Population and Resources Linkages in Nepal

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Abstract

Population change between 1981, 1991 and 2001 in different ecological belts, development region and the districts as well as the resources use patterns have been considered in the study. The analysis found the population number is increasing in all ecological belts however the rate is higher in the Tarai in comparison with the Hill and the Mountain. The changes in population number and demographic characteristics have been exerting considerable impact on resources utilization pattern and ultimately on environmental condition. The study has attempted to establish a linkage between population characteristics and the resources utilization and suggest the need to enhance economic opportunities, well distribution of infrastructure development, maintain production capabilities and stabilize the movement of the population for the sustainable development of the country on the whole.

Key words: Population, resources, linkages, environmental degradation, regional perspectives, sustainability

Introduction

Since the dawn of the modernization, man was perceived as a powerful component in the nature. The thinking of those days was that "man is more than just a passive element in the landscape. He operates as an agent of change…Man adopts to even unfavorable environments" (Hoyt, 1962: 5,16). With the pace of time the number grew swiftly and man started to exert pressure on the surrounding environment. His action was gradually perceived as a destructive element rather than adjustable to its environment. Therefore, direct linkage of man's action over resource use has been established with the growth of population and environmental degradation. The root of the thinking was based on the 'Malthusian School of Thought' on the ground of exponential growth of population as a demand and arithmetic rate in production of foodstuff as a supply (Fauve-Chamoux and Grebenix, 1983:11). The study entitled 'Limits to Growth' of Meadows and others put forth this philosophy strong (Tietenberg, 1994: 3). On the basis of this philosophical ground, resource use and its management in the developing countries have widely drawn with respect to its environmental considerations.

In 1961, the total population of Nepal was 9.4 million, which increased by more than 2.0 percent inter-census growth and reached 23.15 million in 2001 census. Out of the total population in 2001, the Mountain shared 7.29 percent, the Hill 44.28 percent and the Tarai 48.43 percent respectively. The population in the Hill and the

Mountain jointly has increased from 6.34 million in 1961 to 11.94 million in 2001, with a growth rate of over 1.5 percent. The Tarai has comparatively fast growth of population among the geographical region of the country. It was merely over 3 million in 1961 and reached to more than 11 million in 2001 with an absolute change of 8.17 million in the last 40 years time period. There is a large differentiation on its local and regional distribution both in absolute number and in growth rate. Population density, pressure on resources, demographic characteristics, mobility, and many other population parameters have large spatial variations and those are directly interlinked with the resources use and management functions.

The aim of the present paper is to highlight the changing pattern of population of census years 1981, 1991 and 2001 and its implication on resources use in the country. The study is based on the information provided by the Central Bureau of Statistics (CBS), Government of Nepal and various other secondary sources of different dates and volumes. Absolute number of population and growth rate, demographic composition, and various types of resources primarily used by the people are considered main parameters of the analysis with reference to the district, development region and ecological spatial units of the country.

Contextual Background

The Hills and the Mountains have merely over 50 percent share of total population and the 40.2 percent of the total (2,393,710 ha) agricultural land, where agricultural activity is the main source of livelihood. The Tarai comprises the 60 percent of its arable land and nearly 50 percent of its population. The Tarai has more stable land in terms of slope failure; however, the flash floods and river inundations are common catastrophes. In terms of resources types and use pattern it is observed the Mountain and the Hill have more diversifications than in the Tarai because in the Tarai, generally, people have adapted mono cropping pattern and mainly enjoy with cereal crops.

Since 1960s pressure on resources has been reported widely by considering two major variables, i.e. distribution of population and agricultural land over unstable and fragile mountainous topography. The explanation of causes and the remedies have been searched from various angles and levels. Initially, the Stockholm Conference (1972) and Munich Symposium (1974) have highlighted the Himalayan issues of population pressure on resources. The writings of Eckholm (1976) alarmed the world community by stating that "Refugees from Shangri-La" and environmental crises caused by "short-sighted greed" rural population pressure on resources for their livelihood in the Himalayan fragile hill slope. His statements were the conclusions of mounting evidence of deteriorating hill environments, which were being considered as anthropogenic in origin. However, until early 1980s, research findings were

directly striking the issues of population (both human and livestock) pressure on resources of fragile mountains and the incidence of environmental degradation. The 'Theory of Himalayan Environmental Degradation' (the HED theory) has been self-evident with the proposition of population growth-deforestation-land degradation chain of 'down-ward spiral' due to population-resource utilization scenario (Ives and Messerli, 1989). The Mohonk Mountain Conference was organized in 1986 to discuss the issues raised along the HED theory (Ives and Messerli, 1989), which also emphasized the environmental and social problems of the Himalayas. Issues of population pressure and the environmental degradation were perceived as major challenges of the mountain environment, more specifically, the Himalayan environment. Because of that, it was evident that, native governments, donor's organizations, institutions of several multilateral, bilateral, and individual experts and decision makers were working to combat the problems intensively for last couple of decades. On that thread of explanation numbers of native experts had been given their focus on interpretation of the situation at different scale as well as on the basis of various sources of information.

Relieving the steep and fragile hills from burgeoning population was the focus of the first strategy adopted by the government since 1956/57. Since the initiation of structured planning procedures in Nepal, the First Five-year Plan 1956-1961 mentioned a pertinent rehabilitation program. The objectives of that program were to settle the landless peasants, and specifically the hill-people, in new areas, (particularly in the Tarai region), and thus to provide them with means of livelihood. The government had set forth the rehabilitation program by selecting some of the virgin areas in the Tarai and planned resettlement of the poor peasants of the Hills and the Mountains. The Rapti Doon Multi-Purpose Development Project was the first of this kind (NPC, 1963: 225). Similarly, the successive plans documented the objectives for a reduction of the population pressure in the region through resettlement scheme in the Tarai in the river Valleys and the Foothills. Increase off-farm activities to generate income, and the introduction of high yielding variety crops and hybrid domestic animals were also the strategies. Most of these programs were launched through the advice of western experts.

By the Eighth Five-year Plan 1992-97, the strategy became to alleviate poverty, which was considered the most important component of national development. The precarious ecology of the Nepalese hills could not be improved without first tackling the economic poverty of the people (Gurung, 1981). One important step to alleviate poverty was to encourage villagers to seek employment in different sectors and the foreign employment was one of it. Organized foreign employment is a long tradition in Nepal which goes back to Rana Regime and the British-India government in India. After the Anglo-Nepal war of 1814-15, the British-India government enlisted 3,000 Nepalese prisoners of war to serve the British Army which latter became the

First Gurkha Battalion of the British-Indian Army (Tiwari, 1996: 417-448). Since then, most villagers from the Hills and the Mountains especially the Gurung, Magar, Rai, and Limbu ethnic communities, started to join first the Anglo-Indian, and later the Indian and British armies. After this first step, members of other castes and ethnic communities also took up employment in several Indian cities as caterers, house-maids, industrial laborers, security guards, etc. The most attractive factor for doing so was the relatively high wages. This trend of foreign employment has been continuing in the Hills and the Mountains, where large numbers of active youths are leaving home for India, Hong Kong, Japan, Germany, Korea, Malaysia and the Gulf countries. The trend of foreign employment has been further assisted by the government policy that accepts the work of the organized manpower supply companies in the country that operate under the auspices of the Ministry of Labor of Government of Nepal. Both organized and unorganized foreign labor migration is now becoming a boom for labor market as well as the source of foreign currency to generate the national revenue.

The continuous flow of people from the Hill and the Mountains reduces the population density in those regions. It was estimated that in 1952/54, rural-to-rural migration (mostly the Mountain and the Hills to the Tarai) accounted for 65 percent of the total migration volume. That figure was increased to 91 percent in 1961 and 93 percent in 1971 (KC, 1983). According to 1981 census, 26 thousands and 42 thousands people from the Mountains and the Hills respectively migrated to the Tarai. This effect relieves, at least to some extent, the human population stress on the available resources in the origins, however, manpower problems remain for the rural agricultural systems. It has created the dramatic increase in agricultural labor wages. It is reported that the wage rate for basic farm work was more than doubled in the last decade. In a case study conducted at the Kaski district in 2000, noted that in 1990, it was US$0.67 (Rs50) or 2 *pathi* (6.3 kg approximately) grain per person per day, while in 2000, it costs US$1.33 (Rs100) in cash, and grain is rarely accepted. At the same time, the price for agricultural products was increased by only 50 percent (Poudel 2000:9). That caused great distress to farmers who were forced to employ labor in the day-to-day operations. As a result, the labor input in the farming sector has been decreasing considerably. The direct impact of the decreasing labor input caused the abandonment of basic maintenance work on the farmland which has leaded the environmental degradation ultimately (Poudel, 2000:9).

The continuous trend of mobility of the people from the Mountain and the Hill to the Tarai, urban areas and temporarily to abroad have been imparting its direct impact over the population density and distribution; composition and finally the resources use pattern and management.

Population Distribution, Change and Mobility

Population distribution in the country is strongly determined by the resources endowments. Agriculture is the common human activity, thus the distribution of arable land is the major controlling factor for determining population distribution. In 1981 the Mountain had 1.30 million populations. The figure increased to 1.44 million in 1991 and 1.69 million in 2001. The Hill had 7.16 million in 1981, and increased to 8.5 million in 1991 and 10.25 million in 2001. The Tarai is most populous area and contains highest share of population among the three ecological regions. In 1981 the Tarai had 6.56 million populations and increased to 8.62 million in 1991 and 11.21 million in 2001. The percentile change of the total population between the year 1981 and 1991 was the lowest in Western Mountain (-1.5) and the highest was in Far-Western Tarai (58.3). The Tarai of all five development regions had the high percentile change. There were little different scenarios of population change between the year 1991 and 2001 than in previous years. None of the regions as well as districts had the negative change during that period. The Far-Western Tarai was still gaining the highest change but decreased from 58.3 percent to 47.2 percent. The Mountains had little increment than the previous census. Only The Manang district has the exception in the last two censuses. It was negative growth in between 1981 and 1991 whereas in between 1991 and 2001 the rate was highest in the country. The Eastern Mountain had 11.8 percent compared to 6.1 in 1981 and 1991. Similarly, the Western Mountain gained 25 percent compared to –1.5 percent. The Hills had more or less similarities in change with previous census years (Table 1).

All the Tarai districts had the highest growth in both censuses. In contrary almost all the Mountain districts of the country had lesser than the national average. Growth rate in 10 out of 39 total Hill districts had more than 2 percent per annum. The other 29 districts had less than 2 percent or lesser than the country average. Except Jhapa district, all the districts in the Tarai had the growth rate above the national average (Table 2). It shows that the Tarai districts have the fast increment of total population.

In 2001 census data, the male to female ratio of the population revealed that the most of the Mountain and the Hill districts had less male in terms of females. Only the Mustang felt on its exception. Outmigration of male member for earning seems to be the basic reason behind that. Some micro level case studies concluded that the poverty encourages active members to leave the house for the job and earnings (Tiwari, 1996; Thapa and Weber, 1990; Poudel, 2001a; Poudel, 2001b; Poudel, 2003). At least one member from 34.9 percent of the surveyed household was found temporarily emigrating elsewhere for employment in Western Development Region (Tiwari 1996). The figure was 50.7 percent of the total surveyed households (Adhikari, 1995), and 29.3 percent households from Upper Pokhara Valley (Thapa and Weber, 1990). It was 40 percent households from Annapurna Region of Kaski

Table 1. Population Distribution and Change by the Development and Ecological Region of Nepal (1981-2001)

Population Parameters	Development/Ecological Region														
	Eastern Development Region			Central Development Region			Western Development Region			Mid- Western Development Region			Far- Western Development Region		
	M	H	T	M	H	T	M	H	T	M	H	T	M	H	T
Total Pop_1981 (, 000)	338	1257	2113	413	2108	2388	20	2150	958	242	1042	671	289	604	427
Total Pop_1991 (, 000)	359	1429	2658	471	2680	3033	20	2421	1330	261	1220	930	333	671	676
% Change:1981-1991	6.1	13.7	25.8	14.0	27.1	27.0	-1.5	12.6	38.9	7.4	17.0	38.7	15.2	11.0	58.3
Annual Growth Rate: 1981-1991	1.11	1.29	2.32	1.32	2.43	2.42	-.00	1.18	3.34	0.72	1.58	3.33	1.43	1.05	4.70
Household Size: 1991	5.32	5.44	5.41	4.99	5.54	5.65	4.39	5.20	6.10	5.48	5.50	6.35	5.52	5.40	6.69
Male to Female Ratio: 1991	0.96	0.97	1.03	1.00	1.02	1.06	1.09	0.89	1.03	1.03	0.96	1.02	0.95	0.92	1.01
Total Pop_2001 (, 000)	402	1643	3300	555	3543	3934	25	2793	1753	309	1473	1231	398	799	995
% Change: 1991- 2001	11.8	15.0	24.1	17.8	32.2	29.7	25.0	15.4	31.8	18.6	20.8	32.3	19.5	19.1	47.2
Annual Growth Rate: 1991- 2001	1.10	1.55	2.18	1.65	2.83	2.63	2.26	1.44	2.80	1.72	1.91	2.84	1.80	1.76	3.94
Household Size: 2001	5.2	5.32	5.27	4.95	5.12	5.86	4.89	4.91	6.06	5.58	5.46	5.88	5.68	5.59	6.43
Male to Female Ratio: 2001	0.97	0.97	1.02	0.99	1.03	1.07	1.16	0.87	1.02	1.03	0.97	1.01	0.95	0.94	1.03

Note: M = Mountain, H = Hill, T = Tarai

Source: Compiled from the Statistical Year Book, 1995, 2001 and Population Census 2001, National Report (CBS 2002).

district (Poudel, 2001a). Nepal Living Standard Survey (NLSS, 2003/04 reported that of the total population aged 5 years and above, 37 percent have migrated from other places (VDC, municipality or outside the country to their current place of residence). Out of every 100 migrants in the country 81 were from rural areas, 6 from urban areas and 13 from abroad. Among migrants, 75 percent ascribed the reason for migration to family reason, 12 percent to easier life and 7 percent looking for job (CBS 2004). Large volume of outmigration confined to abroad for employment. NLSS (2003/04) further noted that the proportion of households receiving remittances was increased from 23 percent in 1995/96 to 32 percent in 2003/04. Some anecdotal evidences revealed that every year over 500,000 youth come in job market and nearly 100,000 get job within the country and remaining nearly 400,000 youth either go to abroad for the job or they remain job less within the country. However, nearly one million youth from Nepal go to Gulf countries alone and most of them are male. Regular flow of large number of seasonal and regular workers in India, Malaysia and other parts of the world are going for menial work and caused the shortage of labor supply in the country. Percentage share of out migrants male member used to be higher than the female. This indicates that the out-migration of male members of the family households having female domination is higher in the Mountains and the Hills (Table 1).

According to the national census 2001, the Tarai districts comprised high domination of migrants' population than the Mountain and the Hill districts (Table 3). The Tarai districts also had the high percentile contribution of the foreign migrants, but the Hill districts comprised the domination of internal migrants. The contribution of the internal migrants in the Mountain and the Hill was higher in the districts specifically with the urban centers, whereas the Tarai had the domination in the districts having good as well as cheaper agricultural land. The population distribution and the inter-census changes revealed that the Tarai has the contribution of population both from the internal and the external sources, thus, there is faster population growth.

Resources Distribution and Use

Land, forest, water, biological (biodiversity, flora and fauna) and aesthetic are the common resources using by the local people with different scale, however, land is the major source of livelihood. Out of the total income 61 percent was from the farm-based activities, 22 percent was from none farm and 16 percent was from the other sources (CBS, 1996). In 2003/04 that scenario has been changed significantly, where the share of farm was reduced to 48 percent (CBS, 2004). However, the report further stated that the percentage of agricultural households has decreased from 83

Table 2. Districts with Population Growth Rate, 2001

Region	Per Annum Growth Rate 1991-2001(in percent)				
	< 1	1 to < 1.5	1.5 to < 2	2 to < 3	> 3
Mountain (Total 16 districts)	Mustang = 1	Solukhumbu, Sankhuwasabha, Taplejung = 3	Sindhupalchok, Mugu, Jumla, Kalikot, Humla, Dolakha, Darchula, Bajura, Bhajhang, Dolpa, Rasuwa =11	--	Manang =1
Hill (Total 39 districts)	Bhojpur, Khotang, Synagja, Parbat = 4	Gulmi, Terhthum, Ramechhap, Dhankuta, Palpa, Gorkha, Myagdi Okhaldhunga, Lamjung, Panchthar, Argakhachi, Baglung = 12	Baitadi, Achham, Rolpa, Dhading, Nuwakot, Tanahun, Kavre, Rukum, Jajarkot, Dailekh, Salyan, Dadeldhura, Pyuthan = 13	Ilam, Makawanpur, Doti, Sindhuli, Surkhet, Lalitpur, Bhaktapur, Udayapur, Kaski = 9	Kathmandu = 1
Tarai (Total 20 districts)	--	--	Jhapa = 1	Saptari, Dang, Siraha, Morang, Rautahat, Mahottari, Bardiya, Dhanusa, Parsa, Nawalparasi, Chitwan, Sarlahi, Bara, Kapilbastu, Rupandehi = 15	Sunsari, Banke, Kailali, Kanchanpur, = 4

Source: Compiled from the Population Census 2001, CBS (2002).

Table 3. Contribution of Migrants to the Total Population, 2001.

Development/Ecological Region	Internal Migrants	Foreign Migrants
Eastern	13.60	2.93
Mountain	4.18	0.39
Hill	8.80	0.69
Tarai	6.11	3.51
Central	13.48	3.06
Mountain	2.61	0.21
Hill	18.08	1.19
Tarai	10.77	5.11
Western	11.74	2.99
Mountain	15.28	0.26
Hill	7.50	1.03
Tarai	18.45	6.16
Mid-Western	9.94	1.62
Mountain	2.40	0.02
Hill	5.46	0.37
Tarai	15.74	3.17
Far-Western	14.99	1.27
Mountain	2.42	0.40
Hill	3.74	0.45
Tarai	28.96	2.28
Nepal	12.88	2.67

Source: Computed from the CBS Population Census 2001, National Report Table 8.

- Figures are the percentage of total population.

in 1995/96 to 78 in 2003/04. Although there is declining in trend farming is the only dominant source of resources, and the pressure is still high in the arable land. The Mountain and the Hill have lesser extension of arable land thus the population pressure is high over there. Along with increasing population the pressure on land is definitely increased. The other important resources are forest and water. The aesthetic and biological resources are still to develop in an organized manner, thus, the existing contribution is either negligible or in localized area.

Land Resource

In total, Nepal possesses 147,181 square kilometers of land area. The Mountain, the Hill and the Tarai are the three ecological belts extending from west to the east. The Mountain and the Hill together known as mountainous terrain, and comprises around 77 percent of the total land mass. The Tarai has only 23 percent of the total area. Out of the total land area of the country less than one-fourths part is suitable for the agricultural activities. The coverage of forest is confined in slightly more than one-thirds part. A large portion of the territory of the country is under wasteland either under cliff or steep rocky terrain. An extensive portion of the terrain in the Mountain is under highly fragile and vulnerable for landslide or mass wasting. In the Tarai the land units are threatened regularly by flood and sedimentation. Therefore, land resource in the country is negligible for the modern development including mechanized farming and green revolution. In 1961/1962 the average size of land holding was 1.11 hectare and reduced to 0.96 hectare in 1991/1992. According to the National Sample Census of Agriculture Nepal (1991/92), 2,597,400 ha of total land was under the holding in the country, in which 6.8 percent was in the Mountain, 40 percent was in the Hill and 52 percent was in the Tarai, respectively (CBS, 1994). Even under that total holding, only 2,323,400 ha (89.5 percent) land was arable land. The distribution of arable land in different ecological region was 162,300 ha in the Mountain, 871,300 ha in the Hill and 1,289,700 ha in the Tarai. Average holding size of the country was only 0.96 ha, however, size vary with 0.68 ha in the Mountain, 0.77 ha in the Hill and 1.26 ha in the Tarai. While NLSS (2003/04) indicates that the average holding reduced to 0.8 hectare and the region-wise distribution was 0.9, 07 and 1.0 hectare in the Mountain, the Hill and the Tarai, respectively. This indicates that the Mountain and the Hill have comparatively small share of holdings. People in those regions are comparatively less benefited by the use of land resource even though there is a large share of land surface. However, in such large share of households adopting the agricultural activities the availability of the agricultural land is the major determinants of their livelihood. According to the NLSS Report (1996), merely over 50 percent of the total household of the country survive in less than adequate food consumption. Among the ecological belts the percentage was 63.16 in the Mountain, 54.67 in the Hill and 44.87 in the Tarai. Similarly, the analysis made in based on total crop production of the district, calorific value of the crops production and the total population in 1991, Subedi (1995) computed only one each from the Mountain and the Hill district and two from the Tarai districts had relatively better food situation. 8 districts out of 16 in the Mountain, 13 out of 39 districts in the Hill and 3 out of 20 districts in the Tarai were in relatively very poor food situation. Based on the same time database, in one study, 25 districts were ranked in worst category according to the poverty and deprivation index, among them 9 were in the Mountain, 7 were in the Hill and 9 were in Tarai (ICIMOD, 1997). While in 2003 the status of poverty and deprivation index computed based

on 2001 database following the same methodology as of 1997 shows 25 districts under least developed. Among them 10 were in the Mountain, 12 in the Hills and 3 in the Tarai (ICIMOD, 2003). This has revealed that the poverty and deprivation has increasing trend in the Mountain and the Hill districts in comparison to the Tarai districts.

Water Resource

The Nepal Himalayas gains about 1500 to 2500 mm precipitation on an average. The snow and ice supplements the low flow of river during the summer and acts as a balancing reservoir for water as well as heat of subcontinent (Sharma, 1997:34). The snowfield is the main source of glaciers. In the country some 3,252 glaciers were recorded and cover 5,324 square kilometers area in total (Mool, et al. 2001). These high frozen reservoirs release their water at the top of their watersheds. 54 glaciers have some 9.52 kilometers mean length (computed based on the data given in Sharma, 1997: 35-38, Table 2.15). Including all these glaciers and snowfields the country has more than 6,000 river segments. Some of them originate at the Tibetan parts and are antecedent to the Great Himalayas. The Koshi, the Gandaki, and the Karnali rivers are the major antecedent systems. Some others originate at the Mahabharat range and some are at the Siwalik range. All these river systems discharge 200 billion cubic meters water per second on an average annually (NSAC, 1998:10).

All these river system provides very high hydropower potentiality. The theoretical potentiality of hydropower of the water discharged from the region is estimated to 85 MkW (million kW). Of the tremendous hydroelectric power potential, 48 thousand MW is technically viable and only 33 thousand is economically viable (Devkota and Pande, 2002), which, if harnessed in an environmentally sound manner (NSAC, 1998:10). But, since 1911 only 0.6 MkW hydropower is produced in the country so far. From these developments, only 15 percent of the population of the country is getting the benefit among them three percent are from the rural areas (Devkota and Pande, 2002). Nepal is one of the richest countries having hydropower potentiality only 39 percent households in total have the electricity facility. Database of 2001 census, shows that the most of the Mountain and the Hill districts have very small proportions of households having electricity facility. In total, 3 districts in the Mountain, 14 in the Hill and 9 in the Tarai districts are above the national average percentage of households using electricity for lighting.

Table 4. Districts Using Electricity Facility, 2001

Region	Districts within the percentage of households using electricity				
	Below 20	20 - 40	40 - 60	60 – 80	Over 80
Mountain	Dolpa, Bajhang, Bajura, Mugu, Taplejung, Darchula, Humla, Solukhumbu, Jumla, Kalikot = 10	Sindhupalchok, Sankhuwasabha, Rasuwa = 3	Dolakha, Mustang = 2	--	Manang = 1
Hill	Jajarkot, Achham, Rolpa, Khotang, , Panchthar, Bhojpur, Okhaldhunga, Ramechhap, Rukum, Argakhanchi, Terathum, Dhading, Gulmi, Salyan, Pyuthan, Dailekh = 16	Baitadi, Parbat, Myagdi, Sindhuli, Doti, Lamjung, Udayapur, Baglung, Dadeldhura = 9	Gorkha, Surkhet, Tanahun, Syangja Dhankuta, Palpa, Nuwakot, Ilam = 8	Makawanpur, Kavre, Kaski = 3	Lalitpur, Kathmandu, Bhaktapur = 3
Tarai	--	Bardiya, Mahottari, Dang, Rautahat, Kapilbastu, Jhapa, Sarlahi, Siraha, Kailali, Morang, Kanchanpur = 11	Saptari, Bara, Nawalparasi, Sunsari, Parsa, Dhanusa, Banke = 7	Rupandehi, Chitwan = 2	--

Source: Computed from the Population Census 2001, National Report (CBS, 2002).

Similarly, water resource can benefits a large number of farmers but the existing use is in negligible. In 1991/1992, in total 882,400 hectare of arable land was under irrigation (CBS, 1994). Only 18 percent of the arable area was commanded by well-controlled year-round water supplies (NPCS, 1995:69). NLSS (2003/04) has stated that the proportion of irrigated land area has been increased from 40 to 54 percent in between 1995/96 and 2003/04. The Agriculture Perspective Plan point out that Nepal has surplus water resources for both surface (200 billion cubic meters) and groundwater (12 billion cubic meters) development of the 1.8 million hectares of land available for irrigation. Nepal was making use of less than 8 percent of its water resource potential (NPCS, 1995:70), in which 940,000 hectare land was under irrigation, out of that only 25 percent had facility in winter season (Devkota and Pande, 2002). Drinking water is the main use of water, however, the country has

minimal proportion of households (52 percent of the total) getting facility from the pipe-water until 2001 census year. Most of the districts in the Tarai were getting less facility of pipe water, but the situation in the Hill and the Mountain seems better in the database (Table 5).

Table 5. Percentage of Households Using Different Types of Resources, 2001

Development/ Ecological Region	Resources Types		
	Drinking Tape/Pipe Water	Cooking Fuel Wood	Lighting Electricity
Nepal	52.93	65.59	39.39
EDR Mountain	75.32	97.37	18.28
Hill	62.58	90.50	21.01
Tarai	16.59	49.52	36.47
CDR Mountain	82.02	92.02	34.28
Hill	79.20	50.31	67.83
Tarai	31.90	54.33	39.77
WDR Mountain	100	75.83	62.66
Hill	100	74.46	40.49
Tarai	100	45.55	45.94
MWDR Mountain	100	94.82	11.69
Hill	100	90.41	18.38
Tarai	100	66.38	34.87
FWDR Mountain	100	97.63	6.14
Hill	78.12	73.16	14.69
Tarai	100	82.44	33.70

Source: Computed from the Population Census 2001, National Report, (CBS, 2002).

Forest Resource

Forest is one of the major type of resources. Wood is the main source of daily used fuel. On an average 66 percent households of the country have used wood as a cooking fuel (CBS 2002). According to census 2001, over 90 percent households of the 32 districts of the country used wood as a fuel for cooking. Only except the districts of Kathmandu Valley and few districts in the Tarai, almost all districts have highest percentage of the households using wood as fuel (Table 5). All the fuel-wood collect from the public forest. Similarly, over 50 percent of the total fodder requirements, and almost all needs of timber and saplings also collect from the public forest, too. Therefore, public forest is the major source of resources for the

livelihood of the people. The increasing number of people directly gives pressure to the forest resource of the country. From 1978 to 1994 the forest coverage was declined with a rate of 1.7 percent per annum, in which the rate was 1.3 percent in the Tara and the 2.3 percent in the Hill and the Mountains (Forest Resources of Nepal 1999). Subedi (1995) found 13 districts in the Tarai and 7 districts in the Hill were in critical shortage. Only 5 districts in the Tarai and 2 districts in the Mountain were in better position. All the districts in the Hill were in shortage of fuelwood. The situation of the Tarai was still worsening because of high growth of population. After the Forest Master Plan 1988, forest management strategy has been changed under the private and community level. Forest Act 1992 and Forest Regulation 1994 have clearly defined the participatory forest management scheme to reduce the deforestation rate in all three ecological belt of the country. Immediately after the implementation of participatory management scheme a significant change came in the forest conservation. It was reported that over 16,000 households were joined in around 14,000 forest user's group and they were managing around 1.2 million hectare of forest land. Three percent of the total forest area of the Tarai was handed over to the community forest management where 240,000 households were involving and managing around 138, 000 ha of forest land. Because of that deforestation rate of the Tarai was declined to 0.08 in the year 2000-2001 (Himal, 2005). The conservation sector of the forest is now to some extent satisfactory, however, people are less benefited in terms of their livelihood. Still many people who are inhabited close to the well managed forest premises are starving and looking for their livelihood options to other than local resources.

Due to lack of structured database on the use of other resources like biological and aesthetic sector analysis of these resources is not possible. Still it is possible to assume that these resources also provide substantial share on livelihood of the people. Basically, the tourism practice give a good amount of national revenue and employment but it is confined in some pocket area. Kathmandu Valley, Pokhara and few trekking routes are getting good benefits from these resources. Because of the prospects of benefits population concentration is confined at micro level. Similarly, biological resources are also confined in different districts but it is difficult to ascertain the database with geographical region as well as their contribution in real value terms.

Conclusion

Between 1981 and 1991 five districts of the Mountain had negative population growth, but between 1991 and 2001 those districts gained the positive increment. The Hill districts had fewer males in terms of female, which seems to be due to the temporary out-migration of male members of the family for the earnings. Population change occurred in the last decades revealed that the Tarai districts of the country

were gaining rapidly. The Tarai districts are still gaining population from internal and foreign sources and are caused both absolute change and growth rate. All these common scenarios of the population changes in the country are directly or indirectly imparting different implications on the resources use. The increasing growth rate of population in the Mountain and the Hill, environmentally the most sensitive and the fragile ecological belts, has been gradually reducing the per capita holding of arable land. Similarly, the Tarai, once considered as the 'granary of the country' and used to supply the required foodstuff to the Hill and the Mountains, is now under the high population pressure itself. That has not enough production to support its own population. Thus, the Hill and the Mountain could not get its support on food requirements in the days ahead. All these changes in the number of people and the resources use position the country is now towards the worsening situation. Enhancing economic opportunities, well distribution of infrastructure development, maintaining production capabilities and stability of the movement of the population are some of the great challenges of the country for its sustainability. The country on its foot steps to the reconstruction of 'New Nepal' needs to search some scientific alternatives of resources utilization on respective ecological belts considering the potentiality of the resources available.

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