.01-150,000	14.7	7.1
>150,000.01	7.3	2.4
Total	100.0	100.0
Gini coefficient		0.242

Figure 6.1

Contribution of different sources of income in total household income in the research area (Kumariban)



Various sources of income contribute in total household income (Figure 6.1). The highest contribution is from self employment that constitutes 41 percent of the total household income. Salary and benefits contribute to 23 percent of the income while income from animal husbandry and cereal crops both contribute 13 percent of the income. Income from private trees and from the forest products of community forest contributes to about 4 percent of the household income. Wage income constitutes only 2 percent of the total household income. The contribution of sources of income in total household income varies among the income brackets. The share of different sources of in household income by income group is given in Table 6.2. In the lowest income group (<NRs 50,000), the highest share of income accrues from self employment is 49 percent while private trees income constitutes the lowest share of 3 percent. Among the middle income group (NRs 50,000.01-100,000) the self employment constitutes 45 percent of the household income while wage income constitutes only 1 percent of the household income. The high income group (NRs 100,000.01 to 150,000) also gets the major share of their income (30 percent) from self employment while the income from private trees and community forest both constitute 3 percent of the income. The highest income group (>NRs 150,000) gets 64 percent of their household income from salary while private trees income constitutes 4 percent of the household income.

Table 6.2

Share of different sources of household income by income group

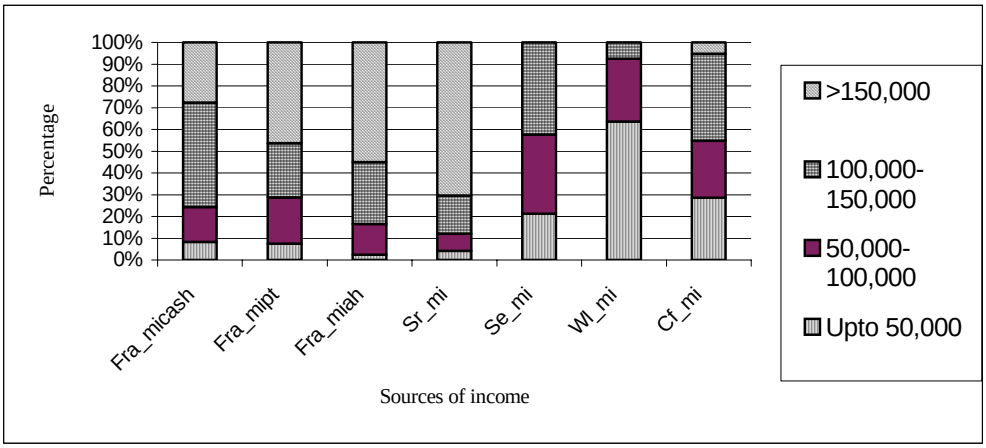
Income Group	Sources of Income						
	Cereal crop	**Private trees**	**Animal husbandry**	**Salary**	**Self employment**	**Wage income**	**Community forest**
Lowest (< NRs 50,000)	12	3	5	19	49	5	7
Middle (NRs 50,000.01–100,000)	12	5	16	18	45	1	3
High (NRs 100,000.01–150,000)	21	3	19	24	30	-	3
Highest (> NRs 150,000)	8	4	24	64	-	-	-
All	**13**	**4**	**13**	**23**	**41**	**2**	**4**

The households in the lower income group (<NRs50,000) rely mainly on off-farm income (self employment and wage income) for subsistence living. The households having annual income in excess to NRs 50,000 have diverse sources of income, with main source being salary and benefits (Sr_mi) from the formal sector employment (Figure 6.2). The percentage contribution of different sources of income in household income is given in Table 6.4. The households having annual income up to NRs 50,000 mainly depend on self-employment (Se_mi) and have different sources of income. It can be their strategy to diversify the sources of income. The farm income (Fra_micash+Fra_miah+Fra_mipt) contributed less than 15 percent in the monthly income of the lowest income bracket. For the highest income bracket, salary and benefits (Sr_mi) and income from animal husbandry (Fra_miah) constituted the major share of the income. The income from the private trees contributes mainly to the highest (>NRs150,000) and middle income (NRs 100,000.01-150,000) group. Similarly animal husbandry (Fra_miah) also contributes mainly to the highest and middle-income group of households. About 48 percent of the cereal crops (Fra_micash) income accrues to the middle income group while only 8 percent of it trickles down to the lowest income group. Similarly 46 percent of the income from private trees (Fra_mipt) goes to the highest income group while only 7 percent of it goes to lowest income (<NRs 50,000)

group. The highest income group captures approximately 70 percent of the income from salary and benefits (Sr_mi) and less than 4 percent is left for the lowest income group. Nearly 42 percent of the income from self employment (Se_mi) goes to the middle income group whereas 64 percent of the wage income (Wl_mi) is captured by the lowest income group. The income from community forest products (Cf_mi) accrues least to the highest income bracket while for other groups it is distributed fairly.

Figure 6.2

Income accrued to different income groups from various sources of income.



Income from the cereal crops (*Fra_micash*), private trees (*Fra_mipt*), animal husbandry (*Fra_miah*) and Salary (*Sr_mi*) are pocketed mainly by the higher (>NRs100,000) income groups. The income from self employment (*Se_mi*) accrues mainly to lower and middle income groups (NRs 50,000.01-150,000). The income from wage employment (*WI_mi*) and community forest products (*Cf_mi*) accrues mainly to lowest and middle income groups (< NRs 100,000)

Table 6.3

Average monthly income from various sources by income group

Income group (NRs)	Cereal crops (Fra_micash)	Private trees (Fra_mipt)	Animal husbandry (Fra_miah)	Salary and benefits (Sr_mi)	Self employment (Se_mi)	Wage income (Wl_mi)	Community forest products (Cf_mi)
Up to 50,000	384.91	102.82	161.91	600.00	1592.10	149.68	228.95
50,000.01-100,000	726.94	294.56	961.69	1112.5	2717.19	68	210.63
100,000.01-150,000	2196.67	344.33	1944.33	2500	3166.67	17.67	319.33
>150,000	1267	642	3750	10000	0	0	42

Source: Kumariban database

Table 6.4

Percentage contribution of different sources in monthly income by income group

Income group	**Fra_micash**	**Fra_mipt**	**Fra_miah**	**Sr_mi**	**Se_mi**	**Wl_mi**	**Cf_mi**
Up to 50,000	8.41	7.43	2.37	4.22	21.30	63.60	28.59
50,000.01-100,000	15.89	21.29	14.11	7.83	36.35	28.89	26.30
100,000.01-150,000	48.01	24.88	28.52	17.59	42.36	7.51	39.87
>150,000.01	27.69	46.40	55.00	70.36	0.00	0.00	5.24
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Almost 70% of the salary income (*Sr_mi*) is captured by the highest income group. The household income from community forestry products (*Cf_mi*), mainly in the form of subsistence use, trickles mainly to the lower and middle income group. Self-employment (*Se_mi*) mainly through *Betbans* (Bamboo-Saddler work) is the main stake of economy for the lower and middle income group. They have inherited a typical skill of weaving bamboo (*Dendrocalamus strictus*) and Nigalo (*Arundinaria intermedia*), yielding a substantial part of their loaf. A significant portion (more than 20 percent) of the income from the self employment goes to the lowest income group through *Betbans* works. Therefore it is also the survival strategy for the lowest income group

Table 6.5

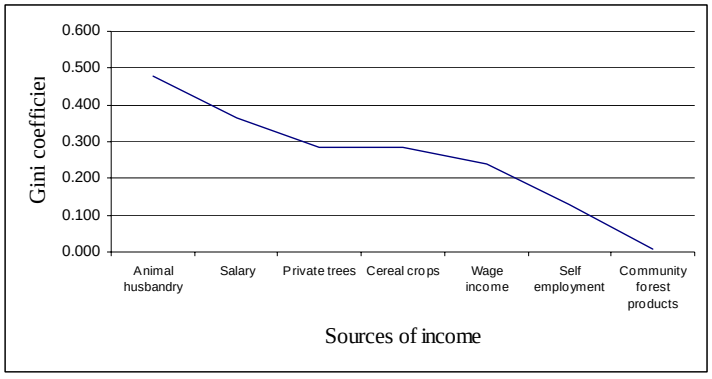
Gini coefficients for various sources of income

Income source	Gini coefficient
Animal husbandry	0.480
Salary	0.365
Private trees	0.287
Cereal crops	0.286
Wage income	0.238
Self employment	0.128
Community forest products	0.007

Source: Author's computation from Kumariban database.

Figure 6.3

Gini coefficients for different sources of income



Gini coefficients from different sources of income are calculated in a bid to understand the effect of various sources of income. The result is summarized in Table 6.5 (The details of the calculation are given in the Annex 6H). Figure 6.3 presents the same result for the sake of convenience. Income from animal husbandry, and salary and benefits has a disequalising effect while wage income, self employment and income from community

forest products[1] have equalizing effects on income distribution. Moreover, the incomes from cereal crops and private trees have no significant effect on income distribution.

Monthly income: The total monthly income of more than 60 percent of the households under lowest income group, is less than NRs 3000 while 40 percent of them manage to get a monthly income in excess of this amount. This seemingly substantial income of these households accrue through *Batbans* works, requiring investment in terms of material and labor. It substantially reduces their net monthly income.

Three fourth of the households under high income group (>NRs 100,000) have a monthly income in excess to NRs 10,000. This disparity in monthly income is also manifested among the castes, nearly 23 percent of the Brahmin households are included in high income group (>NRs 100,000) while non of the Pahari households fall under the group.

Income disparity: The disparity in land ownership, especially of *Khet*, influences the farm income accrued through the cereals. This disparity is clearly visible from the figures on household income provided in Tables 6.3 and 6.4. The households under lowest income bracket (<NRs 50,000) get only about 8 percent where as the households under higher income group (>NRs 100,000) share nearly 76 percent of the total income from the cereals. The Pahari households hardly get 34 percent of total income from the cereals. On the other hand, Brahmin households nearly get half of the total income from the cereals. However, the poorest households have a more justifiable share on self-employment as they get nearly 21 percent of the total income. The Pahari households with an inherited skill of *Betbans* work capture nearly 80 percent of the income from self-employment. The *Betbans* work invariably involves direct material costs so the income from self-employment is obviously overestimated. The households under higher income group (>NRs 100,000) also reap 84 percent of the income from animal husbandry. Nearly 88 percent of the salary and benefits income are captured by the

[1] The valuation of forest products such as timber and firewood were valued by prevailing local market price however the valuation of grass and leaf-litter posed difficulty. So using willingness to accept form of valuation method, women, the main collectors were asked "how much money would they expect for a bhari of grass or leaf litter from a hypothetical buyer who is in a genuine need for such products?" An alternative attempt of valuation of a bhari of leaf litter was done, by using additional investment on chemical fertiliser.

higher income group, which does not incur any immediate investment. The salary and benefits accrue mainly from formal sector employment. The various sources of income and their contribution in total household income of different income groups is summarized in Table 6.4.

Community Forestry: a new lease towards equality: The households under lowest income group are not the laggards in harnessing community forest products. Community forestry income though constitutes only about 4 percent of the total, trickles equally to all households. The households under lowest income group (<NRs 50,000) nearly capture 29 percent of the income from the community forest while the households under higher income group (>NRs 100,000) get 40 percent while the highest income group (>NRs 150,000) are confined to 5 percent. The chi-tests on community forestry income, however, do not show any significant difference between the rich and the poor households. Nevertheless, the Pahari households differ significantly from the rest regarding community forestry income as 78 percent of the income goes to them. The various sources of off-farm income along with the annual income by caste and wealth class are given in Table 6.6. This Table besides showing the difference between Pahari and Non Pahari[2] regarding self-employment, also suggests that Pahari differs from the rest regarding the income from salary and benefits. The Non Pahari also differ from the Pahari households regarding the wage income. Furthermore, the poor households[3] significantly get less annual income than the rich households. Nevertheless, Pahari households differ from the rest regarding income from community forest products, as they get more than the rest households do.

6.1.2 Impact on Income Distribution

The community forestry provides an additional opportunity for those households, with limited income opportunities, to diversify the sources of income. Community forestry contributes about 7 percent in the total household income (it includes wage income and income from forest products). On average a household gets an additional income of NRs

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[2] The term refers to households other than Pahari, besides Brahmins the group also includes a Chaudhari, a Nepali and a Khatry households.

[3] The households are categorized into two groups: rich and poor households based on wealth ranking. Interested readers can refer Sharma and Filius (1999) for details.

3955 due to community forestry. The resulting Gini Coefficient under both circumstances (with and without community forestry income) is given in Table 6.7. The result shows significant reduction of inequality with the inclusion of community forestry income. Gini coefficient calculated by including community forestry income is 0.242 while excluding community forestry income is 0.265. (Please refer Annex 6B for details regarding calculation of Gini coefficients.) But how big is this difference of 0.025 in Gini coefficient? Is a logical question. According to Adelman and Robinson (1978, p. 194), “the bottom decile's income is higher by 15 percent or more; the percentage of households in poverty is more than 3 percentage points lower; the Gini coefficient is more than .022 lower". But in our case, this lowering in Gini coefficient is accompanied by almost 13.7 percent rise in the household income of the lowest income group (<NRs 50,000), similarly there is 4.8 percent rise in the income of middle income group (NRs 50,000– 100,000) while the high income group (NRs 100,000 – 150,000) has 3.3 percent rise in income and the highest income group (>NRs 150,000) has merely 0.3 percent rise in annual income. Put differently, when the households are categorised into three groups, the poorest, average and the richest then the calculated Gini coefficient under with community forestry situation is 0.237 while without community forestry situation is 0.259. A difference of .023 in Gini coefficient has occurred due to community forestry. This means that the annual income of the one-third poorest households has increased by 18.3 percent while for the average group the increase is 6.9 percent. The richest group has only 3.5 percent increase in their annual income due to community forestry. The percentage of households under poverty (poverty line NRs 78,300) is nearly 4.8 percentage point lower. For details of the calculation of Gini coefficient refer to Annex 6I.

But any reliance on a single tool to determine the impact of community forestry on income distribution can be erroneous and premature. For that reason, besides Gini coefficient another tool (income variance method, IVM) is also applied to assess the impact. Since income variance method is a F-test based tool, it is felt necessary to carryout Bartlett’s test to find out its applicability in the present research. The test result shows that the variance of different groups of the population is not homogeneous, implying that IVM may not be a suitable tool in the present case. Nonetheless, the result of IVM shows that the income from community forestry reduces both within and

between group inequality hence total inequality is reduced (see Annex 6D and 6E for details).

A study has been recently carried out to find out who benefits from pro-poor programs of Nepal's community forestry by Pokharel (2007). The study reports that the generated income through community forestry is being invested in different development works. The pro-poor programs receive one-third of the annual investment of the community forestry user groups which indicates a significant increment in the investment. Although the investment in pro-poor programs has increased significantly poor households are not benefiting from it as expected. Non-poor are benefiting more from flow of loan, one major activity of pro-poor programs, suggesting that pro-poor program is not really pro-poor.

Table 6.6

Various sources of off-farm income and annual income by wealth and caste (Pearson's chi-square value within brackets)

Income sources	Wealth class		Caste	
	Rich	Poor	Others (Non Pahari)	Pahari
Self employment	*% of households*			
No	21.4	9.5	26.3	26.3
Yes	-	-	7.9[a]	39.5
If yes:	-	-	(5.78)*	
<NRs 2000	4.8	19.1	-	-
>NRs 2000	23.8	21.4	-	-
	(5.58)			
Salary and benefits				
No	23.8	38.1	9.5	52.4
Yes	26.2	11.9	31	7.1
	(3.01)		(17.83)***	
Community forest product				
<NRs 100	11.9	14.3	23.8	14.3
NRs 100-300	19	19.1	11.9	14.2
>NRs 300	19.1	16.6	4.8	31
	(0.16)		(7.92)*	
Wage income				
No	31	19	28.6	23.8
Yes	19	31	7.1	40.5
	(2.38)		(7.14)**	
Annual income				
<NRs 50,000	7.1	42.9	14.3	35.7
>NRs 50,000	42.9	7.1	26.2	23.8
	(21.43)***		(2.47)	

Significance levels *<0.05 **<0.01 ***<0.001 [a] Brahmins generally do not undertake *Betbans* work, this income has accrued through shops, nursery enterprise and a flour mill operated by the Brahmins.

Table 6.7

A comparison of Gini coefficient with and without community forestry income situation[4]

With Community Forestry income			Without Community Forestry income	
Income group	**% of Income**	**% of Households**	**% of Income**	**% of Households**
<NRs 50,000	30.3	50.0	30.5	52.4
NRs 50,000.01 - 100,000	47.6	40.5	46.5	38.1
NRs 100,000.01 - 150,000	14.7	7.1	15.2	7.1
>NRs 150,000.01	7.3	2.4	7.8	2.4
Gini Coefficient		0.242		0.265

Source: Computed from Kumariban database.

6.1.3 Intensive Community Forest Management

One question that may bother policy makers in community forestry relates with the possible impact on income distribution under the intensive management of community forests. For this purpose, we have defined intensive forest management as a condition where the income from forest products and wage income is increased by five folds. The distribution of income under intensive community forest management is given in the Table 6.8.

[4] Household income was disaggregated by source and Gini coefficient was calculated by including and excluding income from community forestry products and one third wage employment assumed to be generated by community forestry. Thus, with and without community forestry income situations were analysed.

Table 6.8

Household income under intensive CF management

Income group	% of Income	% of Households
<NRs 50,000	9.4	19.0
NRs 50,000.01 -1,00,000	53.9	59.5
NRs 1,00,000.01 -150,000	30.8	19.0
>NRs 150,000.01	5.9	2.4
Gini coefficient		0.204

The calculation of Gini coefficient shows that it reduces by 0.038 however, it means that there will be a reduction of poverty by 22 percentage point. The intensive management of the community forest will increase the total income of the FUG member households by almost 26% and the share of community forestry product income and wage income in the total household income also increases. The contribution of community forest product income in total household income increases from 4.4 percent to 17.5 percent while the contribution of wage income increases from 2 percent to 8.2 percent. The contribution of cereal crops in total household income decreases from 13 percent to 10.4 percent and similarly the share of private trees income decreases from 4 percent to 3.2 percent. Similarly, the contribution of animal husbandry decreases from 13.3 percent to 10.6 percent while salary and benefit income decreases from 22.7 percent to 18 percent. Similarly, the contribution of self-employment decreases from 40.4 percent to 32.1 percent in the total household income. A positive impact on income distribution is expected because the contributions from sources of income having disequalising effect on income distribution are decreased while the contribution of income sources having equalising effects on income distribution increase in the total household income.

When intensive community forest management is carried out, the share of the one-third poorest households in the total income increases from 17.9 percent to 19.3 percent and similarly the share of the one-third average households increase from 28.7 percent to 30.2 percent in the total household income. While the share of the one-third richest households decreased from 53.4 percent to 50.5 percent and this is the reason for a more

favourable distribution of income for the poor and average households. The Gini coefficient under normal community forestry situation is 0.237 while under intensive community forestry is 0.208, thus a lowering of Gini coefficient by 0.029 with intensive forest management. The details are given in the Annex 6K.

6.2 Distribution of Per Capita Income and Consumption in Nepal

The nominal per capita income and consumption by quintiles based on Nepal Living Standards Survey is given in Table 6.9.

The Gini coefficients for urban and rural areas for Nepal based on per capita income and consumption estimates are given in Table 6.10. The Gini coefficients are calculated by Kanel's Reduction Method and the details are given in the Annex 6G. The consumption based Gini coefficient is in general larger than the income based ones. The Gini coefficient based on per capita consumption for Nepal is 0.438. The urban areas have higher inequalities than the rural areas. The Terai regions have higher inequalities than the Hills. The Eastern areas of Nepal have higher inequalities than the Western Nepal.

Table 6.9

Nominal per capita income and consumption by quintiles for Nepal

Nominal per capita income by quintile				Nominal per capita consumption by quintile		
Quintile	**Mean income (NRs)**	**Share of income (%)**	**Cumulative share (%)**	**Mean consumption (NRs)**	**Share of consumption (%)**	**Cumulative share (%)**
Poorest (First)	4003	5.3	5.3	4913	6.2	6.2
Second	6727	8.9	14.2	7373	9.3	15.5
Third	9697	12.8	26.9	10073	12.7	28.2
Fourth	14917	19.7	46.6	14657	18.5	46.7
Richest (Fifth)	40486	53.4	100	42236	53.3	100
Nepal	15162	100		15848	100	
Gini coefficient			0.428			0.438

Source: Nepal Living Standards Survey, 2003/04.

6.3 Spearman's Rank Correlation to Validate Wealth Ranking

Wealth ranking is used to determine the economic standings of the households and stratify them into rich and poor groups. The process is used widely to determine the economic standings of the respective households by development partners in Nepal. In this section, we will try to analyze whether the outcome of wealth ranking is similar to the income related information obtained in household survey.

Table 6.10

Gini coefficients of income and consumption for urban and rural areas of Nepal

Regions	Income based	Consumption based
Nepal	0.428	0.438
Kathmandu valley	0.6876	0.7144
Other Urban	0.3268	0.3816
Rural west Hills	0.0176	0.0332
Rural East Hills	0.0904	0.1044
Rural West Terai	0.034	0.0864
Rural East Terai	0.1596	0.1616

Source: Computed from Nepal Living Standards Survey, 2003/04.

For this purpose, we employ Spearman's rank correlation to make a decision on the similarity or dissimilarity in wealth rank and income rank of the surveyed households.

$$\text{Spearman's Rank Correlation, } R = 1 - \frac{6\sum D^2}{N^3 - N}$$

Where,

D= difference in rank between wealth and income

N= number of households surveyed.

Spearman's rank correlation coefficient is 0.7122 which shows that wealth ranking and income ranking is approximately close enough. The details of Spearman's Rank Correlation Coefficient calculation are given in the Annex 6F.

6.4 Poverty Alleviation Through Community Forestry

On the basis of data collected from Kumariban FUG, Lalitpur it is estimated that a total of one million NRs (base year 1998) is required in the FUG to bring all households below the poverty line at the line of poverty. This analysis is based on poverty gap analysis. A poverty line of NRs 78,300 (annual income per household) is selected to compute the poverty gap and squared poverty gap. If such programmes in community forests are to be carryout through out Nepal, an estimated financial resource of NRs 37.72 billion (US$ 503 million) is required. The detail of the calculation is given in the Annex 6L.

The finding of this research is different from Adhikari (2003). Adhikari reports “Poorer households in forest dependent communities obtain much less value from community forests than middle income and rich households. The average ‘poor’ household obtains NRs 7,756 from CF annually while the more ‘rich’ households obtain in average NRs 24,466 per year from community forests. Thus, in terms of absolute contribution to the total household income, community forests contribute more to the less poor households compared to poor.” (Adhikari, 2003, p 32).

CHAPTER 7

IMPACT OF PRIVATE TREES ON INCOME DISTRIBUTION

7.1 Background

It is obvious from the previous chapter on pattern of land distribution that its ownership, despite having some positive changes in recent years, is still highly inequitable in Nepal. This chapter is an attempt to explore type of landholding by wealth class in one of the research sites (Kumariban, Badikhel). The disparity in landholding has also brought differences in private treeholdings in Nepal. In this chapter, there is an attempt to quantify the impact of income from private trees on its socially justifiable distribution. For this purpose, the possession of private trees by wealth class is examined and its contribution to household income and subsequent impact on income distribution is determined.

This chapter also dwells on the existence of a 'new strategy' supposedly adopted by the farmers under the rapid socio-economic transformation of rural societies in Nepal. The term 'new strategy' is used to refer the sets of strategies that the rural farmer pursues to cope with socio-economic changes that occur under marketing influence (as the village economy changes from closed or subsistence economy to open or cash economy). Malla (1993) forecast that the changed economy, under new socio-economic context, will reduce pressure from the community forests in long run. In this chapter, an attempt is made to examine the validity of this forecast especially in the context of Community Forestry in Nepal. In this research, we categorically examine whether the farmers adopt the so-called 'new strategy' and discuss whether such an adoption brings about positive changes in the community forest resources. An insight in this aspect of research gives us an opportunity to better understand the linkages of Community Forestry with improved income distribution. The research uses database of forty-two households of Badikhel Village Development Committee, Lalitpur. The research also sheds light on the existing labour relations prevailing in the research site. It also explores the income source and other factors that determine the purchase of chemical fertilisers because the purchase of it under open economy provides basis for the mentioned changes in resource use-pattern.

This research also highlights whether subsistence oriented community forest policies in Nepal are appropriate or Nepal Government should heed to the changes and accept commercialisation and incorporate this aspect into the existing Community Forestry related policies in Nepal.

This chapter also attempts to reveal the percentage contribution of private trees in total household income. It also categorises land according to different category and find out whether poor households possess any category of land or they are simply landless. In this chapter, it is also explored whether the intensity of land use is different by wealth class and trees in private land have other dimensions such as religion, culture, etc. There is also an attempt to take a stock on any negative impact of tree growing on the income of poor household and if there exists any difference between the rich and poor households regarding the owning of private trees. The average monthly income from private trees for poor and rich households is also determined to understand the contribution of private trees in equalising income distribution. The findings of this chapter are expected to have sobering effect on equity related issues regarding Community Forestry in Nepal. Towards the end of the dissertation recommendations are made regarding private resource endowment in the context of Community Forestry in Nepal.

7.2 Introduction

It is obvious from the previous chapter on pattern of land distribution in Nepal, that despite some improvements in recent years, the distribution is still inequitable. In this Chapter, the type of land owned by wealth class is explored, and its effect on tree-holding and subsequent impact on income distribution is assessed. For the sake of convenience, land is categorised into two types namely: Khet and Pakhabari. The former is an irrigated wetland where rice is cultivated and mainly owned by the rich households while the latter is dry upland, also owned by the poor households. As trees are mostly retained in the latter, poor households are also expected to get some income from the private trees and in this chapter there is an attempt to quantify the impact of income from private trees on its socially justifiable distribution. An income source that has an equalising effect on its distribution is socially justifiable.

It is also argued that the continued emphasis on protection and limited utilisation of community forests for subsistence needs means that only the private tree growers currently benefit from the opportunities provided by the market. As the private trees income is pocketed mostly by the rich households, criticism often goes to the extent that the Forest Department of Nepal Government acts under the influence of rich people who own more private trees. And this discriminatory practice is the cause for subsistence oriented community forest policies in Nepal.

As the agrarian society transforms from closed and subsistence economy to open and liberal economy, the question: 'Can income from private trees help narrow down poor-rich gap?' becomes more important. Hence, in this chapter we attempt to assess the contribution of private trees on household income and the impact of the private resource endowment for a socially justifiable distribution of income.

In this chapter, we basically try to answer the following three main questions:

- Does the poor and rich household significantly differ in private tree-holdings?
- What is the impact of income from private trees on income distribution?
- Does 'new strategy' exist or does a farmer pursue such strategy under changed socio-economic context?

In order to get answers of above questions, the assessment of land ownership and comparison of the practice of maintaining trees in private lands by wealth class becomes imperative. It is also necessary to determine the contribution of income from private trees on household income and income distribution. Moreover, a categorical analysis of the existence of 'new strategy' becomes necessary.

In some literature, it is rosily depicted that the pressure from the community forest may reduce in future as the closed economy transforms into the open one. The reasons for reduction are the farmers' decision to involve themselves in various off-farm cash-earning activities, not to cultivate their marginal lands, to reduce livestock population and adopt stall-feeding, and to grow trees in the private land. Thus while Community

Forestry has subsistence orientation, the rural people have moved away from such an economy. As rural people are interested in income that may be earned through off-farm employment, Community Forestry policies should heed to this change and accept commercialisation (Malla, 1993).

Moreover, it is widely claimed that rural agrarian societies in Nepal are rapidly transforming under emerging marketing influences. Marketing remains as an ignored dimension of Community Forestry in Nepal. Nepal Government is blamed for neglecting the commercial aspects of Community Forestry (Malla and Fisher, 1988). This criticism mainly stems from the argument that the rural people are increasingly engaged in off-farm cash earning activities (APROSC, 1980; Banskota, 1989). Yet, this aspect has not been incorporated in the Community Forestry policies (Malla, 1993). Community Forestry policies focus largely on meeting the rural people's subsistence needs for fodder, firewood, and timber (HMG, 1988; Manandhar, 1980). While the agrarian societies are transforming, despite continued emphasis on agriculture modernisation, farm incomes barely meet the subsistence needs of the rural farmer. Hence, in order to cope with cash scarcity, the farmers pursue new strategies which include:

1) Off-farm employment

2) Leaving marginal land uncultivated

3) Abandoning cultivation of crops that demand high labour inputs

4) Reducing either number or type of animals

5) Growing cash crops to support purchase of fertiliser, and

6) Sending children to school.

Thus marketing influence on community forest resource is expected to result into:

- A reduction in the number of livestock accompanied by a decrease in the demand of fodder and leaf litter.

- An increase in firewood and timber demand due to the increasing number of commercial enterprises using these products.

- Farmers pursue 'new strategy' to cope with increased cash scarcity.

7.3 Results and Discussion

7.3.1 Land Resource

Agriculture is the main stay of village economy in the Hills of Nepal. However, there is meagre land resource. The total land resource owned by the sampled 42 households in Lalitpur District is just 12.45 hectares. Hence an average of 0.3 hectare of landholding per household in the research site. The richest 1/3rd households own 63 percent and 51 percent of Khet and Pakhabari respectively. The remaining 2/3rd of households, comprising of average and poorest, own about 37 and 49 percents of Khet and Pakhabari respectively (Table 7.1). The Gini coefficient of Khet distribution is 0.369 while that of Pakhabari is 0.392. The Gini coefficient for total land ownership is 0.383 (see Table 7.2). Gini coefficient estimate for Khet is lower than Pakhabari because one-third household do not own it. Only 4.7 percent of the households are landless.

Table 7.1

Ownership of irrigated or rain-fed rice field and upland by wealth class in Kumariban, Badikhel, Lalitpur

% of land

Wealth class	Khet	Pakhabari
1/3 rd poorest	13.3	13.1
1/3 rd average	24.0	35.7
1/3 rd richest	62.7	51.2
Total area (hectares)	3.75	8.70

Source: Sharma and Filius (1999).

The inequality in land distribution is noticeable especially in case of Khet as one-third of the sampled households do not own it. Nevertheless, Pakhabari is an important resource that is in possession of all except a few landless households. The ownership of Khet distinguishes the rich and the poor households, and is one of the culturally suitable indicators of wealth. It is a prestige in Nepal to own Khet among the farming

communities and the disparity is more visible by it's ownership. The statistical analysis of this disparity in land ownership is presented in Table 7.3.

Table 7.2

Distribution of land resources (in hectares) in Kumariban, Badikhel, Lalitpur

Khet land			Pakhabari land		Total land	
Land holding group	**Total households**	**Total area**	**Total households**	**Total area**	**Total households**	**Total area**
Up to 0.1 ha	33	1.65	17	1.2	8	0.5
0.1 1ha - 0.2 ha	7	1.25	11	1.9	14	2.6
0.2 1ha - 0.4 ha	1	0.3	10	3.25	11	3.3
0.41 ha - 0.6 ha	1	0.55	3	1.7	5	2.7
>0.61ha	0	0	1	0.65	4	3.35
Total	42	3.75	42	8.7	42	12.45
Gini Coefficient	0.369		0.392		0.383	

Source: Author's computation from Kumariban database.

Table 7.3

Land ownership by wealth class in Kumariban

(Pearson's chi-square value within the parenthesis)

% of households

Land type Khet	Rich	Poor
No	7.1	26.2
Yes	42.9	23.8
	(6.9)**	
Pakhabari		
No	0	7.1
Yes	50	42.9
	(3.231a)	
If yes:		
<0.2 hectare	23.8	45.2
>0.2 hectare	26.2	4.8
	(9.0)**	

Significance levels *< .05 **< .01 ***< . 001 a: 2cells have expected count less than 5 so Fisher's exact test (2-sided significance) =0.232

More than half of the poor households don't own Khet where paddy is cultivated, while 85 percent of the rich households owned it. There is significant difference between the rich and poor households regarding the ownership of Khet in Chi-square tests. However, there is no significant difference between the rich and the poor households regarding the ownership of Pakhabari. Nonetheless, there is significant difference regarding the magnitude of holding (see Table 7.3). But if we compare this with the Gini coefficient, the Gini coefficient value of Pakhabari is less than that of Khet suggesting more inequality in Pakhabari holding. Thus dependency in any single tool alone can be quite misleading.

When we make a comparison between the ownership of land and proportionate differences in income, with less proportionate difference in income than that of the land ownership, one may assume that the land in possession of the poor households are more intensively used than those in rich household's possession. However, Table 7.3, regarding the ownership of Khet, suggests significant difference between the poor and the rich households. As the Khet is intensively used than the Pakhabari for cropping, the above logic, regarding the difference in intensity of land use by wealth class, is not found valid.

7.3.2 Trees in Private Land

The basic statistics related with private trees by wealth class is given in Table 7.4. There is no empirical evidence (not significant in Chi-square test) to suggest that there are more trees in land owned by the rich households, implying lower intensity of cultivation though they own more trees (three times on average) than the poor households (Table 7.4). There is no significant difference between the rich and poor households in number of trees in Pakhabari (Table 7.5).

Trees are mostly grown in the Pakhabari and only a few of them like Handebayer (Zizyphus *incurva*), Bains (Salix spp.) are found in the Khet. Others like Utis (Alnus *nepalensis*) and Lapsi (Choerspondais *axillaris*) are abundant in the Pakhabari. Bamboo is also prominent as it has high demand among the local people. Thus private trees in

farmland, are the significant complementary resources as forest is highly integrated with the farming system in the hilly areas of Nepal.

Table 7.4

Basic statistics of private trees owned by rich and poor households in the research area (Kumariban) in private land

	Households	
	Poor (N =21)	**Rich (N=21)**
Total number	164	583
Per household average	7.8	27.8
Range (Maximum-minimum)	26 – 0	120 - 0
Standard deviation	7.53	32.65

Source: Kanel and Sharma (2003).

Table 7.5

Ownership of private trees by wealth class under different land-types (Pearson's chi-square value within the parenthesis)

% of households

Khet	Rich	Poor
No	38.1	11.1
Yes	4.8	11.9
Missing[1]	7.1	26.2
	(5.19)	
Pakhabari		
<10 trees	21.4	28.6
>10 trees	28.6	19.0
Missing[2]		2.4
	(1.53)	

1 the households that do not own Khet are missing: rich=3, poor=11

2. only one landless household is missing. Actually, three households do not own Bari, however two of them own Pakhabari where trees are grown

a: validation rule requires Fisher's exact test: 2-sided significance = 0.063

The trees that are planted or retained in the farmland depend on type of land owned. Khet is mostly devoid of trees except for those mentioned. There is no preferential difference in trees planted between the rich and the poor households. Among many species of trees in Pakhabari, Choerospondias *axillaries* is the most important, as it directly contributes in cash income.

Retention or growing of trees in Khet or Pakhabari is not significant by wealth class. It may have other dimensions like culture and religion that are beyond the scope of this research. The finding related with private trees under different types of land by wealth class is presented in Table 7.5.

In this chapter, we have not analysed the relationship between intensity of cropping and size of landholding. However it is observed that the intensity of cropping is strongly related with the type of land in possession itself. For example, Khet is intensively used for cropping than the Pakhabari and it subsequently reduces the scope for tree growing. The findings of this research refute earlier statistics on private tree-holdings while a few are plausible outcomes. Non-parametric test for statistical significance shows that tree-holding by wealth class is not significant.

The local people prefer to keep at least a few fruit trees in their courtyard. Those fruit trees in the courtyard are important source of vitamin and nutrients. Choerospondias *axillaris* is regarded as a multi-purpose tree as besides fruit, it is also an important source of timber and fuelwood. A list of some of the most important trees, common in the research site, and their uses is given in the Table 7.6.

Table 7.6

Common private trees in Kumariban, Badikhel, Lalitpur and their uses

Local name	Latin name	Uses
Alubokhra	Prunus *domestica*	edible fruit
Aru	Prunus *persica*	edible fruit
Bains	Salix spp	firewood
Bogate	Maesa *macrophylla*	edible fruit
Haluwabed	Diospyros *virginiana*	edible fruit
Handebayer	Zizyphus *incurva*	firewood
Jyamir	Citrus spp	edible fruit
Lapsi	Choerospondias *axillaris*	edible fruit, timber, firewood
Naspati	Pyrus *communis*	edible fruit
Suntola	Citrus *reticulata*	edible fruit
Utis	Alnus *nepalensis*	firewood, domestic use, timber

Source: Kanel and Sharma (2003).

Except for a few species enlisted in the Nepal Gazette, the trees in private lands belong to the owner. The owner has full right to dispose the trees as per his or her wish in the market. As reported elsewhere, the rich households own more private trees than that of the poor households both on absolute terms and on average. However the range of holding and subsequently the standard deviation of the distribution is also higher than that for the poor household.

7.3.3 Contributions to Household Income

Income from private trees constitutes 4.8 percent of the monthly income of the one-third poorest households. The income is not necessarily in terms of cash but also in terms of subsistence use. The share of private trees in monthly income is highest in case of the average one-third households constituting 5.8 percent of it. The income from private

trees, in absolute terms, is highest for the richest one-third households. However, it constitutes only 3.8 percent of their income. The comparison of household income with and without private trees income is given in Table 7.7. In Table 7.8, average monthly income between the poor and the rich households is compared. The average monthly income from private trees for poor and rich group is NRs 117 and NRs 296 respectively (NRs 75 = US $1 exchange rate of June 7, 2009).

Table 7.7

Income distribution for with and without private tree situations in Kumariban

Income group (NRs)	With private tree		Without private tree	
	total income	total HH	total income	total HH
Up to 50,000	30.3	50.0	30.5	50.0
50,000.01 -1,00,000	47.6	40.5	47.3	40.5
1,00,000.01 -150,000	14.7	7.1	14.8	7.1
>150,000.01	7.3	2.4	7.3	2.4
Total	100.0	100.0	100.0	100.0
Gini coefficient		0.242		0.241

Source: Author's computation from Kumariban database.

Table 7.8

Average monthly household income and contribution from private trees in Nepalese currency (NRs)

Households	Monthly income	
	Private trees	Total
1/3 rd poorest	157	3277
1/3 rd average	235	4049
1/3 rd richest	267	7058

Source: Kanel and Sharma (2003).

7.3.4 Impact on Income Distribution

Private trees give an opportunity for diversifying source of household-income besides providing important source of nutrients for poor women and children. The Gini coefficient of household income with private trees income is 0.242 while that of without private trees income is 0.241. The calculation of Gini coefficient shows 'inequality' slightly increases due to the income from private trees. Hence, increased income from private trees for the time being fails to reduce inequality, diminishing any prospect of increased income from private trees leading to a reduction in inequality. The finding of this research shows "income from private trees has a dis-equalising effect on income distribution".

7.3.5 New Strategy: Myth or Reality

The research site is undergoing a rapid socio-economic transformation due to strong market influence. This means that the farmers of the area should have developed 'new strategy' to cope with the market transformation. However, the following are the major observations that cast doubt over the existence of the 'new strategy':

1) *Off-farm employment*: The out-migration of people, due to the off-farm employment opportunities is rather rare. The distribution of migration by reason of migration is given in Table 7.9. The table shows that family reason, mostly marriage has been the major reason of migration while migration in search for jobs account for less than 7 percent of migration (NLSS II, 2004).

Table 7.9

Distribution of migrant population by reason of migration in Nepal (Percent)

1.	Family reason	75.2
2.	Education/training	2.6
3.	Political reason	0.1
4.	Natural disaster	0.7
5.	Looking for job	6.8
6.	Easier lifestyle	11.6
7.	Other	3.0
8.	Total	100.0

Source: Nepal Living Standards Survey, 2004.

Self-employment through Betbans (Bamboo-saddler) work is pursued also by the male members, and therefore it contributes substantially to the farm-household income. However, it is found that the market alone does not dictate the adoption of such works by the households. The Brahmin households differ significantly from the Paharis in self-employment, mainly in the Betbans works.

2) *Leaving marginal land uncultivated*: The marketing influence should intensify the cultivation resulting into an intensive land use. If population growth is the cause of agricultural change, not the result, then the principle change is the intensification of land use (Boserup, 1965). The intensity of land use diminishes away from a market centre (Hall, 1966). It is observed that the farmers in the research site are practising multiple cropping (maize with Soya bean). They have further intensified land use by planting Chorespondias *axillaris* on field boundary at their Pakhabari. Thus, no any marginal land has been left uncultivated.

Table 7.10

The practice of Parma by wealth and caste in Kumariban

(Pearson chi-square value within brackets)

% of households

Parma	Wealth class		Caste	
	Rich	**Poor**	**Brahmin**	**Pahari**
Yes	31	26.2	14.2	42.9
No	19	23.8	26.3	16.6
	(0.389)		(5.567)*	

Source: Sharma (1999b).

Significance level *<0.05 **<0.01 ***<0.001

Table 7.11

Purchase of chemical fertiliser using various sources of income in Kumariban (Pearson's chi-square value in parenthesis)

Sources of off-farm income									
Self-employment		Salary		Wage income		Forestry income			
<NRs 1000	>NRs 1000	<NRs 1000	>NRs 1000	<NRs 100	>NRs 100	< NRs 100	NRs 100-300	>NRs 300	
Annual purchase	*% of households*								
<NRs 500	23.8	42.9	50.0	16.7	57.1	31.0	21.4	21.4	23.8
>NRs 500	14.3	19.0	16.7	16.6	9.5	2.4	14.3	7.1	12.0
	(0.202)		(2.625)[a]	(0.454)[b]			(0.675)		
	Farm source of income								
	Cereal crops		Tree crops		Animal husbandry				
	<NRs 500	>NRs 500	<NRs 200	>NRs 200	< NRs 100		>NRs 300		
Annual purchase	*% of households*								
<NRs 500	47.6	19.0	45.2	57.1			57.1		9.5
>NRs 500	4.8	28.6	19.1	9.5			14.3		19.1
	(12.218)***		(0.467)				(8.40[c])*		

Source: Sharma (1999b).

a. Fishers exact test; two tailed significance = 0.165; b. Fisher's exact test; two tailed significance = 0.650; c. Fisher's exact test; two tailed significance = 0.009; significance level *<0.05 **<0.01 *** <0.001

3) *Abandoning cultivation of crops that demand high labour inputs*: The practice of voluntary exchange of labour (Parma) is institutionalised in the research site. This practice is similar to a form of work party or *mwethya* reported from Machakos District of Kenya, by which a person is called in neighbourhood to help with a special project, such as building a hut (Mortimore and Tiffin, 1995). These indigenous institutions (Parma, Nogar etc) are as much efficient as the government sponsored co-operatives (Messerschidmt, 1981). Parma and similar arrangement do not incur any direct cash to the employing household. The rich households having substantial cash income are still found abiding by the Parma (see Table 7.10). Furthermore, if an institution like Parma is manifested in an area lying close to the urban locality, the assumption that the farmers are abandoning cultivation of crops that demand high labour input in the wake of labour scarcity, is rather difficult to accept.

Furthermore, cereal crops dominate cropping pattern in Nepal. Paddy, maize, wheat, millet, and legumes are the major crops grown in the country. The proportion of households cultivating main paddy is 76 percent, wheat and maize is 63 percent each and millet 39 percent in the country (NLSS II, 2004). The percentages of agricultural households cultivating selected crops are given in Table 7.12.

Table 7.12

Percentage of households cultivating selected crops in Nepal

Main Paddy	76.1
Wheat	62.6
Maize	63.4
Millet	38.8
Winter potato	50.0

Source: Nepal Living Standards Survey, 2003/04.

4) *Reducing number or type of animal*: A survey, at one of the Village Development Committee (Ghusel) of Laitpur District, regarding rural transformation from a subsistence to cash economy reports on the increased pressure on ecosystem for increased supply of fodder and firewood (Bhatt and Slayter, 1994). However, such a trend does not exist in the research area. Only one household among the

surveyed households is reported raising livestock in larger number for cash income. The Brahmins keep cows for subsistence consumption of milk. The rich households, generally keep cows but the poor households mostly the Paharis keep goats. Hence, the caste has a bearing on livestock-type being raised, though statistically not significant, than merely the market signals.

In Nepal, cattle are more common in the Mountain while buffaloes are more common in the Hills compared to other ecological zones. Goats and sheep are common throughout the country, but less so in Terai. The average number of cattle, buffalo and goat-sheep are 3.1, 2.1 and 4.5 respectively (CBS, 2004).

5) *Growing cash crops*: There are no cases of growing cash crops in substantial quantities in the research area. However, fruit trees, mainly Choerospondias *axillaris* are being increasingly planted for cash income. The cereal crops are being still cultivated widely in the area.

The statistics on agricultural area and production of cereal and cash crops in Nepal from 1964/65 to 2005/06 is given in Table 7.13 and Table 7.14 respectively. It can be seen from Table 7.13 that the annual growth of cereal crop area remained 1.63 percent against 1.97 percent for the cash crop area. The figures at national level fail to manifest the argument that farmers have switched from the cultivation of cereal crops to the cash crops. In fact, cash crops like jute and tobacco experienced negative growth in terms of cultivation area while sugarcane cultivation grew at the annual rate of 5 percent. While comparing the production, the cereal crop production grew at an annual rate of 2.1 percent while cash crop production growth rate remained 5.51 percent for the mentioned period. It suggests that there has been significant improvement in the productivity of cash crop from 1964/65 to 2005/06. The crops with marked improvement in productivity are paddy, maize and wheat in the cereal crops. Similarly, among the cash crops sugarcane, jute and potato experienced increased productivity between 1964/65 and 2005/06. The details of the area and production of cereal and cash crops in Nepal from 1964/65 to 2005/06 are given in the Annex 7A.

6) *Cash income to purchase chemical fertilisers*: It is observed that the availability of cash definitely encourages investment in chemical fertilisers. However, cash scarcity alone cannot be a determinant for the application of organic manure in

fields by the farmers. The application of organic manure in the field is rather highly influenced by cultural factors while the application of chemical fertiliser is determined by its price. It is found that chemical fertilisers were used in substantial quantities in Nepal during mid-1990s when it was heavily subsidised by the State. The use of chemical fertilisers and improved seeds from 1964/65 to 2004/05 is given in Table 7.15.

Table 7.13

Cereal and cash crop cultivation area (thousand hectares) in Nepal from 1964/65 – 2005/06

Cereal crop area			
	1964/65	**2005/06***	**Annual growth rate (1964/65 -2005/06)**
Cereal crop	1731	3360	1.63%
Paddy	1101	1549	0.84%
Maize	437	851	1.64%
Wheat	100	672	4.76%
Barley	24	26	0.20%
Millet	69	262	3.29%
Cash crop area			
Cash crop	186	391	1.97%
Sugarcane	9	60	5.12%
Jute	32	11	-8.71%
Oilseed	108	187	1.45%
Tobacco	8	4	-1.81%
Potato	29	140	4.23%

Source: Economic survey 2005/06, MACo and CBS, 2007a

* Preliminary estimate

Table 7.14

Cereal and cash crop production (thousand Metric tons) in Nepal from 1964/65 – 2005/06

Cereal crop production			
	1964/65	**2005/06**	**Annual growth rate (1964/65 -2005/06)**
Cereal crop	3270	7656	2.1%
Paddy	2201	4209	1.59%
Maize	854	1734	1.74%
Wheat	126	1394	6.04%
Barley	26	28	0.18%
Millet	63	291	3.80%
Cash crop production			
Cash crop	511	4598.72	5.51%
Sugarcane	126	2463	7.52%
Jute	39	19	-1.74%
Oilseed	51	139	2.48%
Tobacco	9	2.72	-2.88%
Potato	286	1975	4.83%

Only a small portion of farmers use improved seeds in Nepal. On average, about one-fifth of households growing winter vegetable use improved seeds followed by households growing onions (18 percent), winter potato growers (16 percent), summer vegetable growers (12 percent), wheat growers (6 percent), main paddy growers (5 percent) and summer maize growers (4 percent) (CBS, 2004).

Table 7.15

Use of chemical fertiliser and improved seeds in Nepal from 1964/65 to 2004/05

(in Metric ton)

	1964/65	1974/75	1984/85	1994/95	2004/05
a) Chemical fertiliser	**592**	**21758**	**42829**	**90263**	**18458**
Nitrogen	370	14488	31656	64385	8118
Phosphate	180	3895	10623	24300	8941
Potash	42	3375	550	1578	1399
b) Improved seeds	**36**	**1934**	**2116**	**3684**	**2190**
Paddy	18	328	237	324	510
Maize	2	51	93	81	2
Wheat	16	1555	1786	3279	2237

Source: Economic Survey, 2005/06, MACo and CBS (2007a).

The percentage of growers in Nepal, using fertilisers is the highest for main paddy (66 percent). The other crop growers using chemical fertilisers in descending order are wheat (56 percent), maize (34 percent), potato (22 percent), millet (16 percent) etc (CBS, 2004). The cash income from all the sources is not equally spent on purchasing chemical fertilisers (Table 7.11). The households getting substantial incomes from off-farm sources such as self-employment, wage income and community forest income, do not invest much in chemical fertilisers. The non-farm income from salary may be used but it is found insignificant on the Chi-square tests.

Table 7.16

Purchase of chemical fertiliser from total monthly income, wealth class, caste, literacy and land resource perspectives in Kumariban

(Pearson's chi-square value within brackets)

Monthly income (NRs)		Wealth		Caste			Literacy[1]		Land resources			
<5000	>5000	Rich	Poor	No	Pahari	Pahari	<2	>2	Khet	Bari (ropani)		
									yes	no	<4	>4
Annual purchase	*% of households*											
<NRs 500	52.4	14.3	21.4	42.5	19.1	45.2	42.9	23.8	33.3	33.3	52.4	14.3
>NRs 500	11.9	21.4	28.6	4.8	21.4	14.3	4.8	28.5	33.4	0	16.7	16.6
missing				2.4								
	(7.467)**		(10.714)***		(3.385a)		(9.355)**		(10.714b)**		(3.565 c)	

Source: Sharma (1999b).

a- Fisher's exact test; two tailed significance = 0.084

b- Fisher's exact test; two tailed significance = 0.003

c- Fisher's exact test; two tailed significance = 0.082

Significance level *<0.05 **<0.01 ***<0.001

1: No of household member having one time access to formal education.

Only the households having substantial income (>NRs 500) mainly from farm sources such as the cereals and animal husbandry, significantly invest in purchasing the chemical fertiliser. However, the households with a substantial farm income from the tree crops (>NRs 200) do not purchase it much. Hence, the assumption that under marketing influence, with increased liquidity, the use of chemical fertiliser increases and pressure on forest, for products like leaf-litters, decreases is not true. The use of fertiliser and organic manure in fields may also have another dimension, for that reason, Table 7.16 presents the purchase of chemical fertiliser from wealth, caste and literacy perspectives. The rich and more literate households significantly purchase more fertiliser than the poor and less literate households (The operational definition of literacy is the number of households members having one time access to the formal education). The Pahari households purchase less chemical fertilisers than the rest, though not in a significant

extent. The increased income accruing from self-employment, salary and wage, do not give any impetus for increased purchase of chemical fertiliser, rather it is related to the farm income, wealth class and literacy. Furthermore, the households owning Khet (low land crop field) invest significantly more cash in purchasing chemical fertiliser than those who do not own it. However, having more Bari is not significantly related with the investment on chemical fertiliser on Fisher's exact test (see Table 7.16).

7) *Sending children to school*: These days, there is an increasing tendency to send children to schools. However, 'sending children to school' is a complex decision process that involves a lot of factors (Foster, 1980; Shrestha, 1984; Kasaju and Manandhar, 1985). The economic calculations alone do not bring the children to schools. The argument that increased cash income opportunities causes greater enrolment of children in the school does not hold true. In fact, the increased opportunity of cash income has resulted into early drop-outs of some children from schools as reported elsewhere in the literature (Hunt, 1978; Foster, 1980).

The main cooking fuel in the country is firewood. Overall, 69 percent of households use firewood as their main source of cooking (Table 7.17). This is followed by cow-dung (16 percent), LPG (8 percent) and Kerosene (5 percent). However, LPG is the main fuel in urban areas (41 percent). Among the rural areas more than 90 percent of Hills/Mountains households use firewood while a significant proportion of Terai households seem to use “cow-dung/leaves/straw/thatch” (CBS, 2004).

Table 7.17

Distribution of households by fuel use for cooking in Nepal (in percentage)

Wood	69.1
Cow-dung/leaves/Straw/thatch	15.7
LPG	8.2
Kerosene	4.7
Other fuels (biogas etc)	2.3

Source: Nepal Living Standards Survey, 2004.

Those who depict reduced pressure from forest on long run claim that with increased cash income, firewood will be either purchased as it will no longer be a free commodity or substituted with kerosene (Malla, 1993). However, as a finding of this research, it is observed that neither the rich significantly differ from the poor households regarding the use of fuel for cooking nor this difference is evident among the Brahmin and Pahari households (see Table 7.18).

Table 7.18

Main source of fuel for cooking by wealth caste in Kumariban

(Pearson chi-square value within brackets)

Fuel for cooking	Wealth class		Caste	
	Rich	Poor	Brahmin	Pahari
	% of households			
Firewood	32.5	33.3	21.0	47.4
Kerosene	17.5	16.7	13.2	18.4
	(0.011)		(0.433[a])	

Source: Sharma (1999a).

a: Validation rule: Fisher's exact test (2-tailed significance =0.714)

On one hand Nepal Government is blamed for ignoring the commercial aspects of Community Forestry (Malla, 1993) while on the other, social forestry is criticised for omitting the subsistence need of the villagers (Monech and Bandyopadhaya, 1986). The argument for commercialisation of Community Forestry stems from an unfounded belief that under strong market influence, villagers are interested only in cash income and not on subsistence living. The assumption that under socio-economic transformation the pressure on the forest decreases, is in fact, only a rosy depiction. The depiction that 'uncultivated marginal lands, reduction of livestock, stall-feeding' subsequently reduces pressure from common forest (Malla, 1993) may not be true because some of the critical assumptions are invalid.

This research also justifies Foster's (1980) question regarding the role of economic factors on children's education. Some poor Brahmin households are sending children to

school despite the economic hardship, whereas some Pahari are holding children in homes so that they can earn income through Betbans works. Hence, the economic factor or availability of cash alone does not determine the decision regarding the schooling of children. The increased earning opportunity through Betbans work results into more dropouts of Pahari children from the school and even a free education opportunity is unable to retain them. This finding firmly agrees with observations elsewhere (Hunt, 1978; Foster, 1980) and is in contrast with Malla's (1993) anticipation that an increased cash earning opportunity will place a larger number of children in the school. The distribution of primary reasons for leaving school/college for population aged 6-24 years who attended school in past is given in the Table 7.19 (CBS, 2004).

Table 7.19

Reason for leaving school/college for population 6-24 years who attended school in the past (percent)

Help at home	26.8
Too expensive	11.5
Poor academic progress	31.6
Parents did not want	8.5
Completed desired level	3.8
Moved away	4.5
Other	13.4
Total	100.0

Source: Nepal Living Standards Survey, 2004.

It is also fallacious to assume that under stronger market influence, the cultivation pattern shifts from cereal to cash crop. In principle, the findings of this research concede that with increased cash income, people spend much on purchasing chemical fertilisers. However, saying that "a strong market orientation eventually leads to a reduction of pressure on the forest" is still deceptive. It is assumed that under strong market influence, villagers may face acute labour-scarcity and that may encourage for shifting to cash crop (Malla, 1993). However, it is observed that Parma is institutionalised to cope with labour

scarcity during peak agriculture season or under severe cash-scarcity. The rich and poor households do not differ regarding the use of Parma. Nevertheless, the Pahari households differ significantly from the rest. Hence, the existence of such institutions is culturally determined and the market influence may not be decisive. Such institutions may accommodate the scarcity of labour therefore, the so called 'new strategy' may not exist. Thus 'the rosy depiction' on reducing pressure from the forest (Malla, 1993) is just a mirage.

CHAPTER 8

SUMMARY, CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

8.1 Summary

There has been 54 percent increase in agricultural land from 1961 to 2004. However, the area has remained almost stagnant from 1981 to 2004 (only 6 percent increase for the period). The Gini coefficient of the land distribution decreased from 0.683 (1971) to 0.383 (2004). The stagnancy in agriculture land makes the resource scarce and opens the prospects for land renting. The sharing of agriculture produce in the land (72 percent) is a prominent type of land renting in Nepal. This practice already puts pressure on agriculture making farming less attractive to the farmer, in turn compelling them to seek off-farm employment. Besides, land renting stemming from inequality in landholding, the increasing population also pressurises agriculture. There is 142 percent increase in population pressure in the Terai from 1971 to 2001 while there is only 16 percent increase in the Mountain. The increase in the Hills is 53 percent over the years. It indicates substantial migration from Mountain and Hills to the Terai belt of the country. The farming system in the Hills and Mountain is integrated with forestry. Realising this, Government has adopted a policy of hand over community forests to the groups of villagers (often called FUG). The average size of a community forest is 82.7 hectare, with 116 households as beneficiaries. That means 0.713 ha of land is available for each household from which they can bring complementary resources for their farmland and household.

Community Forestry has opened avenue for the emancipation of women and poor. The overall participation of women in FUG committee is 25 percent throughout the country. The average annual income of a community forest is NRs 17,887 while the average expenditure is NRs 12,038. The FUGs are authorised to take decisions regarding the use of their fund. The estimated total annual income from the sale of forest products from community forest is NRs 246 million while the expenditure is NRs 166 million based on DoF database 2004. Almost one-fourth of such expenditures can be related with poverty

alleviation efforts. The mentioned effort for poverty alleviation through community forestry is far below the required amount of NRs 37.72 billion[1] (US $ 503 million) for the purpose.

There is lack of clear guideline indicating the size of forest to be handed over to FUG consisting of beneficiary households. It has resulted into the larger forests handed over to a few households while large number of households are being included in small forests. Consequently, the Gini coefficient of community forest distribution by size is 0.445 in 2004 and it suggests high inequality in distribution. This inequality has further increased to 0.458 in 2007 that means community forests are becoming more inequitable in recent years. This increase in Gini coefficient between two years also suggests that there is a need to institutionalize the practice of computing Gini coefficient for community forestry distribution in Nepal on regular basis so that the inequality trend of distribution can be determined. Nonetheless, the Gini coefficient of community forestry distribution for year 2009 is 0.451 which is almost same as for the year 2007.

The FUGs in the Terai are involved in the commercial sale of forest products from the community forests. One in every three FUGs, in the Terai and adjoining areas, are involved in such activities. The activity has also remained lucrative for the government, as part of the proceeds also goes to it's treasury. The amount accrued to the government treasury reaches up to NRs 517 million (annually) from the commercial sale of timber from the community forests.

Most of the sampled households are income poor in the research site (Kumariban, Badikhel). Fifty percent of households have annual income less than NRs 50,000 and their share in total income is 30.3 percent. Nearly forty percent of households have income NRs 50,000–100,000 and they constitute 47.6 percent of total income. Seven percent of households have income NRs 100,000–150,000 with a share of 14.7 percent in the total income. About 2.4 percent of the household have income in excess to NRs 150,000 and the share in total income is 7.3 percent. Low-income households (<NRs 50,000) mainly depend on self-employment. The farm income contributed less than 15 percent in the income of such households**.** Nearly 46 percent of the income from private

[1] This figure is derived after poverty gap analysis of the households in the case-study site.

trees goes to the highest income group while only 7 percent of it trickles to lowest income (<NRs 50,000) group. Thus, it diminishes any prospect of decreasing inequality through increased income from private trees. Nearly 48 percent of income from cereal crops accrues to the middle income group while only 8 percent of it trickles to the lowest income group. Where as, the households under higher income group (>NRs 100,000) share nearly 76 percent of the total income from the cereals. The highest income group captures approximately 70 percent of the income from salary and less than 4 percent is left for the lowest income group. About 42 percent of the income from self-employment goes to the middle income group whereas 64 percent of the wage income is captured by the lowest income group.

Community forestry contributes in reducing income inequality as it help reduce Gini coefficient from 0.265 to 0.242. The observation is based on a case study where the poor and deprived sections of the society are included in the community forestry process. Hence, there is significant reduction of inequality with the inclusion of community forestry income. If intensive forest management is carried out in the community forests, the Gini coefficient of income distribution lowers by 0.038, the households under poverty decreases by 22 percentage point. The share of income of the one-third poorest households in total income increases by 1.4 percentage similarly the share of the one-third average households increases by 1.5 percentage while the share of the one-third richest households decreases by 2.9 percentage.

8.2 Conclusions

The major conclusions drawn from this study are as follows:

8.2.1 Private Trees and New Strategy

Based on the analysis of results and findings, the following are the specific conclusions regarding private trees and adoption of new strategy by farmers:

- Pakhabari is an important land asset of poor household. Despite higher Gini coefficient, the Chi-square test shows that it is an important land

resource also in the possession of poor households. Hence, development interventions should target this resource.

- There is no significant difference between poor and rich household regarding tree-holding in private land. The income from private trees though have slight disequalising effect on income distribution, as trees are grown mostly in Pakhabari (a resource also in possession of poor households), an increased income from private trees has potential to alleviate poverty. Poor households should be encouraged to form co-operatives to enable them harness benefit from private tree resources.

- Income accrued from the private trees do not substantially reduce 'poor-rich' gap because it fails to produce equalising effect on income distribution. However, a concerted effort in improving the collective bargaining of private tree resource of poor households can affect income distribution favourably. However, it is strongly recommended that questions regarding private endowment of resources, private trees in particular, be explored further before lunching campaign for promoting private plantation at national level.

- The so-called new strategy, supposedly adopted by the farmers in the wake of market influence, is hardly evident. Community forest still plays a significant role in sustaining agriculture in the research area. The socio-economic transformations under increasing influence of market not necessarily minimise the role of community forest as it still contributes substantially in sustaining the subsistence living. Many households still depend on community forest for basic forest products such as firewood, fodder, grasses, and leaf-litters; therefore commercialisation of community forests should be only at an amble pace.

8.2.2 Distribution of Forest Products

The findings and results related with products distribution (Chapter 5) lead this research to make a general conclusion that the provision of 'equal access' (as advocated by Maharjan, 1993) alone, cannot ensure equity in product distribution in community forestry. Furthermore, metric regulation of the forest products, as the one observed in Kumariban for the distribution (by fixing a limit of 25 cft timber per household) is not

the solution for equality in product distribution. Hence, others aspects of equity e.g., in decision-making and fund allocation should also get due attention while framing community forestry related policies.

The research on distribution of forest products sheds light on distribution related inequities in community forests of Lalitpur and Kabhrepalanchok Districts. As these Districts represent the characteristics of most of the community forests in Nepal, the observation can be generalised for community forestry in Nepal. The research also answers the concerns regarding discrimination and variations observed on the acquisitions of forest products from community forests by wealth and caste perspectives.

One very important lesson of this research is "the distribution of forest products, from the community forests in Nepal, is not marred with any discrimination by wealth class and caste as is evident from the statistics on distribution of these products from the community forests". Statistics regarding the use of forest products from the community forests by wealth class and caste fails to manifest any discrimination against the poor or lower caste households. The research shows diverse pattern in Analysis of variance (ANOVA) for the utilisation of forest products from the community forests. This suggests higher localisation of the outcome any generalisation based on case-studies can be grossly erroneous and premature.

The specific conclusions related to distribution of forest products from the community forests are:

- Firewood, grasses and leaf litters are important forest products for subsistence uses. Though, timber is an important product for the rich, even the poor uses it in substantial quantity.
- In comparison to the rich households, the poor households gather larger quantities of firewood, grasses and leaf litters, however, this difference is not statistically significant. The Pahari households use significantly more firewood, timber and grasses than the rest households but there is no difference in the use of leaf litters.

- There is neither a significant difference between rich and poor households nor between lower and higher caste, regarding use of low and high value forest products from the community forest. There is no basis to argue that rich households collect mainly the high value products while the poor households also collect the low value products (as observed by Jodha, 1986 in the dry lands of India). This lack of preferential gathering of forest products by wealth class is due to the indifference in opportunity cost of time of women, mainly involved in gathering low value products from the community forests.

- The use of firewood from the community forests is positively and significantly correlated with the uses of timber and grasses, however, the use of leaf litters is insignificant because of the highly seasonal nature of collection.

- There is neither any significant difference between rich and poor households nor between lower and higher caste regarding the use of domestic fuel for cooking.

- The use of timber is not related with wealth class but is positively and significantly correlated with uses of grasses and leaf litters from the community forests.

- Multiple regression explains only a small portion of variations regarding use of forest products from the community forests by wealth rank. Hence, either all the relations are not linear or other factor such as caste-structure is more important in explaining such variations.

- Among various factors, the caste is most significant in explaining variations in the use of forest products from the community forests. Besides caste, farm-size is significant in explaining variations in use of leaf litters.

- Pearson's correlation matrix shows a significant but inverse relationship between wealth rank and use of firewood from the community forest. It implies that the richer the household is, the lesser amount of firewood it gathers from the community forests.

8.2.3 Community Forestry and Inequality

The community forestry income that has accrued to a majority of households, comes mainly from the subsistence use of forest products such as the dead branches, grasses and leaf litters. There is no market for the transaction of these products and even the utilization of such products is influenced by the cultural factor. An example is the use of pine needles for making compost manure by Pahari households. This practice is common among the people of Tibeto-Burmease origin in mountain and other lower agricultural castes among Newar in the vicinity of Kathmandu valley. Brahmins generally use green bedding materials along with cow dung to fertilize their field. However, some Brahmin households, living among the Pahari, are found gathering pine needles for animal bedding and consequently making compost. It is perceived as an example of cultural assimilation that should not be generalized.

Any hasty conclusion based on a single case study can be erroneous and premature, being just a spurious relationship caused by other variables. Hence, any optimistic remark about the contribution of community forestry in reducing inequality has to be made with extreme care. Moreover, there is a need to compute the Gini coefficient of community forestry distribution on regular basis so that the trend of inequality can be easily determined and proper corrective measures can be applied on time. This section, therefore, is concluded, refraining from making any optimistic remark on the impact of community forestry on income distribution.

8.2.4 Land Distribution, Forest Resource and Community Forests

The following are the specific conclusions regarding land distribution, forest resource and community forest (Chapter 4):

- Larger farmers must have resorted to two options to cope with labour scarcity. Either it must have compelled them to get rid of their farm lands or shift towards more permanent type of cropping in their farm land.

- The Forest Resource Survey (1999) does not rely on a single methodology and uses the results of four different inventories carried out from the year 1987 to 1998. It is regarded as one of the major weakness of the survey.

- The findings of Forest Resource Survey (1999) have to be treated with caution as the definition of reachable forest itself has creeped biasness in favor of lowland and accessible areas. Consequently, broadleaf species such as Sal (Shorea *robusta*) is overestimated while the conifers (Pinus *roxburghii,* Pinus *wallichiana*, Abies *spectabilis*) are under estimated.

- The DFOs were at first reluctant to hand over the Sal forest the hand over of Pinus *roxburghii* remained enthusiastic from the beginning.

- The policy decision regarding Terai and Inner Terai forests in May 2000 is responsible for delayed hand over of community forests in the respective regions.

8.2.5 Household Income and Income Distribution

The following are the specific conclusions regarding household income and income distribution (Chapter 6):

- Lower income households rely mainly on off-farm (wage income and self-employment) sources.

- Income from community forest products trickles mainly to the lower and middle income group. While the highest income group capture the least percentage of the income.

- Income from animal husbandry, and salary and benefits has a disequalising effect while wage income, self employment and income from community forest products have equalizing effects on income distribution.

- Bartlett's test fails to justify Income Variance Method (IVM). However, IVM result shows that community forestry reduces total inequality.

- Spearman's Rank Correlation for similarity in wealth and income ranking proves the closeness of respective rankings. It also shows the applicability of wealth ranking in community forestry related studies.

8.3 Future Direction for Research

The decrease in land Gini coefficient suggests a recent and gradual amelioration of land inequality in Nepal. It can have a sobering effect on land related policy in the country. This gives future ground for serious research.

There is lack of clear Guideline in handing over of community forest for group of households (size of the forest versus number of beneficiary households). This situation has resulted into high Gini coefficient for the distribution of community forests by size of the forest. The Gini coefficient of community forest distribution by size of the forest is also increasing in recent years. This is a virgin area for future research focusing on the threshold of per household forest area in community forests.

Government has done huge investment in areas of crop and animal improvement but it is clear that most of the poor households do not get direct benefit from such investments. An analysis of such investment from the perspective: who gains and who loses? from such investment is an important area of future research. Intensive management of community forests requires huge investment, but it can contribute in substantial reduction of poverty in the country. Hence, community forest resources of Nepal should be intensively managed.

Self-employment provides a cushion against income poor households. The role of self-employment in protecting and safeguarding the economic interests of the poor should be properly assessed. Skill promotion of wage labour can contribute substantially in the income of poor households further research on this aspect is significant. While doing so, the role of government in human development should also be adequately addressed.

An important policy feedback of this research is "community forestry based on FUG concept still remains a viable development strategy for securing the basic needs of

Nepalese people". Community forestry can contribute to poverty reduction because the poor and low caste households have easy access on forest products. However, the "exclusion" issue in community forestry should be appropriately dealt in the Operational Guideline for community forestry in Nepal.

One important aspect of future research should be for establishing and strengthening the linkages of poor households and community forests (providing complementary resources to the resource poor) to reduce economic disparity.

Economic proceeds of community forestry should be channelled in education, health, skill promotion etc. Government via intermediaries should encourage FUGs to invest their fund on the mentioned activities.

The multiplier effects of community forest management on village and local economy should be further studied. The multiplier associated with community forestry growth has to be determined in future studies. Such studies should include increased productivity of farmlands, livestock etc due to the easy availability of forest products.

ANNEXES

Annex 1A

Calculation of Decade Growth in GDP in Different Sectors of Nepal

Example: Agriculture, Fishery and Forestry sector GDP growth from 1994/95 to 2003/04

Agriculture, Fishery and Forestry GDP (at 1994/95 price) in 1994/95 = 85569 million

Agriculture, Fishery and Forestry GDP (at 1994/95 price) in 2003/04 = 115774 million

or $(1+r)^9 * 85569 = 115774$

or, $(1+r)^9 = 115774/85569 = 1.353$ (growth times)

$1+r = (1.353)^{1/9} = (1.353)^{0.111} = 1.0342$

therefore, r= 1.0342-1 = 0.0342 = 3.42 percent

Annex 1B

Human Poverty Indices for the Research Districts

District	Chronic malnourishment among children (under 5 yrs of age)	Adult illiteracy rate	Proportion of population with life expectancy less than 40 year	Population without access to safe water	HPI	Relative value (Nepal=100)	Rank
Nepal	50.5	51.4	17.74	20.48	39.6	100	
Lalitpur	26.7	33.1	10.31	15.85	25	63	2
Kabhrepalanchok	35.8	43.9	9.56	24.39	33.5	85	10

Source: Nepal Human Development Report 2004, UNDP

Annex 1C

Calculation of Nepal's HDI

Calculation of Human Development Index for Nepal (2007)

Life expectancy at birth (yrs)= 63.7

Per capita GDP (PPP) = 1597 US$

Adult literacy (%) = 62.7

Mean Years of schooling = 3.21

Income index = (log 1597-log100)/(log40000-log100)

or = (3.203305-2)/(4.6021-2) = 0.4624

Life expectancy index = 63.7-25/85-25 = 38.7/60 = 0.645

Education attainment index

Adult literacy = 62.7-0/100-0 = 0.627

Mean years of schooling index = 3.21-0/15-0 = 0.214

Education attainment index = 2(0.627)+1(0.214)/3 = (1.254+0.214)/3 = 1.468/3= 0.489

HDI =1/3 of LEI+ 1/3 of EAI+1/3 of II = 1/3*0.645+1/3*0.489+1/3*0.4624 = 0.534

Nepal's HDI = 0.534

Annex 1D

Population of Nepal, 2001

S.No.	High Mountain	Population	No of HH	HH size
1.	Bajhang	167026	28588	5.84
2.	Bajura	100626	18359	5.48
3.	Darchula	121996	21029	5.80
4.	Dolakha	175912	37292	4.72
5.	Dolpa	22071	4414	5.00
6.	Gorkha	288134	58923	4.89
7.	Humla	40595	6953	5.84
8.	Jumla	69226	12147	5.70
9.	Mustang	14981	3243	4.62
10.	Manang	9587	1776	5.40
11.	Mugu	31465	5844	5.38
12.	Rasuwa	44731	8696	5.14
13.	Sankhuwasabha	159203	30766	5.17
14.	Sindhu Palchowk	293719	57649	5.09
15.	Solukhumbu	107686	21667	4.97
16.	Taplejung	134698	24764	5.44
		1781656	**342110**	**5.21**
	Middle Hills			
1.	Achham	231285	44005	5.26
2.	Arghakhanchi	208391	40869	5.10
3.	Baglung	268937	53565	5.02
4.	Baitadi	234418	40387	5.80
5.	Bhaktapur	225461	41253	5.47
6.	Bhojpur	203018	39481	5.14
7.	Dailekh	225201	41140	5.47
8.	Dandeldhura	126162	21980	5.74
9.	Dhading	338658	62759	5.40

10.	Dhankuta	166479	32571	5.11
11.	Doti	207066	36465	5.68
12.	Gulmi	296654	59189	5.01
13.	Ilam	282806	54565	5.18
14.	Jajarkot	134868	24147	5.59
15.	Kabhrepalanchowk	385672	70509	5.47
16.	Kalikot	11510	2026	5.68
17.	Kaski	380527	85075	4.47
18.	Kathmandu	1081845	235387	4.60
19.	Khotang	231385	42866	5.40
20.	Lalitpur	337785	68922	4.90
21.	Lamjung	177149	36525	4.85
22.	Makwanpur	392604	71112	5.52
23.	Myagdi	114447	24435	4.68
24.	Nuwakot	288478	53169	5.43
25.	Okhaldhunga	156702	30121	5.20
26.	Palpa	268558	49942	5.38
27.	Panchthar	202056	37260	5.42
28.	Parbat	157826	32731	4.82
29.	Pyuthan	212484	40183	5.29
30.	Ramechhap	212408	40386	5.26
31.	Rolpa	210004	38512	5.45
32.	Rukum	188438	33501	5.62
33.	Salyan	60643	10926	5.55
34.	Sindhuli	277259	47710	5.81
35.	Surkhet	269870	50691	5.32
36.	Syangja	317320	64746	4.90
37.	Tanahu	315237	62898	5.01
38.	Terahathum	113111	20682	5.47
39.	Udaypur	287689	51603	5.58
		9800411	**1894294**	**5.17**

	Terai/InnerTerai			HH Size
1.	Banke	385840	67269	5.74
2.	Bara	559135	87706	6.38
3.	Bardiya	382649	59569	6.42
4.	Chitwan	472048	92863	5.08
5.	Dang	462380	82495	5.60
6.	Dhanusha	671364	117417	5.72
7.	Jhapa	633042	125947	5.03
8.	Kailali	616697	94430	6.53
9.	Kanchanpur	377899	60158	6.28
10.	Kapilbastu	481976	72932	6.61
11.	Mahottari	553481	94229	5.87
12.	Morang	843220	167875	5.02
13.	Nawalparasi	562870	98340	5.72
14.	Parsa	497219	79456	6.26
15.	Rauthat	545132	88162	6.18
16.	Rupandehi	708419	117856	6.01
17.	Saptari	570282	101141	5.64
18.	Sarlahi	635701	111076	5.72
19.	Siraha	569880	98754	5.77
20.	Sunsari	625633	120295	5.20
		11154867	**1937970**	**5.76**

Source: Computed from CBS (2004c).

Annex 1E

Human Development Index by Regions for Nepal, 2001

Human development index by regions, 2001								
Region	**Life expectancy at birth**	**Adult literacy**	**Mean years of schooling**	**GDP per capita (PPP US $)**	**Life expectancy index**	**Education attainment index**	**Income index**	**HDI index**
Nepal	60.98	48.6	2.75	1310	0.6	0.385	0.429	0.471
Rural	60.61	45	2.35	1162	0.594	0.352	0.409	0.452
Urban	64.53	68.3	5.06	2224	0.659	0.568	0.518	0.581
Mountain	52.55	36.1	2.5	1114	0.459	0.296	0.402	0.386
Hills	65.5	52.3	3.09	1424	0.675	0.417	0.443	0.512
Terai	63.95	46.1	2.54	1235	0.649	0.364	0.42	0.478
EDR	64.9	50.3	2.9	1202	0.665	0.4	0.415	0.493
CDR	62.51	47.7	2.89	1597	0.625	0.382	0.463	0.49
WDR	63	52.9	2.93	1254	0.633	0.418	0.422	0.491
MWDR	54.5	42.5	2.18	988	0.492	0.332	0.382	0.402
FWDR	54.3	41.7	2.14	1079	0.488	0.326	0.397	0.404

Source: Nepal Human Development Report 2004, UNDP

Annex 1F

Economic Empowerment Index for Nepal by Regions, 2001.

Economic empowerment index by region, 2001						
Region	**Proportion of electrified Hh**	**Land inequality (Gini coefficient)**	**Gini corrected average land size (ha)**	**Proportion of HH with access to institutional credit**	**Proportion of labour force employed in non-agricultural jobs**	**Per capita GDP at PPP $**
Nepal	31.08	0.544	0.337	19.85	31.33	1310
Urban	82.53	0.642	0.211	0	71.74	2224
Rural	21.34	0.536	0.348	23.52	25.75	1162
Mountain	16.64	0.484	0.335	14.06	18.02	1114
Hills	34.25	0.489	0.286	14.98	29.09	1424
Terai	30.01	0.569	0.418	25.74	35.81	1235
EDR	24.15	0.516	0.469	21.99	29.51	1202
CDR	44.62	0.562	0.294	17.29	39.01	1597
WDR	32.55	0.518	0.308	21.72	27.14	1254
MWDR	15.69	0.505	0.331	13.65	26.56	988
FWDR	12.45	0.594	0.293	28.82	23.89	1079

Table…continued…

Region	**Electrification index**	**Gini corrected land index**	**Credit index**	**Employment status index**	**Income index**	**Economic empowerment index**	**Relative value Nepal=100**
Nepal	0.317	0.54	0.289	0.309	0.229	0.337	100
Urban	0.852	0.283	0	0.895	0.56	0.518	154
Rural	0.216	0.561	0.342	0.228	0.175	0.304	90
Mountain	0.167	0.535	0.205	0.116	0.157	0.236	70
Hills	0.35	0.436	0.218	0.277	0.27	0.31	92
Terai	0.306	0.704	375	0.374	0.202	0.392	116
EDR	0.245	0.808	0.32	0.283	0.19	0.369	110
CDR	0.458	0.451	0.252	0.42	0.333	0.383	114
WDR	0.332	0.481	0.316	0.249	0.208	0.317	94
MWDR	0.157	0.528	0.199	0.24	0.112	0.247	73
FWDR	0.123	0.449	0.42	0.201	0.145	0.268	79

Annex 1G

Social Empowerment Index for Nepal by Regions, 2001.

Social empowerment index by region, 2001							
Region	**Adult literacy (+15)**	**Mean yrs of schooling**	**Infant mortality**	**% malnourished children under 5 (stunting)**	**Population with access to sanitation (%)**	**Proportion of households with radio**	**Proportion of HH with telephone service**
Nepal	48.6	2.75	68.51	50.51	39.22	52.59	3.91
Urban	68.3	5.06	51.71	36.62	77.06	64.84	20.24
Rural	45	2.35	70.32	51.51	32.05	50.27	0.82
Mountain	50.3	2.05	109.19	61.19	39.95	53.88	0.5
Hills	47.7	3.09	47.32	52.7	51.09	62.53	5.77
Terai	52.9	2.54	59.76	47.13	27.15	42.39	2.54
EDR	42.5	2.9	61.37	44.56	39.77	48.95	2.26
CDR	41.7	2.89	63.51	52.31	43.51	52.91	7.61
WDR	36.1	2.93	58.91	50.33	48.53	57.34	2.34
MWDR	52.3	2.18	103.05	53.86	22.63	54.46	1.05
FWDR	46.1	2.14	84.44	53.68	20.29	47.6	1.01
Source; Nepal Human Development Report 2004, UNDP							

Annex 1G continued…

Region	**Social mobilisation outreach (% of HH covered)**	**Educational attainment index**	**Average health capability index**	**Communication media index**	**social mobilisation outreach index**	**Social empowerment index**	**Relative value Nepal=100**
Nepal	28.75	0.383	0.563	0.297	0.336	0.406	100
Urban	0	0.852	0.825	0.732	0	0.604	149
Rural	34	0.299	0.525	0.214	0.398	0.372	92
Mountain	30.66	0.227	0.419	0.244	0.358	0.315	78
Hills	27.92	0.467	0.646	0.43	0.326	0.476	117
Terai	29.31	0.328	0.552	0.17	0.343	0.362	89
EDR	24.82	0.424	0.612	0.229	0.29	0.398	98
CDR	22.67	0.392	0.582	0.371	0.265	0.413	12
WDR	38.29	0.446	0.623	0.313	0.448	0.468	115
MWDR	29.73	0.268	0.402	0.26	0.348	0.33	81
FWDR	39.47	0.252	0.435	0.192	0.461	0.347	85

Annex 1H

GDP by Sectors and Estimates of Per Capita Income for Nepal by Regions, 2001

Estimates of per capita income by region, 2001 Rs in million							
Region	**Agriculture fisheries and forestry**	**Mining and quarrying**	**Manufacturing**	**Electricity gas and water**	**Construction**	**Trade restaurants hotels**	**Transport communication and storage**
Nepal	151058	1923	35495	7004	39584	44572	33297
EDR	36944	269	7830	1446	4706	10252	7284
CDR	47676	991	20862	3924	20040	16858	16359
WDR	31982	356	4368	1268	8135	9150	5770
MWDR	18782	156	1561	245	3227	4821	2493
FWDR	15674	151	875	122	3477	3491	1390
Mountain	12110	113	811	228	2549	2909	892
Hills	64422	1335	13461	2692	26409	19336	15280
Terai	74526	476	21223	4084	10626	22326	17125

Annex 1H: continued…

Region	**Finance and real estate**	**Community and social services**	**Total economy (total value added)**	**GDP at market prices**	**Population**	**Per capita income Rs at market prices**	**Per capita income in $**	**Per capita income in PPP $**
Nepal	41634	38997	393564	410287	23151423	17722	240	1310
EDR	9525	5137	83392	86936	5344476	16266	221	1202
CDR	16025	23753	166487	173561	8031629	21610	293	1597
WDR	8292	5042	74363	77522	4571013	16960	230	1254
MWDR	4300	3045	38629	40271	3012975	13366	181	988
FWDR	3492	2021	30693	31997	2191330	14602	198	1079
Mountain	2726	2054	24392	25429	1687859	15066	204	1114
Hills	19369	27116	189420	197468	10251111	19263	261	1424
Terai	19540	9827	179752	187390	11212453	16713	227	1235

Source: Nepal Human Development Report 2004, UNDP

Annex 1I

Gender Related Development Index for Nepal by Regions, 2001.

Gender related development index by region, 2001						
Region	**Life expectancy**		**Adult literacy**		**Mean years of schooling**	
	Female	**Male**	**Female**	**Male**	**Female**	**Male**
Nepal	61.5	60.5	34.9	62.7	1.95	3.56
Rural	61.1	60.2	31.2	59.4	1.6	3.1
Urban	65.3	63.8	55.8	80	4.06	6.06
Mountain	52.8	52.3	20.9	51.9	1.25	2.84
Hills	66.2	64.9	38.3	67.4	2.27	3.9
Terai	63.6	62.6	32.8	59	1.73	3.34
EDR	65.5	64.4	37.1	63.8	2.13	3.68
CDR	62.5	61.5	34	60.7	2.05	3.74
WDR	62.8	62.2	40.7	67	2.21	3.65
MWDR	55	54.1	28.6	56.8	1.42	2.94
FWDR	54.1	53.6	23.4	61.2	1.15	3.13

Table continued…

	Estimated earned income		**GDI**	**Relative Value (Nepal=100)**	**GDI/HDI**
	Female	**Male**			
Nepal	0.345	0.485	0.452	100	0.959
Rural	0.319	0.468	0.43	95	0.952
Urban	0.403	0.582	0.562	124	0.967
Mountain	0.37	0.43	0.363	80	0.941
Hills	0.395	0.482	0.498	110	0.973
Terai	0.317	0.481	0.45	100	0.943
EDR	0.328	0.472	0.475	105	0.962
CDR	0.37	0.519	0.467	103	0.953
WDR	0.378	0.459	0.477	105	0.971
MWDR	0.332	0.421	0.385	85	0.959
FWDR	0.359	0.429	0.377	83	0.933

Annex 1J

Level of Education Attainment for Population Aged 6 and Above by Sex for the Period 1981-2001

Population age 6 yrs and above by education attainment by sex, 1981-2001						
Literacy, level of education	**1981**		**1991**		**2001**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
Total no (in 000)	6233	5947	7523	7622	9593	9663
Illiterate (%)	66	88	45.2	74.4	34.3	56.8
Literate (%)	34	12	54.1	24.7	65.1	42.5
total	100	100	100	100	100	100
Level of education attainment (%)						
No schooling	23.9	22.8	22.3	24	8.5	9.2
Primary	46.1	56.4	39.1	45.2	39.3	45.9
Secondary	22.2	15.9	23.7	20.1	30.8	30.3
SLC	3.6	2.4	5.6	3.8	9.6	8.1
Intermediate and above	4.1	2.4	4.6	2.4	10.7	5.3
Total	100	100	100	100	100	100

Source: Nepal Human Development Report 2004, UNDP

Annex 1K

Human Poverty Index for Nepal by Regions, 2001

Human Poverty Index by region, 2001						
Region	**Chronic malnourishment among children (under 5 yrs of age)**	**Adult illiteracy rate**	**Proportion of population with life expectancy less than 40 year**	**Population without access to safe water**	**HPI**	**Relative value (Nepal=100)**
Nepal	50.5	51.4	17.74	20.48	39.6	100
Rural	51.5	55	18.2	22.19	42	106
Urban	36.6	31.7	13.39	11.46	25.2	64
Mountain	61.2	63.9	27.4	28.01	49.8	126
Hills	52.7	47.7	12.24	27.7	38.8	98
Terai	47.1	53.9	15.51	12.1	39.6	100
EDR	44.6	49.7	10.5	17.15	37.1	94
CDR	52.3	52.3	16.46	15.84	39.7	100
WDR	50.3	47.1	15.26	18.52	36.7	93
MWDR	53.9	57.5	26.08	35.66	46.3	117
FWDR	53.7	58.3	21.71	32.89	45.9	116

Source: Nepal Human Development Report 2004, UNDP

Annex 1L

Foreign Aid Disbursement by Major Sources

Rs in Million

Fiscal years								
Heading	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
Bilateral	**2771.2**	**4675.3**	**10044.4**	**9013.2**	**9230.8**	**7658.4**	**16406.4**	**10207.7**
Grant	2184.5	4588.3	9387.2	8947.2	9104.3	7617.8	7401.8	9575.6
Loan	586.7	87	657.2	66	126.5	40.6	9004.6	632.1
Multilateral	**16026.2**	**9709.5**	**5841.1**	**9899.2**	**14426.5**	**14383.4**	**9447.9**	**19092.8**
Grant	4568.9	2097.9	1951.9	2336.2	5286.9	6209.7	8399.0	10745.1
Loan	11457.3	7611.6	3889.2	7563	9139.6	8173.7	1048.9	8347.7
Total	**18797.4**	**14384.8**	**15885.5**	**18912.4**	**23657.3**	**22041.8**	**25854.3**	**29300.6**
Grant	6753.4	6686.2	11339.1	11283.4	14391.2	13827.5	15800.8	20320.7
Loan	12044	7698.6	4546.4	7629	9266.1	8214.3	10053.5	8979.9

Source: Economic Survey, 2008/09.

Annex 4A
Land Distribution in Nepal from 1961 to 2004

	Year 1961		Year 1971		Year 1996	
Landholding group	**% of HH**	**% of cultivated area**	**% of HH**	**% of cultivated area**	**% of HH**	**% of cultivated area**
<1ha	72	23.6	63.5	10.5	66.14	25.7
1 to 3 ha	19.2	27.2	19.5	18	27.65	41.36
3 to 5 ha	4.8	15	7.1	12	4.05	14
5 to 10 ha	2.9	16.5	5.8	21	1.61	10.1
>10 ha	1.1	17.7	4.1	38.5	0.55	8.84

	Year 2001		Year 2004	
Landholding group	**% of HH**	**% of cultivated area**	**% of HH**	**% of cultivated area**
<1ha	74.95	38.9	72.9	37.3
1 to 3 ha	22.17	43.8	24.4	46.7
3 to 5 ha	2.13	10	1.9	8.4
5 to 10 ha	0.64	5.3	0.7	5.7
>10 ha	0.11	2	0.1	1.9

Calculation of Land Gini Coefficient

Year 1961

ΣX_i	ΣY_i	$\Sigma X_i Y_{i+1}$	$\Sigma X_{i+1} Y_i$
1.1	17.7	37.62	70.8
4	34.2	196.8	300.96
8.8	49.2	672.32	1377.6
28	76.4	2800	7640
100	100	0	0
		3706.74	9389.36

$G = 1/(100)^2 * 3706.74\text{-}9389.36$

0.56826

Year 1971

ΣX_i	ΣY_i	$\Sigma X_i Y_{i+1}$	$\Sigma X_{i+1} Y_i$
4.1	38.5	243.95	381.15
9.9	59.5	707.85	1011.5
17	71.5	1521.5	2609.75
36.5	89.5	3650	8950
100	100	0	0
		6123.3	12952.4

$G = 1/(100)^2 * 6123.3\text{-}12952.4$

0.68291

Year 1996

ΣX_i	ΣY_i	$\Sigma X_i Y_{i+1}$	$\Sigma X_{i+1} Y_i$
0.55	8.84	10.417	19.0944
2.16	18.94	71.1504	117.6174
6.21	32.94	461.403	1115.348
33.86	74.3	3386	7430
100	100	0	0
		3928.97	8682.06

G = 1/(100)2 * 3928.97-8682.06

0.47531

Year 2001

ΣX_i	ΣY_i	$\Sigma X_i Y_{i+1}$	$\Sigma X_{i+1} Y_i$
0.11	2	0.803	1.5
0.75	7.3	12.975	21.024
2.88	17.3	175.968	433.365
25.05	61.1	2505	6110
100	100	0	0
		2694.746	6565.889

$G = 1/(100)^2 * 2964.746\text{-}6565.889$

0.38711

Year 2004

ΣX_i	ΣY_i	$\Sigma X_i Y_{i+1}$	$\Sigma X_{i+1} Y_i$
0.1	1.9	0.76	1.52
0.8	7.6	12.8	20.52
2.7	16	169.29	433.6
27.1	62.7	2710	6270
100	100	0	0
		2892.85	6725.64

$G = 1/(100)^2 * 2892.85\text{-}6725.64$

0.38328

Annex 4B
Distribution of Forests and Shrubland by Development Regions

	Forest area (ha)	Shrub area (ha)	Total Forest
FWDR	687400	263900	951300
MWDR	1192400	442000	1634400
WDR	734300	256900	991200
CDR	918600	233800	1152400
EDR	736100	362600	1098700
All Nepal	**4268800**	**1559200**	**5828000**

Annex 4C
Proportion of Conifer and Broadleaf Species in Nepal

	Volume million m^3	% of total volume
Conifers	54.9	14.2
Pinus *roxburghii*	24.4	6.3
Abies *spectabilis*	17.2	4.4
Tsuga *dumosa*	7.3	1.9
Pinus *wallichina*	4.1	1.1
Abies *Pindrow*	1.8	0.5
Other conifers		0.02
Broadleaves	332.6	85.8

Annex 4D

Total Stem Volume of the Main Tree Species

Species	Total stem volume million (m^3)	% of total stem volume
Shorea *robusta*	109.4	28.2
Quercus spp.	35.9	9.3
Terminalia alata	29.4	7.6
Pinus *roxburghii*	24.4	6.3
Abies *spectabilis*	17.2	4.4
Rhododendron spp.	16.4	4.2
Alnus *nepalensis*	11.2	2.9
Schima *wallichii*	7.9	2.0
Miscellaneous	135.7	35.0
Total	387.5	100

Annex 4E

Total Stem Volume (Million m^3) by Altitude Class and Development Region

Altitude class (m)	FWDR	MWDR	WDR	CDR	EDR	Nepal
0-500	27.9	27.5	15.7	33.6	23.8	128.5
501-1000	12	18.4	3	15.9	10.3	59.6
1001-1500	9.2	6.7	4.1	5.6	13.2	38.8
1501-2000	17.2	4.3	2.3	8.9	8.7	41.4
2001-2500	5.6	5	6.1	6.2	17	39.9
2501-3000	n/a	6.1	10.4	17.4	23.7	57.6
3001-	n/a	3.1	2.2	2.2	14.2	21.7
Total	71.9	71.1	43.8	89.8	110.9	387.5

Annex 4F

Community Forest Area (ha) by Forest Condition in Different Ecological Belts

	Forest condition					
Ecological region	**Not specified**	**Degraded**	**Good**	**Very degraded**	**Very good**	**Total**
High Mountain	15,050.98	41,727.89	144,375.89	4,081.79	20,502.12	225,738.68
Middle Hills	56,302.48	109,112.04	524,278.38	6,800.28	65,184.59	761,677.77
Terai/InnerTerai	11,389.42	27,119.51	94,005.30	12,010.30	7,292.02	151,816.56
Total	82,742.88	177,959.45	762,659.57	22,892.37	92,978.73	1,139,233.01

Annex 4G

Community Forests (ha) by Forest Condition in Development Regions of Nepal

Development Region	**Forest condition**					**Total**
	Very Good	**Good**	**Degraded**	**Very Degraded**	**Not specified**	
Central	25303	174268	37541	2591	9336	249040
Eastern	23300	193862	51765	12807	17613	299347
Far Western	12140	92870	32274	1677	827	139788
Mid Western	16046	176227	33418	4074	50125	279890
Western	16190	125433	22961	1744	4841	171169
Total	92979	762660	177959	22892	82743	1139233

Annex 4H
Distribution of Community Forests by Ecological Regions

Ecological regions	% of FUG	% of CF area	% of Beneficiary households
High Mountain	18.6	19.8	16.7
Middle Hills	73.3	66.9	67.9
Terai/Inner Terai	8.0	13.3	15.4

Ecological regions	% of forest area	% of beneficiary HH	ΣX_i	ΣY_i	$\Sigma X_i Y_{i+1}$	$\Sigma X_{i+1} Y_i$
High Mountain	19.8	16.7	13.3	15.4	1107.89	1235.08
Middle Hills	66.9	67.9	80.2	83.3	8020	8330
Terai/Inner Terai	13.3	15.4	100	100	0	0
All Nepal					9127.89	9565.08

$G = 1/(100)^2 * (9127.89-9565.08)$

$= 0.043719$

Annex 4I
The Hand Over of Forests in Hectares by Forest Type or Tree Species from the year 1991 to 2000

	Year				
Tree species	**1991**	**1992**	**1993**	**1994**	**1995**
Alnus *nepalensis*	544	1,056	2,326	3,074	3,556
Oak- rhododendron	938	5,286	4,240	8,535	9,632
Pinus *roxburghii* (Pine)	3,591	11,785	17,402	22,830	25,612
Schima *castanopsis*	2,224	9,025	12,443	16,814	14,678
Shorea *robusta* (Sal)	5,508	13,078	22,506	34,181	45,622
Subtropical deciduous	4,590	7,726	10,869	17,518	26,477
Upper slope coniferous	514	2,175	9,185	12,336	20,975
Upper slope mixed hardwood	2,397	851	6,107	3,216	8,262
Total	20,307	50,982	85,079	118,504	154,814

Annex 4I Contd…

Tree species	1996	1997	1998	1999	2000	Total	% of hand over
Alnus *nepalensis*	2,389	2,610	1,858	1,134	1,735	20,281	2.1
Oak- rhododendron	6,245	14,597	7,772	5,988	4,857	68,088	7.2
Pinus *roxburghii* (Pine)	24,947	22,069	13,467	14,940	13,667	170,311	18.0
Schima *castanopsis*	11,903	9,740	6,866	7,893	5,166	96,752	10.2
Shorea *robusta* (Sal)	42,378	50,007	44,022	35,255	29,286	321,845	33.9
Subtropical deciduous	25,863	19,136	15,254	12,205	12,800	152,437	16.1
Upper slope coniferous	7,499	10,588	1,951	5,184	5,563	75,970	8.0
Upper slope mixed hardwood	7,454	4,404	2,432	4,095	3,202	42,421	4.5
Total	128,677	133,151	93,622	86,695	76,276	948,106	100.0

Annex 4J

Area of Community Forests (ha) by Tree Species in Different Ecological Belts

Forest type	Ecological belts			Total
	High Mountain	Middle Hills	Terai/InnerTerai	
Shorea *robusta* (Sal)	23657	265968	86556	376181
Upper slope mixed hardwood	24300	23877	2161	50338
Oak- rhododendron	27736	47440		75176
Upper slope coniferous	71902	12042	328	84273
Pinus *roxburghii* (Pine)	31506	156008	366	187880
Subtropical deciduous	7534	125927	57056	190516
Schima *castanopsis*	23654	82810		106464
Alnus *nepalensis*	4688	17144		21832
Not specified	10761	30462	5349	46572
Total	225739	761678	151816	**1139233**

Annex 4K

Women in FUG Committee in Nepal

S.N.	District	No of FUG	No of committee members	No of Women in Committee
1.	Achham	264	2718	478
2.	Arghakhanchi	251	2855	705
3.	Baglung	337	4081	1418
4.	Baitadi	294	3292	560
5.	Bajhang	272	3276	779
6.	Bajura	218	2449	562
7.	Banke	59	778	247
8.	Bara	13	180	50
9.	Bardiya	122	1453	713
10.	Bhaktapur	54	658	272
11.	Bhojpur	383	4177	924
12.	Chitwan	24	304	81
13.	Dailekh	217	2461	643
14.	Dandeldhura	290	3377	899
15.	Dang	373	2814	712
16.	Darchula	225	2649	690
17.	Dhading	472	4850	1684
18.	Dhankuta	329	3702	765
19.	Dhanusha	20	252	40
20.	Dolakha	268	3240	1022
21.	Dolpa	48	556	133
22.	Doti	193	2416	607
23.	Gorkha	330	3831	1065
24.	Gulmi	249	3036	672
25.	Humla	56	633	160
26.	Ilam	174	2198	518
27.	Jajarkot	181	1801	398
28.	Jhapa	26	438	40
29.	Jumla	101	1333	577
30.	Kabhrepalanchowk	401	4319	774
31.	Kailali	23	288	155
32.	Kalikot	97	1170	291
33.	Kanchanpur	28	396	83
34.	Kapilbastu	19	224	49
35.	Kaski	401	3871	765
36.	Kathmandu	148	1647	540
37.	Khotang	216	2868	439
38.	Lalitpur	170	1833	326

39.	Lamjung	245	2594	531
40.	Mahottari	53	561	129
41.	Makwanpur	249	2964	683
42.	Manang	19	173	15
43.	Morang	26	353	83
44.	Mugu	69	858	251
45.	Myagdi	251	2952	865
46.	Nawalparasi	32	398	98
47.	Nuwakot	263	3114	479
48.	Okhaldhunga	219	2495	781
49.	Palpa	465	5267	997
50.	Panchthar	129	1686	331
51.	Parbat	287	3190	994
52.	Parsa	25	332	42
53.	Pyuthan	287	3063	838
54.	Ramechhap	317	4090	1240
55.	Rasuwa	111	1297	327
56.	Rauthat	15	180	59
57.	Rolpa	220	2442	686
58.	Rukum	228	2512	449
59.	Rupandehi	25	387	62
60.	Salyan	260	808	179
61.	Sankhuwasabha	235	2602	582
62.	Saptari	105	1276	344
63.	Sarlahi	31	416	138
64.	Sindhu Palchowk	417	4963	1082
65.	Sindhuli	199	2496	723
66.	Siraha	78	944	256
67.	Solukhumbu	121	1596	265
68.	Sunsari	10	119	8
69.	Surkhet	199	2291	845
70.	Syangja	369	4071	919
71.	Tanahu	358	4090	1027
72.	Taplejung	79	974	236
73.	Terahathum	293	3115	598
74.	Udaypur	156	2027	564
	Total	**13791**	**155120**	**38542**

Source : DoF Database, 2004.

Annex 4L

Gini Coefficient of CF Distribution by Size of the Forest

1) Gini coefficient of CF distribution by size of the forest, 2004

Community forest group	No of forest	Total area (ha)	Total HH
< 10 ha	2736	13,932.70	185,261.00
10.01 to 50 ha	5227	135,069.23	489,733.00
50.01 to 100 ha	2553	179,912.03	314,356.00
100.01 to 200 ha	1882	260,911.95	272,579.00
200.01 to 500 ha	1099	321,340.64	233,304.00
500.01 to 1000 ha	210	141,362.74	58,195.00
more than 1000.01 ha	51	86,683.71	21,883.00
Total	**13758**	**1139213**	**1575311**

Community forest group	Total area (%)	Total HH (%)	∑Xi	∑Yi	∑Xi Yi+1	∑Xi+1 Yi
< 10 ha	1.2	11.8	7.61	1.4	38.67938	27.80731
10.01 to 50 ha	11.9	31.1	20.02	5.1	398.2228	245.1435
50.01 to 100 ha	15.8	20.0	48.23	19.9	1793.808	1414.973
100.01 to 200 ha	22.9	17.3	71.13	37.2	4065.084	3233.146
200.01 to 500 ha	28.2	14.8	86.92	57.2	7669.852	5645.273
500.01 to 1000 ha	12.4	3.7	98.78	88.2	9877.699	8823.972
> 1000.01 ha	7.6	1.4	100.00	100.0	0	0
Total	100.0	100.0			23843.34	19390.31

$G=1/(100)^2$ 23843.34-19390.31

0.445303

2) Gini coefficient of CF distribution by size of the forest, 2007.

Size of CF	No of Forests	Total area (ha)	Total # of HH
< 10 ha	2943	15424.08	200236
10.01-50 ha	5406	143064.49	509973
50.01-100 ha	2614	187921.72	321580
100.01 - 200 ha	1950	274314.25	293356
200.01 - 500 ha	1131	334205.42	241661
500.01 - 1000 ha	211	142554.11	58809
> 1000.01 ha	55	121787.88	21076
Total	**14310**	**1219272**	**1646691**

Size of CF	% of area	% of HH	∑Xi	∑Yi	∑XiYi+1	∑Xi+1Yi
< 10 ha	1.265	12.160	9.989	1.280	48.45908	27.74864
10.01-50 ha	11.734	30.970	21.680	4.851	423.3471	238.1503
50.01-100 ha	15.413	19.529	49.091	19.527	1833.124	1397.899
100.01 - 200 ha	22.498	17.815	71.589	37.342	4071.291	3248.777
200.01 - 500 ha	27.410	14.676	87.001	56.871	7642.21	5615.111
500.01 - 1000 ha	11.692	3.571	98.735	87.840	9873.498	8784.01
> 1000.01 ha	9.989	1.280	100.000	100.000	0	0
Total	**100.000**	**100.000**			23891.93	19311.7

$G=1/(100)^2$ 23891.93-19311.7

G=**0.458023**

3) Gini coefficient of community forest distribution by size of the forest in Nepal, 2009.

Size of CF	No of FUGs	Total CF in ha	Total # of HH	Total area %	Total HH %
< 10 ha	2991	15291.9	196429	1.243578	11.83468
10.01-50 ha	5430	143642.9	502276	11.68142	30.26169
50.01-100 ha	2633	189341.1	328529	15.39772	19.79359
100.01 - 200 ha	1972	277492.9	302214	22.56646	18.20813
200.01 - 500 ha	1145	337759.2	249559	27.46747	15.03571
500.01 - 1000 ha	213	144121.3	59692	11.72033	3.596391
> 1000.01 ha	55	122020.6	21076	9.923035	1.269811
Total	14439	1229670	1659775	100	100
Gini coefficient					**0.451**

Source: Authors' computation from National FUG database, DoF, 2009.

Annex 4M

Hand Over of Potential Community Forest by Development Regions

Region	No of FUG	Total area	Forest area	Potential CF Area	Area H.O.	% of area (H.O./Potential)	Total HH
Central	3250	2826660	1391820	574032	249039.7	0.433843	1502425
Eastern	2579	2488599	934644	677845	299346.9	0.441616	1026328
Far Western	1807	1844295	841945	522477	139787.6	0.267548	371772
Mid Western	2517	4280202	1726986	871966	279889.7	0.320987	541231
Western	3638	2579563	1043538	774092	171169	0.221122	866715
All Nepal	**13791**	**14019319**	**5938933**	**3420412**	**1139233**	**0.33307**	**4308471**

Annex 4N

Land Tenure in Nepal.

Number and area of holdings with land tenure, Nepal 1991/92 - 2001/02 (in thousands)			
Land Tenure	**1991/92**	**2001/02**	**% increase /Decrease**
Total number of holdings	2703.9	3337.4	23.43
One form of tenure	2303.3	2939.6	27.63
Owned	2239.1	2896.2	29.35
Rented from others	47	35.5	-24.47
Other tenure form	17.3	7.9	-54.34
More than one tenure form	400.6	397.9	-0.67
Total area of holdings	2597.4	2653.9	2.18
One form of tenure	2152.7	2241.1	4.11
Owned	2109.5	2212.8	4.90
Rented from others	36.1	26.3	-27.15
Other tenure form	7.1	2	-71.83
More than one tenure form	444.7	412.9	-7.15
Owned	252.6	204.5	-19.04
Rented from others	185.1	204.2	10.32
Other tenure form	7	4.2	-40.00

Annex 4O

Landlessness in Nepal

	All holdings		No land			With land		
Ecological belt/Development Region	**No of holdings**	**Total area (ha)**	**Avg area (ha)**	**No of holdings**	**Total area (ha)**	**No of holdings**	**Total area (ha)**	**Avg area (ha)**
Nepal	3364139	2654037	0.789	26700	118.2	3337439	2653919	0.795
Mountain	298223	218706.6	0.733	989	2.3	297234	218704.3	0.736
Hill	1586406	1038615	0.655	4985	7.3	1581421	1038607	0.657
Terai	1479510	1396716	0.944	20726	108.6	1458784	1396607	0.957
Development region								
Eastern	810017	795521.4	0.982	10339	50.8	799678	795470.6	0.995
Central	1035827	750212.9	0.724	8888	50.2	1026939	750162.7	0.730
Western	715808	512152.1	0.715	4079	7.7	711729	512144.4	0.720
Mid-western	469527	370702.1	0.790	2108	5.8	467419	370696.3	0.793
Far Western	332960	225448.8	0.677	1285	3.7	331675	225445.1	0.680

Annex 4P
Area and Fragmentation of Holdings in Nepal 1961/62 - 2001/01

Category	1961/61	1971/72	1981/82	1991/92	2001/02	Changes from 1971/72 to 2001.02
Total holdings (000)	1540	1721.2	2194	2736.1	3364.1	118.4481
% increase		11.77	27.47	24.71	22.95	
Holdings with land	1518	1707.3	2185.7	2703.9	3337.4	119.8551
% increase/decrease		12.47	28.02	23.71	23.43	
Holdings with no land	22	13.9	8.2	32.1	26.7	21.36364
% increase/decrease		-36.82	-41.01	291.46	-16.82	
Holdings with land						
Area of holdings (000)	1685.4	1654	2463.7	2597.4	2654	57.47004
% increase/decrease		-1.86	48.95	5.43	2.18	
Average holding size	1.09	0.96	1.12	0.95	0.79	-27.9142
% increase/decrease		-12.19	16.85	-15.46	-16.90	
Number of parcels (000)	10318.2	12282.5	9516.4	10806.2	10987.4	6.485627
% increase/decrease		19.04	-22.52	13.55	1.68	
Average parcel/holding	6.8	7.2	4.4	4.0	3.3	-51.5655
% increase/decrease		5.84	-39.48	-8.21	-17.62	
Average parcel size (ha)	0.15	0.14	0.23	0.25	0.30	106.4646
% increase/decrease		-5.52	65.23	8.94	21.39	
Recalculated from the table						

Table 2. Number and area of holdings by size of holding, Nepal, 2001/02

Size of holding (ha)	Holdings				Area in Ha		
	Number (000)	Percent	Cumulative percent		Area (000ha)	Percent	Cumulative Percent
Total	3364.1				2654		
Holdings with no land	26.7	0.79	0.79		0.1		0
Holdings with land	3337.4	99.2	100		2653.9		100
under 0.1 ha	260.5	7.74	7.74		13.2	0.50	0.50
0.1-<0.2	346.1	10.29	18.03		49.9	1.88	2.38
0.2-<0.5	972.3	28.90	46.93		327.1	12.32	14.70
0.5-1.0	915.7	27.22	74.15	74.95	641.7	24.18	38.88
1.0-<2.0	588.6	17.50	91.65		792	29.84	68.72
2.0-<3.0	157	4.67	96.32	22.16	371.2	13.99	82.71
3.0-<4.0	51.6	1.53	97.85		175.7	6.62	89.33
4.0-<5.0	20.2	0.60	98.45	2.13	89.3	3.36	92.69
5.0-<10.0	21.6	0.64	99.09	0.64	139.8	5.27	97.96
10.0 and over	3.8	0.11	99.21	0.11	54.2	2.04	100.00

Annex 4Q

Holding Renting Land: Area by Condition of Rent, Nepal, 1991/92-2001/02

Condition of rent	2001/02				
	Holdings (000)	% to total	Area (000ha)	%	Avg area
Total holdings renting land	445.8	95.09	230.50	104.20	0.52
Fixed amount of money	28.4	6.06	11.5	5.20	0.40
Fixed quantity of produce	65.7	14.01	35.3	15.96	0.54
Share of produce	256.4	54.69	159	71.88	0.62
Exchange for service	11.6	2.47	2.6	1.18	0.22
Mortgage	69.1	14.74	18.9	8.54	0.27
Other	14.6	3.11	3.2	1.45	0.22
Recalculated					

Annex 4R

Landholdings by Regions

Table: selected holding characteristics of ecological belts and development region Nepal 2001/02

Geographic area	No of holdings (000)	area of holdings (000 ha)	average holding size (ha)
Nepal	3364.1	2654	0.79
Ecological belts			
Mountain	298.2	218.7	0.73
Hill	1586.4	1038.6	0.65
Terai	1479.5	1396.7	0.94
Development Regions			
Eastern	810	795.5	0.98
Central	1036.8	750.2	0.72
Western	715.8	512.2	0.72
Mid-western	469.5	370.7	0.79
Far Western	333	225.4	0.68

		2001/01			1991/92		
	Ecological belt/ Development Region	**No of holdings (000)**	**area of holdings (000 ha)**	**average holding size (ha)**	**No of holdings (000)**	**area of holdings (000 ha)**	**average holding size (ha)**
	Nepal	3364.1	2654	0.789	2736.1	2598.97	0.950
Mountain		298.2	218.7	0.733	260.7	176.9	0.679
	Eastern	71.3	69.4	0.973	63.7	61.2	0.961
	Central	105.5	67.8	0.643	89.9	58.4	0.650
	Western	4.2	2.4	0.571	3.4	2	0.588
	Mid-western	50.2	38.8	0.773	46	24.5	0.533
	Far Western	67	40.3	0.601	57.7	30.8	0.534
Hill		1586.4	1038.6	0.655	1357.7	1047.3	0.771
	Eastern	282.8	256.6	0.907	245.8	282.4	1.149
	Central	429.2	237	0.552	360.8	236	0.654
	Western	485.2	302.8	0.624	422	329.3	0.780
	Mid-western	253.9	171.7	0.676	209.8	144.1	0.687
	Far Western	135.3	70.6	0.522	119.2	55.6	0.466
Terai		1479.5	1396.7	0.944	1117.6	1374.8	1.230
	Eastern	455.9	469.5	1.030	326.9	440.4	1.347
	Central	501.1	445.4	0.889	404.6	425.9	1.053
	Western	226.5	207	0.914	183.4	235.2	1.282
	Mid-western	165.4	160.2	0.969	115.6	156.3	1.352
	Far Western	130.6	114.6	0.877	87.2	117	1.342
Recalculated							

Landholdings by regions (Contd..)

	1991-2001	% Increase/Decrease	
Region	No of holdings (000)	area of holdings (000 ha)	average holding size (ha)
Nepal	22.95	2.12	-16.95
Mountain	14.38	23.63	8.08
Eastern	11.93	13.40	1.31
Central	17.35	16.10	-1.07
Western	23.53	20.00	-2.86
Mid-western	9.13	58.37	45.12
Far Western	16.12	30.84	12.68
Hills	16.84	-0.83	-15.13
Eastern	15.05	-9.14	-21.02
Central	18.96	0.42	-15.58
Western	14.98	-8.05	-20.02
Mid-western	21.02	19.15	-1.54
Far Western	13.51	26.98	11.87
Terai	32.38	1.59	-23.26
Eastern	39.46	6.61	-23.56
Central	23.85	4.58	-15.56
Western	23.50	-11.99	-28.74
Mid-western	43.08	2.50	-28.36
Far Western	49.77	-2.05	-34.60

Annex 4S

Forest Type of Community Forests by Beneficiary Households

Type of CF	Area in hectares	Percent area	Beneficiary households	Percent beneficiaries
Forest	713461.67	63.0	835447.00	53.0
Shrub	115500.41	10.0	194074.00	12.0
Forest/Shrub	107634.94	9.0	108700.00	7.0
Forest/Plantation	58577.98	5.0	118901.00	8.0
	39014.79	3.0	45634.00	3.0
Shrub/Plantation	27188.50	2.0	61610.00	4.0
Plantation	25148.28	2.0	133509.00	8.0
Forest/Grass	15802.44	1.0	16847.00	1.0
Forest/Shrub/Plantation	9793.56	1.0	12348.00	1.0
Forest/Shrub/Grass	5768.11	1.0	7119.00	0.0
Shrub/Grass	5392.14	0.0	9734.00	1.0
Forest/Shrub/Plantation/Grass	5316.31	0.0	5186.00	0.0
Plantation/Grass	3669.11	0.0	10233.00	1.0
Shrub/Plantation/Grass	3290.41	0.0	4313.00	0.0
Grass	1865.63	0.0	8019.00	1.0
Forest/Plantation/Grass	1808.73	0.0	3838.00	0.0
Total	**1139233.01**	100.0	**1575512.00**	100.0

Annex 4T

Gini Coefficients of Land Distribution by Farm Size in Different Regions of Nepal

Mountain	% of HH	% of cultivated area	∑ Xi	∑ Yi	∑ Xi Yi+1	∑ Xi+1 Yi
Less than 0.1 ha	6.0	0.4	8.4	31.0	533.4	911.4
0.1-0.25	9.9	1.9	29.4	63.5	2590.14	3848.1
0.25-0.50	23.5	9.6	60.6	88.1	5920.62	7409.21
0.50-1.0	31.2	24.6	84.1	97.7	8376.36	9183.8
1.0 - 2.0	21.0	32.5	94.0	99.6	9400	9960
2.0 and over	8.4	31	100.0	100.0	0	0
					26820.52	31312.51

G= 1/(100)^2 * (h33-i33)

0.4492

Hills	% of HH	% of cultivated area	∑Xi	∑ Yi	∑Xi Yi+1	∑Xi+1 Yi
Less than 0.1 ha	6.8	0.5	4.0	17.1	192.8	335.16
0.1-0.25	17.1	4.3	19.6	48.2	1597.4	2448.56
0.25-0.50	25.3	13.7	50.8	81.5	4836.16	6202.15
0.50-1.0	31.2	33.3	76.1	95.2	7571.95	8872.64
1.0 - 2.0	15.6	31.1	93.2	99.5	9320	9950
2.0 and over	4	17.1	100.0	100.0	0	0
					23518.31	27808.51

G= 1/(100)^2 * (h33-i33)

0.42902

Terai	% of HH	% of cultivated area	∑ Xi	∑ Yi	∑ Xi Yi+1	∑ Xi+1 Yi
Less than 0.1 ha	8.1	0.4	12.0	41.6	873.6	1431.04
0.1-0.25	15.4	2.6	34.4	72.8	3109.76	4273.36
0.25-0.50	17.8	6.6	58.7	90.4	5693.9	6915.6
0.50-1.0	24.3	17.6	76.5	97.0	7619.4	8914.3
1.0 - 2.0	22.4	31.2	91.9	99.6	9190	9960
2.0 and over	12	41.6	100.0	100.0	0	0
					26486.66	31494.3

G= 1/(100)^2 * (h33-i33)

0.50076

Nepal	% of HH	% of cultivated area	∑ Xi	∑Yi	∑Xi Yi+1	∑ Xi+1 Yi
Less than 0.1 ha	7.3	0.4	8.0	31.4	501.6	850.94
0.1-0.25	15.7	3.2	27.1	62.7	2352.28	3461.04
0.25-0.50	21.8	9.6	55.2	86.8	5321.28	6683.6
0.50-1.0	28.1	24.1	77.0	96.4	7669.2	8936.28
1.0 - 2.0	19.1	31.3	92.7	99.6	9270	9960
2.0 and over	8	31.4	100.0	100.0	0	0
					25114.36	29891.86

G= 1/(100)^2 * (h33-i33)

0.47775

EDR	% of HH	% of cultivated area	∑ Xi	∑ Yi	∑Xi Yi+1	∑ Xi+1 Yi
Less than 0.1 ha	4.8	0.2	14.7	45.0	1128.96	1782
0.1-0.25	13.5	1.9	39.6	76.8	3631.32	4830.72
0.25-0.50	18.8	6.2	62.9	91.7	6157.91	7491.89
0.50-1.0	23.3	14.9	81.7	97.9	8153.66	9320.08
1.0 - 2.0	24.9	31.8	95.2	99.8	9520	9980
2.0 and over	14.7	45	100.0	100.0	0	0
					28591.85	33404.69

G= 1/(100)^ 2 * (h33-i33)

0.48128

CDR	% of HH	% of cultivated area	∑ Xi	∑Yi	∑ Xi Yi+1	∑Xi+1 Yi
Less than 0.1 ha	8.7	0.7	4.5	19.9	237.15	423.87
0.1-0.25	17.7	4.5	21.3	52.7	1759.38	2677.16
0.25-0.50	22.8	12.2	50.8	82.6	4815.84	6079.36
0.50-1.0	29.5	29.9	73.6	94.8	7308.48	8655.24
1.0 - 2.0	16.8	32.8	91.3	99.3	9130	9930
2.0 and over	4.5	19.9	100.0	100.0	0	0
					23250.85	27765.63

G= 1/(100)^2 * (h33-i33)

0.45148

WDR	% of HH	% of cultivated area	∑Xi	∑ Yi	∑Xi Yi+1	∑Xi+1 Yi
Less than 0.1 ha	6.1	0.5	5.1	21.8	275.91	501.4
0.1-0.25	14.3	3.3	23.0	54.1	1902.1	2834.84
0.25-0.50	27.2	13.5	52.4	82.7	5040.88	6582.92
0.50-1.0	29.4	28.6	79.6	96.2	7920.2	9033.18
1.0 - 2.0	17.9	32.3	93.9	99.5	9390	9950
2.0 and over	5.1	21.8	100.0	100.0	0	0
					24529.09	28902.34

G= 1/(100)^2 * (h33-i33)

0.43733

MWDR	% of HH	% of cultivated area	∑Xi	∑Yi	∑Xi Yi+1	∑ Xi+1 Yi
Less than 0.1 ha	11.6	0.7	7.6	31.3	461.32	760.59
0.1-0.25	19.5	4.1	24.3	60.7	2145.69	3247.45
0.25-0.50	15.4	6.9	53.5	88.3	5093.2	6083.87
0.50-1.0	29.2	27.6	68.9	95.2	6841.77	8415.68
1.0 - 2.0	16.7	29.4	88.4	99.3	8840	9930
2.0 and over	7.6	31.3	100.0	100.0	0	0
					23381.98	28437.59

G= 1/(100)^2 * (h33-i33)

0.50556

FWDR	% of HH	% of cultivated area	∑ Xi	∑Yi	∑ Xi Yi+1	∑Xi+1 Yi
Less than 0.1 ha	6.1	0.3	9.6	35.6	588.48	961.2
0.1-0.25	11.8	2.5	27.0	61.3	2367.9	3622.83
0.25-0.50	23.0	9.5	59.1	87.7	5744.52	7200.17
0.50-1.0	32.1	26.4	82.1	97.2	8185.37	9127.08
1.0 - 2.0	17.4	25.7	93.9	99.7	9390	9970
2.0 and over	9.6	35.6	100.0	100.0	0	0
					26276.27	30881.28

G= 1/(100)^2 * (h33-i33)

0.4605

Urban	% of HH	% of cultivated area	∑ Xi	∑ Yi	∑ Xi Yi+1	∑Xi+1 Yi
Less than 0.1 ha	16.5	1.4	4.7	25.1	238.29	379.01
0.1-0.25	24.5	7.1	15.1	50.7	1146.09	1774.5
0.25-0.50	24.0	15.6	35.0	75.9	3202.5	4478.1
0.50-1.0	19.9	25.2	59.0	91.5	5817.4	7640.25
1.0 - 2.0	10.4	25.6	83.5	98.6	8350	9860
2.0 and over	4.7	25.1	100.0	100.0	0	0
					18754.28	24131.86

G= 1/(100)^2 * (h33-i33)

0.53776

Rural	% of HH	% of cultivated area	∑ Xi	∑ Yi	∑ Xi Yi+1	∑Xi+1 Yi
Less than 0.1 ha	6.6	0.4	8.2	31.6	518.24	884.8
0.1-0.25	15.0	3.0	28.0	63.2	2444.4	3589.76
0.25-0.50	21.6	9.3	56.8	87.3	5486.88	6844.32
0.50-1.0	28.8	24.1	78.4	96.6	7808.64	9022.44
1.0 - 2.0	19.8	31.6	93.4	99.6	9340	9960
2.0 and over	8.2	31.6	100.0	100.0	0	0
					25598.16	30301.32

G= 1/(100)^2 * (h33-i33)

0.47032

Urban Ktm	% of HH	% of cultivated area	∑Xi	∑ Yi	∑Xi Yi+1	∑Xi+1 Yi
Less than 0.1 ha	41.5	16.2	0.0	0.0	0	0
0.1-0.25	45.3	51.9	0.0	0.0	0	0
0.25-0.50	12.1	27.2	1.1	4.7	35.09	62.04
0.50-1.0	1.1	4.7	13.2	31.9	1106.16	1866.15
1.0 - 2.0	0.0	0.0	58.5	83.8	5850	8380
2.0 and over	0	0	100.0	100.0	0	0
					6991.25	10308.19

G= 1/(100)^2 * (h33-i33)

0.33169

Urban other	% of HH	% of cultivated area	∑Xi	∑Yi	∑Xi Yi+1	∑Xi+1 Yi
Less than 0.1 ha	12.0	0.9	5.6	26.0	295.68	462.8
0.1-0.25	20.7	5.3	17.8	52.8	1400.86	2170.08
0.25-0.50	26.2	15.1	41.1	78.7	3855.18	5296.51
0.50-1.0	23.3	25.9	67.3	93.8	6669.43	8254.4
1.0 - 2.0	12.2	26.8	88.0	99.1	8800	9910
2.0 and over	5.6	26	100.0	100.0	0	0
					21021.15	26093.79

G= 1/(100)^2 * (h33-i33)

0.50726

Rural East Mts/Hills	% of HH	% of cultivated area	∑Xi	∑ Yi	∑Xi Yi+1	∑ Xi+1 Yi
Less than 0.1 ha	5.2	0.3	7.3	27.3	446.03	753.48
0.1-0.25	14.8	3.1	27.6	61.1	2387.4	3501.03
0.25-0.50	22.7	10.1	57.3	86.5	5535.18	6920
0.50-1.0	29.7	25.4	80.0	96.6	7976	9157.68
1.0 - 2.0	20.3	33.8	94.8	99.7	9480	9970
2.0 and over	7.3	27.3	100.0	100.0	0	0
					25824.61	30302.19

G= 1/(100)^2 * (h33-i33)

0.44776

Rural West Mts/Hills	% of HH	% of cultivated area	∑ Xi	∑ Yi	∑ Xi Yi+1	∑Xi+1 Yi
Less than 0.1 ha	5.8	0.5	2.7	11.4	109.08	191.52
0.1-0.25	15.3	4.1	16.8	40.4	1340.64	2076.56
0.25-0.50	27.5	15.6	51.4	79.8	4903.56	6296.22
0.50-1.0	34.6	39.4	78.9	95.4	7850.55	8986.68
1.0 - 2.0	14.1	29.0	94.2	99.5	9420	9950
2.0 and over	2.7	11.4	100.0	100.0	0	0
					23623.83	27500.98

G= 1/(100)^2 * (h33-i33)

0.38772

East Terai	% of HH	% of cultivated area	∑ Xi	∑ Yi	∑Xi Yi+1	∑ Xi+1 Yi
Less than 0.1 ha	6.8	0.4	11.2	39.7	803.04	1337.89
0.1-0.25	15.6	2.7	33.7	71.7	3019.52	4187.28
0.25-0.50	19.2	7.3	58.4	89.6	5658.96	6952.96
0.50-1.0	24.7	17.9	77.6	96.9	7728.96	9031.08
1.0 - 2.0	22.5	32.0	93.2	99.6	9320	9960
2.0 and over	11.2	39.7	100.0	100.0	0	0
					26530.48	31469.21

G= 1/(100)^2 * (h33-i33)

0.49387

West Terai	% of HH	% of cultivated area	∑Xi	∑Yi	∑Xi Yi+1	∑Xi+1 Yi
Less than 0.1 ha	10.2	0.5	14.1	45.4	1070.19	1711.58
0.1-0.25	13.9	2.2	37.7	75.9	3483.48	4683.03
0.25-0.50	14.2	4.9	61.7	92.4	6003.41	7013.16
0.50-1.0	24.0	16.5	75.9	97.3	7552.05	8737.54
1.0 - 2.0	23.6	30.5	89.8	99.5	8980	9950
2.0 and over	14.1	45.4	100.0	100.0	0	0
					27089.13	32095.31

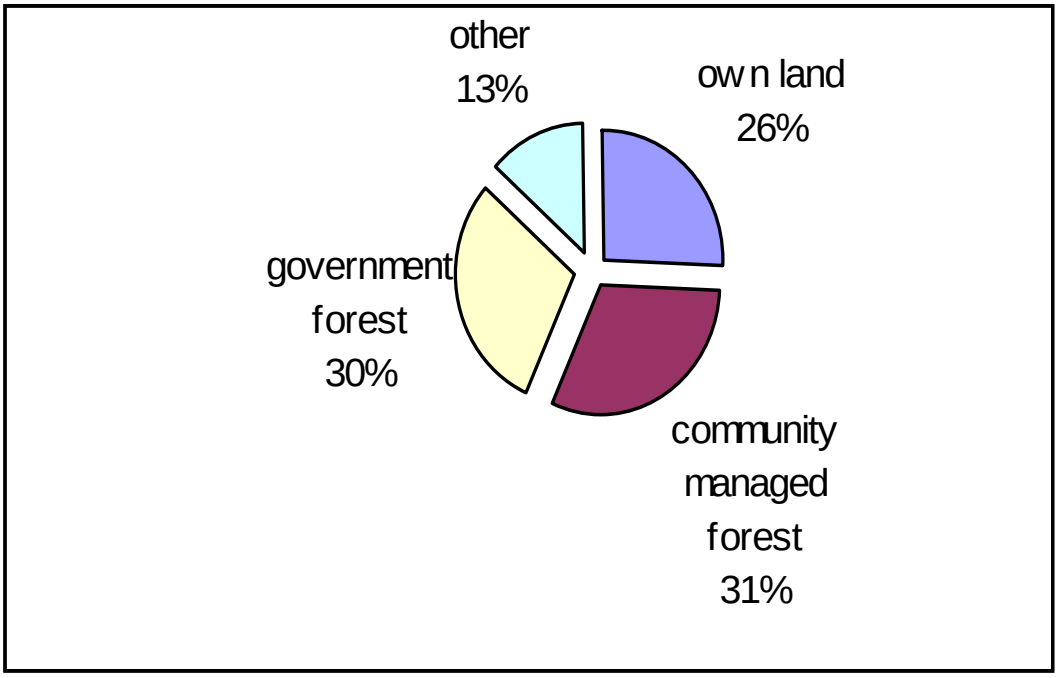
G= 1/(100)^2 * (h33-i33)

0.50062

Annex 5A

Collection of Firewood from Different Sources.

own land	**25.74**
community managed forest	30.6
government forest	30.3
other	13.4
Total	100



Annex 6A
Different Sources of Monthly Income in the Sampled Households of Badikhel, Lalitpur

HH_Owner	W/R	Fra. micash	Fra. mipt	Fra. miah	Sr. mi	Se. mi	Wl. mi	Cf. mi	O. mi
Chalise Vasker Nath	100	1267	642	3750	10000	0	0	42	15701
Chalise Ganga Prasad	93	1358	833	2433	2200	0	0	90	6914
Pahari Lurrae	71	47	25	0	4000	0	0	0	4072
Pahari San Bahadur	47	534	467	42	0	5000	482	0	6525
Pahari Prem Bahadur	11	109	0	0	2000	1750	0	0	3859
Pahari Durga Bahadur	52	338	292	0	0	4000	52	317	4999
Khatri Ram Saran	103	2867	700	1200	5500	0	0	412	10679
Neupane Basudev	101	1273	0	2200	2000	6000	0	0	11473
Pahari Santa lal	15	167	62	188	0	2500	76	213	3206
Acharya Keshav Nath	108	2450	333	2433	0	3500	53	546	9315
Pahari Kali Bahadur	31	983	125	450	0	1500	86	268	3412
Pahari Chakra Bahadur	19	17	42	833	0	1500	33	802	3227
Pahari Tanka Bahadur	59	725	2083	1083	0	2100	22	406	6419
Pahari Sano Maiya	42	375	96	83	0	2000	0	424	2978
Pahari Nar Bahadur	24	190	42	83	0	2500	0	217	3032
Pahari Bas Bahadur	13	458	17	250	0	2625	80	318	3748
Thapa Magar Balaram	96	1533	142	3596	0	0	81	10	5362
Pahari Balkrishna	55	228	42	250	0	3750	0	258	4528
Chalise Murali Prasad	81	1032	83	2000	2000	1000	0	208	6323
Pahari Tek Bahadur	54	217	50	83	0	3500	42	479	4371
Chalise Shiva Prasad	43	213	250	0	0	0	750	0	1213
Pahari Indra Bahadur	58	871	358	50	0	4500	125	508	6412
Pahari Purkae	84	655	208	67	0	6000	83	347	7360
Chalise Shambu Prasad	30	237	408	208	1700		0	154	2707
Pahari Dan Bahadur	56	117	0	0	0	4500	0	0	4617
Pahari Ramesh	39	375	200	0	0	1000	0	15	1590
Pahari Sate	40	350	33	667	0	1500	21	198	2769
Pahari Basanta Bahadur	35	268	0	0	0	3000	0	257	3525
Nepal Mani Ram	91	1025	0	3333	2600	0	0	54	7012
Pahari Chandra Bahadur	41	723	38	500	0	3000	47	467	4775
Pahari Gopi	75	792	229	100	0	1800	67	329	3317
Chalise Achuyet Prasad	80	758	108	2000	3000	0	0	223	6089
Chaudhari Jaggu	3	333	0	0	1600	0	1950	0	3883
Neupane Madhav	99	350	0	0	3000	4000	0	0	7350
Acharya Krishna Prasad	62	1158	42	0	5000	0	0	0	6200
Acharya (F) Kasinath	26	1256	17	0	1000	0	0	0	2273
Pahari Purkae	37	570	233	83	400	967	85	371	2709
Pahari Hari Krishna	1	0	0	0	0	2500	0	0	2500
Pahari Budhha Singh	8	226	17	33	0	5625	196	482	6579
Pahari Budhhiman	33	263	192	492	0	1750	65	642	3404
Nepali Gyangro	4	10	208	0	0	3042	38	200	3498
Acharya Chiranjibi	63	1238	33	42	2500	0	0	150	3963

Annex 6B
Calculation of Gini Coefficients by Including and Excluding Community Forestry Income

Including CF income		
	total income	total HH
Up to 50,000	778620	21
50,000-1,00,000	1222020	17
1,00,000-150,000	377604	3
>150,000	188412	1
Total	2566656	42
	total income	total HH
Up to 50,000	30.3	50.0
50,000-1,00,000	47.6	40.5
1,00,000-150,000	14.7	7.1
>150,000	7.3	2.4
Total	100.0	100.0

ΣX_i	ΣY_i	$\Sigma X_i Y_{i+1}$	$\Sigma X_{i+1} Y_i$
7.3	2.4	69.91198	52.50634
22.1	9.5	1102.633	663.467
69.7	50.0	6966.403	5000
100.0	100.0	0	0
		8138.948	5715.973

$G = 1/(100)^2 * (h33\text{-}i33) = 0.242297$

Excluding CF income		
	total income	total HH
Up to 50,000	731112	22
50,000-1,00,000	1116072	16
1,00,000-150,000	365472	3
>150,000	187908	1
Total	2400564	42
	total income	total HH
Up to 50,000	30.5	52.4
50,000-1,00,000	46.5	38.1
1,00,000-150,000	15.2	7.1
>150,000	7.8	2.4
Total	100.0	100.0

ΣX_i	ΣY_i	$\Sigma X_i Y_{i+1}$	$\Sigma X_{i+1} Y_i$
7.8	2.4	74.54915	54.88591
23.1	9.5	1097.718	662.3253
69.5	47.6	6954.416	4761.905
100.0	100.0	0	0
		8126.683	5479.116

G= $1/(100)^2$ * (h33-i33) = 0.264757

Annex 6D
Bartlett's Test of Income Homogeneity and Income Variance Method

Bartlett's test of homogeneity is implied to test whether the variances of income groups are equal. The test is important to determine the applicability of income variance method in the research. The basic statistics required for the test is summarised in Table-1.

Table-1: Basic statistics for Bartlett's test.

a) Annual income group	b) # households	c) Average income	d) Variance	e) Bartlett's tabulated value (0.01 level)	f) Bartlett's critical value f=b*e
< NRs 50000	22	37776	87687908.6	0.8614	18.951
NRs 50,000-100,000	16	73098	129554381	0.8101	12.962
>NRs 100,000	4	141504	1092304320	0.3165	1.266
Over all group	42	61110.86			

Critical region = sum of critical value / N = (18.951+12.962+1.266)/42 = 0.78997

S_p^2 =(21*87687908.6)+(15*129554381)+(3*1092304320)/(42-3) = 181068583.4

$b = [(87687908.6)^{21} (129554381)^{15} (1092304320)^{3}]^{1/39} /181068583.4$

Computed b= 0.68321

Decision: Since the computed value is less than the critical value the null hypothesis is rejected implying that the population variance of the income groups differs.

Bartlett's test suggests that income variance method (which is based on F-test) has limited applicability in determining the measure of inequality in the research. However, IVM is still employed to assess the effect of including community forestry income in the income distribution in the research area.

Source: Walpole and Myers, 1985.

Annex 6E

Calculation of Income Variance by Using IVM

Income variance method:

$Var(x)=\sum N_j/N*Var(xj) + \sum N_j/N* (x-X)^2$

$W=\sum Nj/N*Var(xj)$

$B=\sum Nj/N* (x-X)^2$

Annual income with Community Forestry:

Proportion of lowest income group = 22/42 = 0.5238

Proportion of middle income group = 16/42 = 0.3809

Proportion of high income group = 4/42 = 0.0952

Income group	Variance	W=∑Nj/N*Var(xj)	x	X	$(x-X)^2$	B= ∑Nj/N* $(x-X)^2$
Lowest income (< NRs 50,000)	87687908.6	45931761.63	37776	61110.8571	544515557.9	285222435
Middle income (NRs 50,000-100,000)	129554381	49354049.83	73098	61110.8571	143691593.9	54739655
High income (> NRs 100,000)	1092304320	104028982.9	141504	61110.8571	6463057418	615529278
		199314794.3				955491368

Total inequality = W+B = 1154806162

Annual income without Community Forestry:

Proportion of lowest income group = 22/42 = 0.5238

Proportion of middle income group = 16/42 = 0.3809

Proportion of high income group = 4/42 = 0.0952

Income group	Variance	W=∑Nj/N*Var(xj)	x	X	$(x-X)^2$	B=∑Nj/N* $(x-X)^2$
Lowest income (< NRs 50,000)	98863865.8	51785834.4	33232.3636	57156.2857	572354048	299804501.1
Middle income (NRs 50,000-100,000)	136259441	51908358.4	69754.5	57156.2857	158715003	60462858.36
High income (> NRs 100,000)	1275151140	121442966	138345	57156.2857	6591607327	627772126.4
		225137159				988039485.9

Total inequality = W+B = 1213176644

	With CF	Without CF
W	199314794	225137159
B	955491368	988039486
Total inequality	1154806162	1213176644

Decision: Both within group inequality and between group inequality hence total inequality reduces by community forestry.

Annex 6F
Spearman's Rank Correlation to Determine the Relationship Between Income Ranking and Wealth Ranking

HH_Owner	Wealth rank	Income rank	D=W-I	D^2
Chalise Shiva Prasad	23	42	-19	361
Pahari Ramesh	27	41	-14	196
Acharya (F) Kasinath	33	40	-7	49
Pahari Hari Krishna	42	39	3	9
Chalise Shambu Prasad	32	38	-6	36
Pahari Purkae	28	37	-9	81
Pahari Sate	26	36	-10	100
Pahari Sano Maiya	24	35	-11	121
Pahari Nar Bahadur	34	34	0	0
Pahari Santa lal	36	33	3	9
Pahari Chakra Bahadur	35	32	3	9
Pahari Gopi	12	31	-19	361
Pahari Budhhiman	30	30	0	0
Pahari Kali Bahadur	31	29	2	4
Nepali Gyangro	40	28	12	144
Pahari Basanta Bahadur	29	27	2	4
Pahari Bas Bahadur	37	26	11	121
Pahari Prem Bahadur	38	25	13	169
Chaudhari Jaggu	41	24	17	289
Acharya Chiranjibi	14	23	-9	81
Pahari Lurrae	13	22	-9	81
Pahari Tek Bahadur	20	21	-1	1
Pahari Balkrishna	19	20	-1	1
Pahari Dan Bahadur	18	19	-1	1
Pahari Chandra Bahadur	25	18	7	49
Pahari Durga Bahadur	21	17	4	16

Thapa Magar Balaram	6	16	-10	100
Chalise Achuyet Prasad	11	15	-4	16
Acharya Krishna Prasad	15	14	1	1
Chalise Murali Prasad	10	13	-3	9
Pahari Indra Bahadur	17	12	5	25
Pahari Tanka Bahadur	16	11	5	25
Pahari San Bahadur	22	10	12	144
Pahari Budhha Singh	39	9	30	900
Chalise Ganga Prasad	7	8	-1	1
Nepal Mani Ram	8	7	1	1
Neupane Madhav	5	6	-1	1
Pahari Purkae	9	5	4	16
Acharya Keshav Nath	1	4	-3	9
Khatri Ram Saran	2	3	-1	1
Neupane Basudev	3	2	1	1
Chalise Vasker Nath	4	1	3	9
$R=1-(6\sum D^2)/N^3-N$				**3552**
(Source: Walpole and Myers, 1985).				
or, $1-(6*3552)/42^3-42$				
Spearman's rank correlation = 0.71218				
Conclusion: The result shows that wealth ranking and income ranking is approximately close enough.				

Annex 6G

Calculation of Gini Coefficients for Different Quintiles and Regions of Nepal by Using Kanel's Reduction Method (KRM)

Nominal per capita income by quintile			
Quintile	**Mean income (NRs)**	**Share of income (%)**	**Cumulative share (%)**
Poorest (First)	4003	5.3	5.3
Second	6727	8.9	14.2
Third	9697	12.8	26.9
Fourth	14917	19.7	46.6
Richest (Fifth)	40486	53.4	100
Nepal	15162	100	193
		Proportion	1.93

Kanel's reduction method

1/n(1+n-2*yi) or, 1/5 (1+5-2*1.93) = 0.428

Distribution of population by nominal per capita income quintile and geographic regions							
Quintile	**Kathmandu valley**	**Other urban**	**Rural west Hills**	**Rural East Hills**	**Rural West Terai**	**Rural East Terai**	**Total**
Poorest (First)	1.2	8.6	17.5	26.4	17	25.9	20
Second	0.6	9.4	18.5	20.1	24.7	25.3	20
Third	3.3	17	23.5	16.9	25.4	21	20
Fourth	14.9	21.6	23.2	22.9	15.7	18.4	20
Richest (Fifth)	80	43.5	17.2	13.7	17.1	9.4	20
Nepal	100	100	100	100	100	100	100

Cumulative distribution of population by nominal per capita income quintile and geographic regions							
Quintile	**Kathmandu valley**	**Other urban**	**Rural west Hills**	**Rural East Hills**	**Rural West Terai**	**Rural East Terai**	**Total**
Poorest (First)	1.2	8.6	17.5	26.4	17	25.9	20
Second	1.8	18	36	46.5	41.7	51.2	20
Third	5.1	35	59.5	63.4	67.1	72.2	20
Fourth	20	56.6	82.7	86.3	82.8	90.6	20
Richest (Fifth)	100	100.1	99.9	100	99.9	100	20
Total	128.1	218.3	295.6	322.6	308.5	339.9	100
Proportion	1.281	2.183	2.956	3.226	3.085	3.399	

The formula used for the calculation is based on Kanel's reduction method = 1/n(1+n-2*yi)

Kathmandu valley

1/5 (1+5-2*1.281) **= 0.6876**

Other Urban

1/5 (1+5-2*2.183) **= 0.3268**

Rural west Hills

1/5 (1+5-2*2.956) = **0.0176**

Rural East Hills

1/5 (1+5-2*3.226) = **0.0904**

Rural West Terai

1/5 (1+5-2*3.085) = **0.034**

Rural East Terai

1/5 (1+5-2*3.399) = **0.1596**

Regions	Income based	Consumption based
Nepal	0.428	0.438
Kathmandu valley	0.6876	0.7144
Other Urban	0.3268	0.3816
Rural west Hills	0.0176	0.0332
Rural East Hills	0.0904	0.1044
Rural West Terai	0.034	0.0864
Rural East Terai	0.1596	0.1616

Nominal per capita consumption by quintile			
Quintile	**Mean consumption (NRs)**	**Share of consumption (%)**	**Cumulative share (%)**
Poorest (First)	4913	6.2	6.2
Second	7373	9.3	15.5
Third	10073	12.7	28.2
Fourth	14657	18.5	46.7
Richest (Fifth)	42236	53.3	100
Nepal	15848	100	190.4
		Proportion	1.904

1/5 (1+5-2*1.904) = 0.4384

Distribution of population by nominal per capita consumption quintile and geographic regions							
Quintile	**Kathmandu valley**	**Other urban**	**Rural west Hills**	**Rural East Hills**	**Rural West Terai**	**Rural East Terai**	**Total**
Poorest (First)	0.4	7.4	13.1	26.1	22.4	26.7	20
Second	1.2	9	21.1	21.4	24.4	23.2	20
Third	3.1	13.7	26.5	18.8	18.6	22.5	20
Fourth	10	20.6	23	19.9	21.5	18.9	20
Richest (Fifth)	85.3	49.3	16.3	13.8	13.2	8.8	20
Nepal	100	100	100	100	100	100	100

Cumulative distribution of population by nominal per capita consumption quintile and geographic regions							
Quintile	**Kathmandu valley**	**Other urban**	**Rural west Hills**	**Rural East Hills**	**Rural West Terai**	**Rural East Terai**	**Total**
Poorest (First)	0.4	7.4	13.1	26.1	22.4	26.7	20
Second	1.6	16.4	34.2	47.5	46.8	49.9	20
Third	4.7	30.1	60.7	66.3	65.4	72.4	20
Fourth	14.7	50.7	83.7	86.2	86.9	91.3	20
Richest (Fifth)	100	100	100	100	100.1	100.1	20
Total	121.4	204.6	291.7	326.1	321.6	340.4	100
Proportion	1.214	2.046	2.917	3.261	3.216	3.404	

Kathmandu valley

1/5 (1+5-2*1.214) = **0.7144**

Other urban

1/5 (1+5-2*2.046) = **0.3816**

Rural west Hills

1/5 (1+5-2*2.917) = **0.0332**

Rural East Hills

1/5 (1+5-2*3.261) = **0.1044**

Rural West Terai

1/5 (1+5-2*3.216) = **0.0864**

Rural East Terai

1/5 (1+5-2*3.404) = **0.1616**

Annex 6H
Gini Coefficients of Different Sources of Income in Kumariban, Badikhel, Lalitpur

Fra_micash (Household income from Cereal crops)						
	No of HH	**total income (NRs)**				
< 50,000	22	8468				
50,000-100000	16	11631				
100000-150000	3	6590				
>150000	1	1267				
total	42	27956				
	Total income	**Total HH**	**∑Xi**	**∑Yi**	**∑Xi Yi+1**	**∑Xi+1 Yi**
upto 50,000	30.3	52.4	4.5	2.4	43.16307	66.91638
50,000-1,0000	41.6	38.1	28.1	9.5	1338.328	663.9004
1,00,000-150,000	23.6	7.1	69.7	47.6	6970.954	4761.905
>150,000	4.5	2.4	100.0	100.0	0	0
Total	100.0	100.0			8352.445	5492.722

G= 1/(100)^2 * (f13-g13)

0.285972

Fra_mipt (Household income from Private trees)						
	No of HH	**Total income (NRs)**				
< 50,000	22	2262				
50,000-1,00,000	16	4713				
1,00,000-1,50,000	3	1033				
>1,50,000	1	642				
total	42	8650				
	Total income	**Total HH**	**∑Xi**	**∑Yi**	**∑ Xi Yi+1**	**∑Xi+1 Yi**
upto 50,000	26.2	52.4	7.4	2.4	70.68538	46.10515
50,000-1,00,000	54.5	38.1	19.4	9.5	922.1029	703.3306
1,00,000-1,50,000	11.9	7.1	73.8	47.6	7384.971	4761.905
>1,50,000	7.4	2.4	100.0	100.0	0	0
Total	100.0	100.0			8377.759	5511.34
			G= 1/(100)^2 * (m13-n13)			

			0.286642			

Fra_miah (Household income from Animal husbandry)						
	No of HH	total income (NRs)				
< 50,000	22	3562				
50,000-1,00,000	16	15387				
1,00.000-1,50,000	3	5833				
>1,50,000	1	3750				
total	42	28532				
	total income	**total HH**	**∑ Xi**	**∑ Yi**	**∑Xi Yi+1**	**∑ Xi+1 Yi**
upto 50,000	12.5	52.4	13.1	2.4	125.1727	79.96869
50,000-1,00,000	53.9	38.1	33.6	9.5	1599.374	833.4835
1,00,000-1,50,000	20.4	7.1	87.5	47.6	8751.577	4761.905
>1,50,000	13.1	2.4	100.0	100.0	0	0
Total	100.0	100.0			10476.12	5675.357

G= 1/(100)^2 * (t13-u13)

0.480077

Sr_mi (Household income from Salary and benefits)						
	No of HH	**total income (NRs)**				
< 50,000	22	13200				
50,000-1,00,000	16	17800				
1,00,000-1,50,000	3	7500				
>150000	1	10000				
total	42	48500				
	total income	**total HH**	**∑ Xi**	**∑ Yi**	**∑ Xi Yi+1**	**∑Xi+1 Yi**
upto 50,000	27.2	52.4	20.6	2.4	196.3672	85.91065
50,000-1,00,000	36.7	38.1	36.1	9.5	1718.213	693.1762
1,00,000-1,50,000	15.5	7.1	72.8	47.6	7278.351	4761.905
>1,50,000	20.6	2.4	100.0	100.0	0	0
Total	100.0	100.0			9192.931	5540.992

G= 1/(100)^2 * (t13-u13) = **0.365194**

Se_mi (Household income from self employment)						
	No of HH	**total income (NRs)**				
< 50,000	22	33434				
50,000-1,00,000	16	43475				
1,00,000-1,50,000	3	9500				
>1,50,000	1	1				
total	42	86410				
	total income	**total HH**	**∑Xi**	**∑Yi**	**∑Xi Yi+1**	**∑ Xi+1 Yi**
upto 50,000	38.7	52.4	0.0	2.4	0.011022	26.17918
50,000-1,00,000	50.3	38.1	11.0	9.5	523.5836	583.883
1,00,000-1,50,000	11.0	7.1	61.3	47.6	6130.772	4761.905
>1,50,000	0.0	2.4	100.0	100.0	0	0
Total	100.0	100.0			6654.367	5371.967

G= 1/(100)^2 * (t13-u13)

0.12824

Wl_mi (Household income from Wage income)						
	No of HH	**total income (NRs)**				
< 50,000	22	3293				
50,000-1,00,000	16	1088				
1,00,000-1,50,000	3	53				
>1,50,000	1	1				
total	42	4435				
	total income	**total HH**	**∑Xi**	**∑ Yi**	**∑ Xi Yi+1**	**∑ Xi+1 Yi**
upto 50,000	74.3	52.4	0.0	2.4	0.214742	2.899018
50,000-1,00,000	24.5	38.1	1.2	9.5	57.98035	245.2354
1,00,000-1,50,000	1.2	7.1	25.7	47.6	2574.972	4761.905
>1,50,000	0.0	2.4	100.0	100.0	0	0
Total	100.0	100.0			2633.167	5010.039

G= 1/(100)^2 * (t13-u13)

0.23769

Cf_mi (Household income from Community forest products)						
	No of HH	**total income (NRs)**				
< 50,000	22	5037				
50,000-1,00,000	16	3370				
1,00,000-1,50,000	3	958				
>1,50,000	1	42				
total	42	9407				
	total income	**total HH**	**∑ Xi**	**∑ Yi**	**∑ Xi Yi+1**	**∑ Xi+1 Yi**
upto 50,000	53.5	52.4	0.4	2.4	4.252153	25.31043
50,000-1,00,000	35.8	38.1	10.6	9.5	506.2086	442.4264
1,00,000-1,50,000	10.2	7.1	46.5	47.6	4645.477	4761.905
>1,50,000	0.4	2.4	100.0	100.0	0	0
Total	100.0	100.0			5155.938	5229.642

G= 1/(100)^2 * (t13-u13)

0.00737

Total Income						
Income group (NRs)	% of total income	% of total Household				
upto 50,000	30.3	50				
50,000-1,00,000	47.6	40.5				
1,00,000-1,50,000	14.7	7.1				
>1,50,000	7.3	2.4				
Total	100	100				
	total income	**total HH**	**∑ Xi**	**∑ Yi**	**∑Xi Yi+1**	**∑ Xi+1 Yi**
upto 50,000	30.3	50	7.3	2.4	69.35	52.8
50,000-1,00,000	47.6	40.5	22.0	9.5	1100	661.2
1,00,000-1,50,000	14.7	7.1	69.6	50.0	6960	4995
>1,50,000	7.3	2.4	99.9	100.0	0	0
Total	100	100			8129.35	5709

G= 1/(100)^2 * (t13-u13)

0.242035

Annex 6I

Gini Coefficients of CF in Kumariban, Badikhel by Using KRM

Annual income (NRs)			
	Without CF	**With CF**	**% rise in annual income due to CF**
1/3rd poorest	388752	460044	18.33868
1/3rd average	688296	735468	6.853447
1/3rd richest	1323516	1371144	3.598596
Total	2400564	2566656	
	Without CF	With CF	
1/3rd poorest	16.19419	17.92387	
1/3rd average	28.67226	28.65472	
1/3rd richest	55.13354	53.42142	
Total	100	100	
Cumulative share of annual income	Without CF	With CF	
1/3rd poorest	16.19419	17.92387	
1/3rd average	44.86646	46.57858	
1/3rd richest	100	100	
Total	161.0607	164.5024	
Proportion	1.610607	1.645024	
Kanel's reduction method			
Without CF			
G=	1/n(1+n-2*yi)		
	0.2596		
With CF			
G=	1/n(1+n-2*yi)		
	0.23665		
G difference =	**0.02294**		

Households under Poverty (Poverty line NRs 78,300)

	With CF	**Without CF**
No of HH under poverty	32	34
Above the Poverty line	10	8
Total	42	42

Percentage point above poverty line = **4.761905**

Annex 6J
Calculation of Gini Coefficient for Household Income Under Intensive CF Management

Household income under intensive CF management						
Income Group	total income	total HH				
<NRs 50,000	302664	8				
NRs 50,000-1,00,000	1742388	25				
NRs 1,00,000-1,50,000	995544	8				
> NRs 1,50,000	190428	1				
Total	3231024	42				
	% of total income	% of total HH	∑Xi	∑ Yi	∑ Xi Yi+1	∑Xi+1 Yi
<NRs 50,000	9.4	19.0	5.9	2.4	126.3	87.39
NRs 50,000-1,00,000	53.9	59.5	36.7	21.4	2971	1942
NRs 1,00,000-150,000	30.8	19.0	90.6	81.0	9063	8095
> NRs 150,000	5.9	2.4	100.0	100.0	0	0
Total	100.0	100.0			12161	10125

G= 1/(100)^2 * (X33-Y33)

0.203621

Annex 6K
Comparison of Gini Coefficients Under Normal and Intensive Community Forestry Management

	CF Normal	CF Intensive	Cumulative Normal	Cumulative Intensive	
1/3rd poorest	17.92	19.27	17.92	19.27	
1/3rd average	28.65	30.23	46.57	49.5	
1/3rd richest	53.42	50.5	99.99	100	
		total	164.5	168.8	
		Proportion	1.645	1.688	
		Kanel's reduction method (Normal)			
			1/n(1+n-2*yi)		
			or, 1/3 (1+3-2*1.645)		
			0.237		
		Kanel's reduction method (Intensive)			
			1/n(1+n-2*yi)		
			or, 1/3 (1+3-2*1.688)		
			0.208		
		G difference =	0.029		

Annex 6L
Estimation of Financial Resources Required for Poverty Alleviation through Community Forestry in Nepal

POVERTY GAP AND ESTIMATED AMOUNT OF BUDGET REQUIRED FOR POVERTY ALLEVIATION THROUGH COMMUNITY FORESTRY IN NEPAL		
X (Poverty line= NRs 78300 annually per household)	**PG=X/78300**	**Squared poverty gap (PG^2)**
63744	0.8141	0.66
59220	0.756322	0.57
31704	0.404904	0.16
45792	0.584828	0.34
51024	0.651648	0.42
39576	0.505441	0.26
48300	0.616858	0.38
45072	0.575632	0.33
45816	0.585134	0.34
42564	0.543602	0.3
37452	0.478314	0.23
41916	0.535326	0.29
39828	0.508659	0.26
38496	0.491648	0.24
37356	0.477088	0.23
36324	0.463908	0.22
36000	0.45977	0.21
33324	0.425594	0.18
30744	0.392644	0.15
25848	0.330115	0.11
31992	0.408582	0.17
29436	0.375939	0.14
21000	0.268199	0.07
23964	0.306054	0.09
22896	0.292414	0.09
18312	0.23387	0.05
13956	0.178238	0.03
1356	0.017318	0
5232	0.06682	0
1272	0.016245	0
2424	0.030958	0
3900	0.049808	0
1005840	**12.84598**	**6.54**

Poverty line 78300

Poverty gap = y* - yi/y*

Squared poverty gap=$(y^*-yi/y^*)^2$

1006155 This is when 1285% of 78300 is taken

12.845 should be divided by 42 to get the poverty gap

0.305833333

This means that to eradicate poverty we have to multiply 0.3058 of 78300 by the total number of households (1575512) to get the estimated figure

37724279900 This is the amount that is required to move all above the line of poverty

37724.2799 Million

37.724 billion NRs is required to move all above the line of poverty.

502.9903987 Million US $

Annex 7A
Area and Production of Cereal Crop and Cash Crop in Nepal from 1964/65 to 2005/06

1) Area of Cereal crop and cash crop in Nepal from 1964/65 to 2005/06.

Type of crop	1964/65 (Thousand Hectares)	2005/06 (Thousand Hectares)	Growth times	Annual growth rate (Percent)
Cereal crops	**1731**	**3360**	**1.94**	**1.63**
Paddy	1101	1594	1.41	0.84
Maize	437	851	1.94	1.64
Wheat	100	672	6.72	4.76
Barley	24	26	1.08	0.20
Millet	69	262	3.79	3.29
Cash crop	**186**	**416.2**	**2.24**	**1.98**
Sugarcane	9	62	6.88	4.82
Jute	32	12.45	0.38	-2.28
Oilseed	108	188	1.74	1.36
Tobacco	8	2.73	0.34	-2.59
Potato	29	151	5.21	4.11

2) Production of Cereal and Cash crop in Nepal from 1964/65 to 2005/06

Type of crop	1964/65 (Thousand Metric Ton)	2005/06 (Thousand Metric Ton)	Growth times	Annual growth rate (Percent)
Cereal crops	**3270**	**7656**	**2.34**	**2.1**
Paddy	2201	4209	1.91	1.59
Maize	854	1734	2.03	1.74
Wheat	126	1394	11.06	6.04
Barley	26	28	1.07	0.18
Millet	63	291	4.62	3.80
Cash crop	511	4599	8.99	5.51
Sugarcane	126	2463	19.54	7.52
Jute	39	19	0.48	-1.74
Oilseed	51	139	2.72	2.48
Tobacco	9	2.72	0.30	2.88
Potato	286	1975	6.90	4.83

Note: The area and production growth times was determined by dividing the figure in 1964/65 by the corresponding figure in 2005/06. 1964/65 = 29 thousand hectares

For example, growth times in oilseed area = 151/29 = 5.207

$(1+r)^{41} = 5.207$

or, $1+r = (5.207)^{1/41}$, $(5.207)^{0.02439}=1.0411$

$r = 1.0411 – 1 = 0.0411 = 4.11\%$ annual growth rate

Annex 7B
Household Survey Questionnaire

Notice: The present survey is for the academic research work. Any information you provide will be kept strictly confidential and would be used for academic purpose only. It is expected that the information you provide is right and best represents the truth.

HH Code: Name of HH Owner: W/R:

Household interview with: ..... Village: ..... Ward No. .....

Total No. of HH members: ..... Male: ..... Female:.....

No. of Children(*above 5 years*):

Education:

Primary: ..... Secondary ..... Tertiary (*above SLC*): .....others:……

Occupation of HH head: ..... If, occupies any position in FUG committee: Y/N

If, Yes then which post..... Is their voice reflected in FUG management ?: .....

Main activities of HH members:

Men:	Women:	Children:
1)	……	…….
2)	……	…….

Land Resources:

(Low-land) Khet:.....Ropani (Up-land) Bari:..... Ropani others:.....Ropani

Ownership: ....

Tenureship(*in*): ....

Tenureship(*out*): ....

Crop yield *(including from tenure)*

Paddy*(dhan)*:..... Wheat:..... Maize:..... Mustard:…….

Soya bean……. Millet:…….. Others:..... fruits:.....

Did they get forest products from community forest in previous or recent year?*(specify period)*

Firewood:..... Timber:..... Fodder & Grasses:.... Leaf litters*(sottar)*:.....

When ?…….. …… …….. …….

How much?…… …….. …… …….

Monthly HH income: *(both cash &subsistence)*	Type	Monthly income
Farming and related activities:		
a) *major cereals & cash crops:*	.....	.....
b)private trees, bamboo and fruit trees etc:	……	……
c) animal husbandry(cattles, goats, poultry):	……	……
Salary and remittances:	.....	.....
Self employment(*including bet nigalo works*):		.....
.....		
Wage labor (*including from CF employment*):	.....	.....
Community forest *(only from products)*:		
a) Firewood:	.....	.....
b) Timber:	……..	……..
c) Grasses & leaf litters:	……..	……...
d) others:	……	……
Others:	.....	.....

Trees in Bari (up-land) (*specify trees e.g., bamboo ?)*

Species	No. of trees	potential use
.....	.....	.....
.....	.....	.....
.....	.....	.....…

Trees in Khet (low-land):

Species	No. of trees	potential use
.....	.....	.....
.....	.....	.....
.....	.....	.....

Animal husbandry:

Livestock	Number owned	Number tenured	purpose
Cattle*(specify type)*	……..		*(also amount of milk)*
Buffalo			
Goat			
Sheep			
Pig			
others			

Main source of fuel:..... Do you sometimes use other sources ?.....

If yes, which one ?…… How often *(ask quantity)?*……

Which 3 forest products in community forest you think are most important for you ? (on priority)

1)……. 2)…… 3)…….

Why ?……. ……. ……..

how long it takes to walk to the community forest ?..... How far is national forest ?.....

Do you use chemical fertilizer in your farm ? ..... How much you invest on chemical fertilizer? ...

If, instead of using compost, you use fertilizer, how much extra money you have to invest ?……

Do you sometimes hire labor to help in your private land ? Seasons:.....

Male:.....Rs/day Female:.....Rs/day Free lunch ?.....

Do any of this HH member sometimes work for other HHs ?.... Seasons:.....

Does your HH sometimes exchange labor (*parma*) with other HHs ?..... Seasons:.....

How many man-days seasonwise? ……

Do any of the HH member have other jobs? who:.....

What are their earning:.....Rs/ month where do they work ?.....

How many bharis(back-load) of fuel wood did your HH receive from the community forest ?.....

This year ..... last year *(pohor)*..... previous *(parar)* year:.....

The weight of a bhari(*fuel wood*):.....Kilos How much it costs if you purchase from the market ?.....

Do you sometimes sell or buy fuel wood ?.....How often ?..... Sell:..... Buy:.....

Did any of HH member work in the community forest ? Y/N If yes, then how many days ?

This year:.....last year:…….previous year:……

Did they get wage for working in CF? If yes, how much? ....

Has your HH used timber from the community forest ? When?.....

What kind of timber ?..... amount:.....cft price paid to FUG:.....

How much you are prepared to pay for that timber at your court yard ?

Do you know the market price of similar timber ? Y/N Rs/cft..... which market ?.....

<u>Total collection of fruits in past 12 months from the community forest</u>

.....kilos equivalent price:.....

Are you required pay ? If yes, how much ? .....

Did you collect the followings from the community forest ?

Medicines: Y/N vegetables: Y/N how often:.....

Are you required pay ? If yes, how much ?

....

Do you collect fodder & grasses from the community forest? Y/N How much?.....

Seasons?..... How much it costs if you have to buy at your court yard?.....

Are you required pay ? If yes, how much ? .....

How much time it requires for collecting a bhari of :

Fodder:..... Grasses:.....

Is that same for leaf litters? If No, please reveal ?……..

Do you collect leaf-litters from the community forest ? Y/N Seasons.....

How much bhari ?..... Do you use it for making compost? Y/N

Are you required pay ? If yes, how much ? .....

how much it costs if you use fertilizer instead ?.....

Do you attend regularly the Forest User Group annual assembly ? If yes, what is your comment regarding your voice being reflected in management works.

Please give your opinion regarding the effect on wealth to your household due to the common property resources (mainly in the context of community forest)?

considerable		*(Why?)*.....
moderate		.....
small effect		.....
no effect		.....

Please give your opinion on the recent changes related with the management of community forest:

Thanks for the cooperation.

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