Physical and cultural patterns in the Himalaya

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New Era, Kathmandu, Nepal

2002

Keywords: mountains, physical characteristics, cultural diversity, biodiversity, geology, vegetation, hydropower, population growth, protected areas, languages, tourism, Himalaya.

1. Introduction

Since mankind is earthbound and ascent involves physical effort, mountains have been an object of consideration. Kalidas, a Sanskrit poet of the 4th century alluded to India's northern ramparts as follows:

> God of the distant north, the Snowy Range
> O'er other mountains tower imperially;
> Earth's measuring-rod, being great and free from change
> Sinks to the eastern and the western sea ...[1]

The above reference was to the Himalayan range and its sweep from the Bay of Bengal to the Arabian Sea. Arab geographers of the Middle Ages were more knowledgeable and had a wider perspective about the configuration of the world. One of their fanciful notions "was to regard the Eurasian landmass as a desirable woman clothed in nothing but a long chain girdle about her ample waist. The girdle was of mountains studded with snowy peaks. It stretched from the Pyrenees through the Alps, Balkans, Caucasus and Elburz to the limits of the known world in the Hindu Kush and the Himalayas."[2]

One finds lack of consistency on the designation for the highest mountain range in the world. That is, some render it in singular as 'Himalaya' while others use the plural as 'Himalayas'. I wish to clarify that these two forms of designation should be used according to the context under discussion. This mountain range deserves to be treated as a singular entity owing to its emphatic physiographic expression of extreme elevation. Its homogenous personality conjures up the image of the Himalaya as an earthly phenomenon with ethereal aura since the power places there have an element of unity - be it Shamanistic, Buddhistic or Hinduistic.

This does not mean that its plural version is spurious. It becomes relevant when referring to topical components of the Himalaya and can be exemplified from three systematic disciplines. In geology, its respective components are Higher Himalaya, Lower Himalaya, and Sub-Himalaya. Its vegetation realms are West Himalayan

(xerophytic) and East Himalayan (hydrophytic). Again, its geographical divisions yield the Western, Central and Eastern Himalaya. The boundaries with regard to the above topical components are latitudinal (east-west) for geology and longitudinal (north-south) for vegetation and geography. They also vary in precision when visualised as a transect. Geological boundaries determined by structural faults and thrusts are more emphatic than vegetation or geographic boundaries that are indicated by transition zones.

There is no enlightenment in the statement that the Himalaya is a complex of high mountains, elevated plateaus, deep gorges and extended valleys. In order "to promote economically and environmentally sound development" in the mountain (as formulated by ICIMOD), one must have a better understanding of the nature, resources, and potentials of the mountain's component areas. The first step towards appreciation of the total complex is identification of smaller, less heterogeneous or interconnected parts. If there is complexity, its degree needs to be examined. Such a methodology can yield inter-relationship among elements within the given space. The mosaic of meaningful parts provides a broader framework for comparative analysis and synthesis for conclusion or application.

What follows is description of regional pattern of some physical and cultural aspects of the Himalaya. My topical sources are Austrian on geology, German on biodiversity, French on language and Indian on population. I merely mediate as a Nepalese geographer.

Physical Pattern

Process refers to temporal change and pattern to spatial difference. In the Himalaya, vertical variation is too obvious. Therefore, this paper attempts to highlight the horizontal or lateral diffentiation across the Himalaya. The Himalayan range extends over 2,400 km in a vast southerly arc between the bend of the Indus marked by Nanga Parbat (8,125 m) on the west to the Tsangpo-Dihang bend around Namche Barwa (7,755 m) in the east. It is the loftiest mountain complex with 31 peaks exceeding 7,600 m in elevation.[3] The extreme elevation and rugged relief are the result of mountain-building forces and vigorous erosion processes. The transport of vast quantities of material is compensated by the uplift rate of one metre annually (ten times faster than in the Alps). The Himalayan range is not a massive mass but a series of narrow chains and its crest-line rarely falls below 5,500 metres. Where it has been breached by trans-Himalayan rivers, the deep gorges have great vertical contrast over very short horizontal distance.

(a) Geology. Three major geological units extend across the length of the Himalaya. They are arranged en echelon in elevation from the Gangetic plain to the Tibetan plateau along with increasing antiquity in geological age. The first and youngest (Tertiary) elevation, the Sub-Himalaya (Siwaliks), extends 2,000 km. along the foothill made-up of erosion materials from the rising Himalaya (Fig. 1).[4] Beyond it, the Main Boundary Fault marks the first structural discontinuity (Table 1). Overlying

this major thrust line occurs the Lower Himalaya. Its 600 to 800 million years old sediments are characterised by reverse metamorphism and recumbent folds. The Lower Himalaya is superceded by another discontinuity, the Main Central Thrust, marked by occurrence of hot-springs in places. Above it lays the Higher Himalaya of the oldest core material of crystalline with normal metamorphism. This unit is in turn superimposed by Tethys sediments.

Table 1: Geological Units Across the Himalaya

Unit & Discontinuity	West	Central	East
1. Higher Himalaya Crystalline; Metamorphism normal	Entrenched between crystallines of Indian shield and sediments of Tethys	Extensive and bifurcated	Extensive in Bhutan; separated from Tethys by old Paleozoic sediments eastwards
Main Central Thrust	D i s c o n t i n u i t y		
2. Lower Himalaya Pre-Cambrian to Lowest Paleozoic; Metamorphism reversed	Extremely narrow west of the Sutlej	Extensive but petering out eastwards	Narrow in Bhutan; Extensive in Arunachal Pradesh
Main Boundary Fault	D i s c o n t i n u i t y		
3. Sub-Himalaya Tertiary; Mollasse-type sediments	Extensive west of the Sutlej	Prominent with Dun valleys	Inconspicuous between Sapta Kosi & Manas rivers; Emphatic in Arunchal Pradesh

The above three geological units exhibit varied regional pattern from east to west. The Sub-Himalaya becomes progressively extensive west of Sutlej River as it is less eroded in the drier Western Himalaya. From the Ganges to the Kosi, it is punctuated by spindle-shaped depressions known variously as dun, marhi and khonch. It has been eroded away for over 300 km between the Kosi and Manas Rivers. The Sub-Himalaya emerges as emphatic foothills east of the Bhutan duars in Arunchal Pradesh.

The Lower Himalaya similarly evidences much regional difference. In Central Himalaya, it is fairly extensive but intruded by Higher Himalaya exposures. In the west, it is extremely narrow west of the Sutlej. It peters out from east Nepal to Bhutan and broadens in Arunchal Pradesh in the east.[5]

The Higher Himalaya geological unit constitutes the core of the main range. Normally, this crystalline complex overlies those of the Lower Himalaya. However, in the west (Himachal Pradesh), it occurs in direct contact with crystalline rocks of the Indian shield.[6] In Central Himalaya, it alternates with the Lower Himalaya with extensive exposures further south. East of Mount Everest, it extends as a compact formation marked with numerous structural faults that are oriented north-south.

(b) Biodiversity. The type of natural vegetation can be taken as the index of the environment of the locality. Vertical zonation of vegetation is a common phenomenon in the Himalaya. But there are also horizontal differences across the length of the range. The humid Eastern Himalaya may have luxuriant vegetation but the drier Western Himalaya has a higher variety of plant associations.[7] Some examples of regional variation are as follows:

- The horizontal zonation of vegetation along the Himalayan foothills varies from tropical rain forest in Assam to sub-tropical thorn-steppe in the Punjab.
- In the respective belt of highest precipitation and humidity, the east has broad-leaved, the central oak-coniferous mix, and the west coniferous forests.
- Arrangement of ranges that determine access to moisture carrying winds contributes to different patterns of vegetation. The north-west has monsoon vegetation south of Pir Panjal, winter rain-fed one in Kashmir Valley and dry steppe in Ladakh. In contrast, these broadly developed types are compressed into the wet forest in Bhutan by the accentuated power of the monsoon.

Carl Troll provides a comprehensive perspective on the three-dimensional landscape of the Himalayan system.[8] These encompass: (a) south to north (plain to plateau), (b) north-west to south-east (desert to rain forest), and (c) the lowlands to alpine zone. Although the schema (Fig 2) excludes Nepal, it provides contrast along the sections of the Himalaya extending over 9 degrees of latitude and 22 degrees of longitude. First, the snow-line rises from 4,800 metres in the west to 4,900 metres in the east with the highest in Garhwal (5,000 m). Secondly, the tree-line rises from 4,000 metres in the west to 4,200 metres in the east while it is lowest in Garhwal (3,900 m). Third, the wet forest of the east has a wide range in contrast to the progressive narrowing of moist forests westwards. At lower elevations, the predominant species are Shorea robusta in the east and the Pinus variety in the west.

Woodlands are the habitat of variety of birds. And they also seem to have environmental preference. Take the case of pheasants which belong to the order of galliformes (game birds). Of the six types of pheasants found in the Himalaya, the central section has three, the west two and the east one as endemic.[9] Cheer (Catreus wallichii) and Koklass (Pucrasia macrolopha) are found in the west and Blood Pheasant (Ithagenic cruentis) in the east. The Central Himalayan ones are Monal (Lophophorus impeyanus), Satyr Tragopan (Tragopan Satyra) and the Kalij (Lophura leucomelana). Even within the central section, the Kalij is white-crested westwards, black-backed (melanota) in-between and black-crested eastwards. That most of them converge in the longitude of Kali-Gandaki valley is indicative of the richness of flora and fauna of this area in Central Himalaya.[10]

3. Cultural Pattern

I will now traverse into the cultural pattern with a brief citation of two early conjectures on the physical process in the Himalaya. It was initially assumed that the vast deposit of the Hindustan plain was the vestige of an ancient Indo-Brahma River that once flowed east-west parallel to the Himalaya. Since then, geologists have concluded that this vast material was derived from the Himalaya through surface erosion. Similarly, there used to be a debate on whether the six rivers that cut across the Himalaya were antecedent to the range or the consequence of headward erosion. There is now consensus on the former process: that these rivers have maintained their course by digging deeper as the mountain rose.

Thus, the Himalaya wedged between the centre of two Asiatic civilisations was no more a cultural divide than it was a major water divide. It was both a new frontier and vestigial haven of refuge for diverse races.[11] The peopling of the Himalayan area was the outcome of successive waves of migration of Mongoloids from the east and north and Caucasoids from the west and south. The epicentre of the former was in Yunnan plateau while that of the latter was in Central Asian steppe. They migrated in stages each carrying their livelihood culture to this new habitat, that of root crop with pig from the east and grain with cattle from the west. Owing to their respective migration routes, the zone of Caucasoid-Mongoloid interface became tangent to the mountain crest whereby the former spread over the entire Western Himalaya and the latter more numerous east of the Gandak basin.

The medieval and modern history of the Himalayan region also provides evidence of expansion beyond their culture area. In the east, the Shan Ahom descended to the Brahmaputra Valley in early 13th century and ruled for four centuries. In Central Himalaya, the Khasa-Gorkhali held sway between Tista and Sutlej during the first decade of 19th century. The final conquest of trans-Himalayan Ladakh by a Dogra ruler of Jammu was accomplished only in 1833. With colonisers and conquerors also came their faith: Brahmanism from the tropical plain, Lamaism from the high plateau and Islam from the western desert. Higher religions even exchanged distant symbols as conch-shells reverberate in Tibetan gompas and yak-tails serve as fly-whisks in Hindu temples. Yet the spiritual mould of the Himalayan people continues to be influenced by the older substratum of anonymous deities as indicated by their Shamanistic proclivity. Another characteristic feature of this culture contact zone was the juxtaposition of diverse economies: shifting cultivation of the east, trade-pastoralism of the north, and agro-artisan of the west. The vortex of this regional amalgam is represented by Kathmandu Valley where the natives profess Indic religions yet persist with mattock and fecal manure in farming, and use shoulder-pole (kharpan) for load-carrying that are more reminiscent of the Sinic realm.

(a) Language. The distinction between language and dialect has remained contentious due to linguistic interpretation and political consideration. According to a macro study of South Asia, the Himalaya is home to 51 languages.[12] Of these, the central and western sectors record 20 each and the east eleven (Table 2). According to their language family affinity, 35 are Tibeto-Burman and 16 Indo-Aryan. Among

those of Indo-Aryan family, 10 are Pahari, 2 Dardic and 4 others as unclassified. Of the Tibeto-Burman family languages, 30 are Bodic and 5 Baric.

Table 2 : Languages of the Himalaya (Number)

West (20)			Central (20)			East (11)		
A. INDO-ARYAN (11)			A. INDO-ARYAN (5)			B. TIBETO-BURMAN (11)		
I.	Dardic (2)	Location	II	Pahari (1)	Location	I	Bodic (6)	Location
1.	Shina	Pak (NWFP)*	1.	Nepali	Nepal	1.	Lepcha	Sikkim
2.	Kashmiri	Kashmir	III	Others (4)		2.	Denjongke	N. Sikkim
II.	Pahari (9)		2.	Danuwar	C.Nepal	3.	Dzongkha	Bhutan
3.	Bhadrawahi	Kashmir	3.	Darai	"	4.	Sangla	S.E.Bhutan
4.	Chameali	Himachal Pradesh	4. 5.	Kumal Majhi	" E. Nepal	5. 6.	Monpa Arunachal Pradesh Memba ,, ,,	
5.	Bharmauri	"						
6.	Kului	"	B.	TIBETO-BURMAN (15)		II.	Baric (5)	
7.	Mandeali	"	I.	Bodic	W. Nepal	7.	Aka (Hrusso) Arunachal Pradesh	
8.	Sirmauri	"	6.	Byangsi	"	8.	Dafla (Nissi) " "	
9.	Jaunsari	"	7.	Raji	C.Nepal	9.	Miri " "	
10.	Garhwali	Garhwal	8	Magar	"	10.	Adi (Abor) " "	
11.	Kumaoni	Kumaon	9	Gurung	"	11.	Mishmi " "	
B.	TIBETO-BURMAN (9)		10	Thakali	"			
I.	Bodic (9)		11	Chepang	"			
12.	Balti	Kashmir	12	Newari	"			
13.	Ladakhi	Ladakh	13	Tamang	"			
14.	Kanashi	Himachal Pradesh	14 15	Thami Jirel	E. Nepal "			
15.	Kinnaur	"	16	Sunuwar	"			
16.	Lahuli	"	17	Rai	"			
17.	Spiti	"	18	Sherpa	"			
18.	Darmiya	Uttarakhand	19	Dhimal	"			
19.	Chaudangsi	"	20	Limbu	"			
20.	Rangkas	"						

Indo-Aryan	16
I. Dardic	2
II. Pahari	10
III. Others	4
B. Tibeto-Burman	35
I. Bodic	30
II. Baric	5
TOTAL	51

** NWFP = North-West Frontier Province, Pakistan.*

Source : Ronald J-L. Breton, *Atlas of the Languages and Ethnic Communities of South Asia,* New Delhi: Sage, 1999, Annex C, pp. 200-205

The Dardic language group occurs only in the extreme north-west. Similarly, Baric languages are confined to Arunchal Pradesh. Pahari is widespread in the western and central sector. Their number as nine languages seems unreliable as the six in Himachal Pradesh are highly localised ones while those in Garhwal, Kumaon and Nepal are not so differentiated. Similar is the case with Bodic ones in Himachal Pradesh and Uttarakhand. The regional variants of Pahari are as Western in Himachal Pradesh, Central in Uttarakhand and Eastern in Nepal. Bodic languages are fairly widespread despite their small population size. They are found all across the higher elevations be they in cis-Himalaya or trans-Himalaya. Half of the Bodic languages are recorded in Nepal, mostly in the eastern and central hills. Bodic languages have status of state language in Sikkim and Bhutan. The north-east of India is a veritable jumble of Tibeto-Burman languages including islands of Mon-Khmer (Khasi) and Thai (Khamti). But all five languages north of Brahmaputra river in Arunchal Pradesh belong to the Baric group of the Tibeto-Burman family (Fig. 3).

(b) Population. The political /administrative units in the Himalaya between the Indus and Dihang rivers cover an area of 493,379 km.^{2} However, 23.1 percent of Nepal's land area falls in the piedmont plain of tarai. If the tarai plain of Nepal is excluded from this highland zone, the total Himalayan area comes to 459,360 km^2 (Table 3B). Of this, 65.1 percent is covered by the five states of India. The share of all Nepal is 32.0 percent and that without the tarai lowlands 24.6 percent. Bhutan's land share comes to 10.2 percent. The total population of Bhutan, Indian Himalayan states and highland Nepal comes to 31.3 million (Table 3B). There is a wide variation in population density according to these political units. Highland Nepal's density is 87.2 persons per km.^{2} It is 67.1 persons per km^2 for five Indian states and only 29.8 persons per km^2 for Bhutan. Thus, highland Nepal has nearly three times higher population density than that of Bhutan (Table 3A).

Table 3 : Population of Countries/States, 1991

A. Country/State	Area (km^2)	Population 1991	Density Persons/km^2
Indian States [a]	299,198	20,086,738	67.1
1. Jammu & Kashmir	101,562	7,718,700	76.0
2. Himachal Pradesh	55,673	5,170,877	92.9
3. Uttarakhand	51,124	5,926,146	115.9
4. Sikkim	7,096	406,457	57.3
5. Arunachal Pradesh	83,743	846,558	10.3
Bhutan [b]	47,1000	1,400,000	29.8
Nepal [c]			
a. All Nepal	147,181	18,491,097	125.6
b. Excluding tarai	113,162	9,863,019	87.2

B. By Section	Area	%	Population	%	Density Persons/km^2
Western Himalaya (1+2+3)	208,359	45.4	18,815,723	60.0	90.3
Central Himalaya* (Nepal)	113,162	24.6	9,863,019	31.5	87.2
Eastern Himalaya (4+5+Bhutan)	137,839	30.0	2,671,015	8.5	19.4
Himalaya Region	459,360	100.0	31,349,757	100.0	68.2

* Excluding tarai

Sources : (a) Nandy & others, 2000; (b) World Bank estimate (1998); (c) Nepal census, 1991

Aggregation of political territories into discrete sections of the Himalaya provides a more meaningful regional pattern. That is one of progressively higher population density from the east to the west. The western and eastern sections of the Himalaya have higher density than the Himalayan average of 68.2 persons per km2 (Table 3B). Western Himalaya has a share of 60 percent of the total 31.3 million population although it covers 45.4 percent of the total area. Highland Nepal claims 31.5 percent of total population with a quarter of total area. Eastern Himalaya covers 30

percent of Himalayan region but has only 8.5 percent of its population. Western Himalaya has a slightly higher density than that of the central sector. The density of the Western Himalaya is 4.7 times higher than that of Eastern Himalaya. Among Indian states, Uttarakahand in the west has the highest population density and Arunachal Pradesh in the east the lowest.

The linguistic distribution described above (Section 2a) shows predominance of Indo-Aryan group in the west and that of Tibeto-Burman group in central and eastern sectors. Such a pattern is the consequence of migration waves of Caucasoids from the west and that of Mongoloids from the east. These two groups also differ in their social structure. The Caucasoids, except the Muslim, have a hierarchical caste system based on ritual purity. The Mongoloids, on the other hand, constitute distinct groups based on own territory, language and tribal customs. This contrast is reflected in the social composition of the regional population even now. The Hinduised west has a considerable proportion of scheduled caste and very few scheduled tribe population. The case is reverse in the eastern Indian districts. The proportion of scheduled caste is progressively higher as one turns west of Uttarakhand towards Himachal Pradesh. Of the 12 districts of the latter state, five have a range of 27.1-31.3 percent as scheduled caste (Table 4). On the other hand, their proportion in five districts of Arunchal Pradesh is extremely low : 0.1 to 0.4 percent. Conversely, Himachal Pradesh districts have very low percentage of scheduled tribe population (Table 4). But they constitute 53.0 to 85.9 percent of population of Arunchal Pradesh districts. Nepal in Central Himalaya despite being a Hindu kingdom represents the intermediate situation with 34.8 as indigenous people (Janajati) and 14.5 percent as low caste (Dalit) of its total population.

Table 4 : Contrast in Social Composition, 1991

District	Scheduled Caste %	Scheduled Tribe %
Himachal Pradesh (West)		
Solan	31.3	0.6
Sirmur	31.3.	1.6
Mandi	29.0	1.2
Kulu	28.9	3.6
Simla	27.1	0.7
Arunchal Pradesh (East)		
West Kameng	0.4	53.0
West Siang	0.3	78.4
Upper Subansiri	0.2	85.9
Tawang	0.2	78.6

East Kameng	0.1	85.6

Source : Nandy et al, 2000, pp. 56 & 58

Migration factor rather than fertility rate is an important determinant in the population dynamics of highland areas. This is also the evidence of population growth in the Himalayan region. The five Himalayan states of India recorded a high decadal growth rate of 29.05 during 1981-91.[13] Western states of Uttarakhand and Himachal Pradesh with high density of population (Table 3) had a lower decadal growth rate: 22.55 and 20.79 respectively. They also recorded a declining growth rate in 1991 over 1981 census. Arunchal Pradesh in the east has extremely low population density of 10.3 persons per km.2 Its decadal growth rate was very high (36.83) mainly due to in-migration into this frontier land.

Nepal in the Central Himalaya evidences a similar demographic pattern of descent to the lowlands. The country's population increased by 15 million in about five decades (1952/54-2001). Of this increase, 64.2 percent occurred in the lowland tarai. Since 45 out of 51 highland districts were already overpopulated by 1971,[14] the migratory flow was directed to the low density plain districts.

Tip of the Iceberg

'Berg' is a German term for mountain. Icebergs break-off the main mass, float and melt away into the sea. Mountains are squeezed out of the substratum by orogenic forces and their floatation is maintained through isostatic balance.[15] This is expressed by the mechanism of uplift in relation to the unloading of materials by surface erosion. There is an obvious contrast between iceberg fragility and mountain dynamism. The purpose of invoking the iceberg imagery is to indicate two Himalayan resources that have immense development possibilities.

Some have identified (1) inaccessibility, (2) fragility, (3) marginality, (4) diversity, (5) niches, and (6) adaptation mechanism as specificities of mountain environment.[16] In fact, inaccessibility and marginality, on one hand, and diversity and niches, on the other, are expressions of the same essentials. Fragility is a misleading notion regarding dynamic mountains[17] while adaptation mechanism is not peculiar to the mountain environment. In substance, the specificities associated with mountain areas are (1) inaccessibility, (2) diversity, and (3) conspicuity.

Inaccessibility is not all constraint as it sustains cultural diversity and local autonomy. But it imposes high livelihood burden on the mountain people. Inaccessibility is the main factor contributing to the economic marginality of Himalayan areas. Remoteness does not only imply a higher transport cost but also distance decay in innovation. Therefore, the wide temporal gap between the plantation of tea in Eastern Himalaya (1854) and apple in Western Himalaya (1930's). Similar was the long time lapse in potato introduction: 1774 in Bhutan,

1850's in Kumaon and 1890's in Jumla. However, military confrontation has opened up vast tracts of the Himalaya with road network. Since the Sino-Indian war of 1962, India has built over 11,000 kilometres of road in Western Himalaya in addition to those in Arunachal Pradesh.Indo-Pakistan conflict has boosted the horticulture and tourism economy of Gilgit and Hunza through the life-line of Karakoram Highway. Security concern has also expanded roads in Bhutan (+3000 km) and Sikkim (+1,000 km). Nepal now has a road network of 13,000 km but mostly traversing the plains and some hill areas. Since no one wishes a wider conflict, many areas in the Himalaya will remain roadless. However, the expansion of road accessibility since the last four decades has opened new avenues of economic opportunity to the Himalayan people.

Diversity of products is an essential characteristic of the mountain area because of its varied ecological zones. The subsistence economy of the Himalaya varies from shifting cultivation, seasonal farming to nomadic herding that are supplemented by petty trade. Increased road access in recent decades has facilitated the marketing of local products and crops/livestocks with comparative advantage vis-à-vis the lowlands. This is apparent from the trend in mountain agriculture. Time series data from a comparative research initiated by ICIMOD show increasing trend of crop diversification towards cash crops.[18] In Himachal Pradesh, paddy cropland declined while increase in wheat and maize cropland was nominal (Table 5). But acreage under apple, citrus and vegetables increased. In Uttar Pradesh, both paddy and maize cropland declined. In Nepal, area increase of cash crops was nearly three time that of food crops. Increase in area of cash crops compared to that of food crops was even much higher in Pakistan. Cash crops with larger area gains were citrus in Himachal Pradesh, and apple as well as citrus in Nepal and Pakistan.

Table 5 :Trends in Cropland

Annual growth rate

Country/Area	Change in Food Cropland			Change in Cash Cropland		
	Paddy	Wheat	Maize	Apple	Citrus	Vegetable
India						
Himachal Pradesh	- 0.38	0.17	0.19	1.6	3.4	2.5
Uttarakhand	- 0.13	0.01	- 0.94			
Nepal				2.83	2.39	-
Mountain	0.74	0.85	1.11			
Hill	0.36	0.55	1.06			

Pakistan						
Baluchistan	0.6	2.1	0.6	4.87	4.45	2.96
NWFP*	0.10	0.4	1.4	2.37	3.23	1.88

*North-West Frontier Province.

Source : Tulachan, 2001, Tables 1 & 2

Finally, I come to the tip of the iceberg or the hidden mountain alluded to earlier. An essential element in the definition of a mountain is its conspicuity.[19] And the stuff of Himalayan conspicuity are hydropower and tourism potentials.

(a) Hydropower. The term 'Himalaya' (abode of snow) captures well its role in hydraulic recycling of water vapour into snow and then perennial rivers that irrigate the lowlands. However, the vast energy potential of Himalayan rivers still remains submerged like an iceberg. The estimated annual flow in billion cubic metres are 115 for Upper Indus, 195 for the Ganges, and 200 for the Brahmaputra river.[20] The hydropower generation potential of Himalayan rivers of Pakistan, India, Nepal and Bhutan is estimated at 150,000 MW. Of this, barely five percent has been harnessed. Those so far harnessed include 2,220 MW in Western Himalaya, 1,678 MW in Nepal and 344 MW in Bhutan. The constraints to the fuller exploitation of Himalayan rivers are not only financial / technological but political as well since they span more than one country. The prospect for collaboration among the contending countries in the near future seems as sombre as the labours of the Himalayan Sisyphus.

(b) Tourism potential. However, there is yet one area of high prospect that can enhance the mountain economy along with environmental conservation. The Himalaya embodies unique physical and cultural resources for adventure as well as spiritual tourism.[21] Despite lack of comparable data on tourism across Himalayan countries, the few available indicate a considerable volume and revenue that can be exploited for developing mountain areas. Uttarakhand is visited by 14 million tourists annually of whom two-thirds are pilgrims.[22] Himachal Pradesh had 3.5 million visitors in 1993 and a quarter of these were domestic tourists to Shimla. Kashmir used to have an annual tourist flow of 100,000 until disrupted by violence since 1989. Nepal receives nearly half a million annually but the figure discounts many more Indians that come overland. Bhutan has put an annual ceiling of 4,000 tourists since 1998. The number may be small but tourism revenue constitutes about 5 percent of Bhutan's GDP. In Nepal, tourism is one of the significant sources of foreign exchange. Tourism earning for Himachal Pradesh is estimated to be about Rs. 2 billion.

It is indeed encouraging that there are numerous protected areas across the Himalaya. These include 86 in the west, 25 in the east, and 17 in the central section (Table 6). Indian states in the Himalaya have 15 national parks and 82 other types of protected areas. Nepal has 8 national parks and 9 conservation area/reserves. These 128 protected areas account for a total area of 62,628 km2 or 13.6 percent of the Himalayan region. Of this, 39.5 percent falls in central, 37.7 percent in western, and 22.8 percent in eastern Himalaya.

Table 6 : Protected Areas in the Himalaya.

Sector Country/State	National Parks		Other Protected Areas		Total		
	No.	Area (km^2)	No.	Area (km^2)	No.	Area (km^2)	%
West	12	9,913	74	13,691	86	23,604	37.7
Jammu & Kashmir	3	4,500	40	8,000	43	12,500	20.0
Himachal Pradesh	2	1,413	29	3,882	31	5,295	8.5
Uttarakhand	7	4,000	5	1,809	12	5,809	9.3
Central							
Nepal	8	10,144	9	14,605	17	24,749	39.5
East		850			25	14,275	22.8
Sikkim	1	..	4	125	5	975	1.6
Bhutan	..	..	..	..	14	9,300	14.8
Arunachal Pradesh	2		4	..	6	4,000	6.4
Total	23 +	..	91 +	..	128	62,628	100.0

.. Break-down unavailable

Source : Zurick & Karan, 1999, pp.260-62

I will conclude with two examples of best practices in conservation and development. Annapurna Conservation Area Project in Nepal that initiated (1986) local participation in conservation had most encouraging results. Since then, Royal Chitwan National Park has introduced (1996) the novel scheme of 'buffer zone' whereby the Park revenue is shared with the adjoining community. Replication of these models to other Himalayan protected areas has tremendous potential for involving local people in conservation along with their economic development.

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Notes to readers

This paper was presented at the International Seminar on Mountains (ISM), Kathmandu, Nepal, 6-8 March 2002. The seminar was organized by the Royal Nepal

Academy of Science and Technology (RONAST) in cooperation with Ev-K2-CNR, Italy and co-sponsored by International Centre for Integrated Mountain Development (ICIMOD), World Conservation Union (IUCN), King Mahendra Trust for Nature Conservation (KMTNC), Swiss Development Cooperation (SDC), and World Wildlife Foundation (WWF).

This paper was also a case study written for the Mountain Forum e-consultation, Mountain Tourism and the Conservation and Maintenance of Biological and Cultural Diversity, Bishkek Global Mountain Summit, UNEP, 23-28 April 2002.

The Mountain Forum would like to thank Dr. Dinesh R. Bhuju, Organising Secretary of the ISM, for his permission to include this on the Mountain Forum Online Library.