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PHYSICAL LANDSCAPES OF HALDWANI BLOCK, NAINITAL, UTTARAKHAND

Brish Kumar

Abstract:

Haldwani region consists geologically of middle and lower Siwalik Formations found in the North and Indo-gangetic alluvium in the South of the study region. The region has four main rivers – Baur Nadi, Bhakra Nadi, Gola river and Kailash Nadi. The foothills forming the northern plain is forested while the central part is cultivated and the southern part consists of build-up area. The maximum height of the region is around 1000 m in the North and 300 m in the South. The study regions is divided into high relief region, medium relief, low relief/plain coinciding with these three regions. We have worked out three slope regions i.e. steep slope in the north, moderate slope toward south and further south gentle slope to flat. The rivers which have been divided into 12 drainage basin. The soil of the region includes Bhabar belt which occurs in the submontane hill tract of Siwalik. The Terai belt has fine sand, silt and clay. The vegetation of the area is of two types i.e. in the south subtropical forest zone having sal, Kanju, Simal, Haldu, Khair, Sissu, Tun and Sain while towards North warm temperate forest zone with chir, oak (Banj), Moru and Carsu. Climatically the area has been divided into two zones coinciding with the forest zones namely subtropical climate and warm temperate climate.

Keywords : Physical landscape, Haldwani Block, Geological structure, Vegetation

INTRODUCTION

The study of landforms provides information useful to human as well as physical geographers. Now such studies are not only of academic interest but have occupied important place in applied fields *viz.*, in regional planning. The geographer is concerned with what, where and how much, while the geologist is concerned with 'structure, processes and time'. Kesseli, in his paper 'A Neglected Field : Geomorphology', too, suggests three concepts (i) concept of descriptive landform analysis, (ii) concept of landform type, and (iii) concept of landform type regions.

Formerly, the geomorphological studies were more of qualitative nature, generally based on the concepts of Davis and Penck. Morphometric analysis of landforms, introduced recently, has brought the quantitative study of landforms to limelight. It has, since long, been a problem to a regional geomorphologist to portray the total characteristics of individual landform elements so as to make a

meaningful regional synthesis. Most of the literature available on the subject deals primarily with the physiographic and natural regions.

In India very little attention has been paid to the field of geomorphology. Chibber contributed a series of papers on various parts of the Himalayan terrain which have been published by National Geographiocal Society of India, Varanasi during 1950's. Asthana (1967) and the Kharkwal (1968) made first attempt to classify some parts of the Kumaon Himalaya into morpho-units in their work, entitled "Morphometric Evaluation of Landforms in Almora and its Environs" and "Classification of Kumaon Himalaya into Morpho-units" respectively. The present work is an attempt to analyse the landforms and settlements in Haldwani block and its environs. The area selected for the study forms a part of Lower Himalaya in Kumaon (Uttaranchal).

OBSERVATION

(i) Physical Landscape

Broadly the study region is a transversely rectangular in shape lying in NW-SE direction with roughly 60 km of length and 20 km of width. It is also observed that the area is generally sloping from North to South. The major part of southern region is almost plain while the northern part is slightly sloping from North to South. This region constitutes of Lower Siwalik Formations while the former is a part of Indo-Gangetic alluvium.

The region is drained by four major rivers flowing from Northern Siwalik foothills towards south part. These rivers flowing from NW-SW Baur Nadi, Bhakra Nadi, Gola river and Kailash Nadi. These rivers are fed by first and second order streams flowing down from the Siwalik formations. There are two prominent lake like bodies one at the South- Western part of the area, other at South Eastern part of the area.

(i) Relief and Slope :

Fig. 3 exhibits the contour pattern of the study area. It is observed that the contours range from 300 m to 1000 m at the foothill region of Siwalik formation and the foothill slope is between 1000m and 500 m proceeding towards South. There is a flat region ranging from 500 m and 300 m contours further South. The 300 m flat region continues right up to Southern boundary of the study region.

(ii) Geological Structure :

Geologically the area consists of Middle and Lower Siwalik sandstones and shales in the north and Indo-Gangetic Alluvium in the South. The Siwalik Formations strikes in North West-South East direction and the dip is towards NE direction. The Main Frontal Thrust running in NE-SW direction separates the Siwalik Formation of North from the Indo-Gangetic Alluvium in the South of the study region. In other words the rocks are simply dipping beds (Fig. 5).

(iii) Drainage :

The four major rivers namely Baur Nadi, Bhakra Nadi, Gola river and Kailash river are flowing from North to South in parallel pattern along with other minor rivers form twelve drainage basins. The first order streams of these drainage basins are of dendritic pattern, and, when they meet angular drainage patterns are formed giving rise to 2nd order stream and these 2nd order streams finally meet in parallel manner form to 3rd order basins. All these rivers originate from Siwalik Formations in the North and they enter into the Indo-Gangetic Alluvium plains in the South. Apart from these rivers there are two major reservoirs, a larger one in the Western part of the study region *viz.*, Baur dam reservoir and the smaller one in the extreme South Eastern part of the area *viz.*, Nanak Sagar Lake.

(iv) Soil [Bhabar-Tarai tract (width 25-40 km)] :

The term Bhabar-Tarai is applied to a broad foothill country at the northern of the Great Plain of Ganga which is of recent origin and is mainly composed of the detritus washed away from the Southern slopes of the Siwalik ranges. Because of the related differences in site, topography, drainage, soil-depth and fertility, nature of vegetation, human habitation and occupation etc. the region exhibits a prominent landmark of the whole of Uttarakhand Himalaya region. This submontane belt, running at the foot of the Siwalik from West to East in the Southern border consists of two almost parallel strips (Fig. 5).

(a) The Bhabar Belt :

This is just a narrow submontane strip, South of the foot of the Siwalik hills. This is a zone of unassorted sediments where fans and talus and disappearance of the seasonal torrents traversing the South scrap of the Siwalik are the common features. These deposits are characterized by huge beds of boulders under this porous gravelly soil, which are generally more than 2m deep almost everywhere. The whole tract, due to a porous substratum, is remarkable for the absence of water. This region forms the source region of several streams flowing into the Ganga plain. Due to very thin layer of top soil and heavy soil erosion and absence of superficial water, this tract is unfit for agriculture. However, the agricultural fields can be observed in suitable pockets. This tract is well known for the forest wealth.

The region gradually tapers towards South on an average rate of 1 m per 100m. Maximum slope is found near the Northern margin along the foot of the Siwalik, alluvium mixed with boulder debris fans and also along the river banks. Among the river sides, uneven ground and huge boulder deposits present more rugged surface. The topographic diversities produced by the changing courses of various rivers are predominantly observed in the whole of Bhabar tracts.

(b) The Tarai belt :

It includes the long and narrow strip of low lying plain with the deposition of finer material South of the Bhabar land forming the upper limit of the Upper Ganga plain. This is the zone of seepage where fine sand, silt and clay are deposited by the emerging streams. Almost the level and fertile soil along with high water table has rendered unique physical and cultural landscape to the belt. The region is generally known as the wet and swampy land. But, the region is shrinking mainly because of reclamation measures and the deforestation schemes. Hence, the ecology of the tarai region has changed greatly in the recent years.

(v) Vegetation and Climate

The character of natural vegetation in this region is the outcome of the environmental complex which exercise its influence, among other things, through soil and climate, particularly moisture supply. A critical role is also played by structure, relief, altitude and aspect. Besides, varied factors of environment like amount of moisture and sunshine, seasonal variations in humidity and exposure to hot, dry and cold winds, etc. also play a significant role in the distribution of vegetation.

RESULT

The assumptions, made while analyzing the area by morphometric techniques, have further been testified in the light of the geology and structure of the area.

Physical Landscape: The study region has concave shape (Fig. 1).

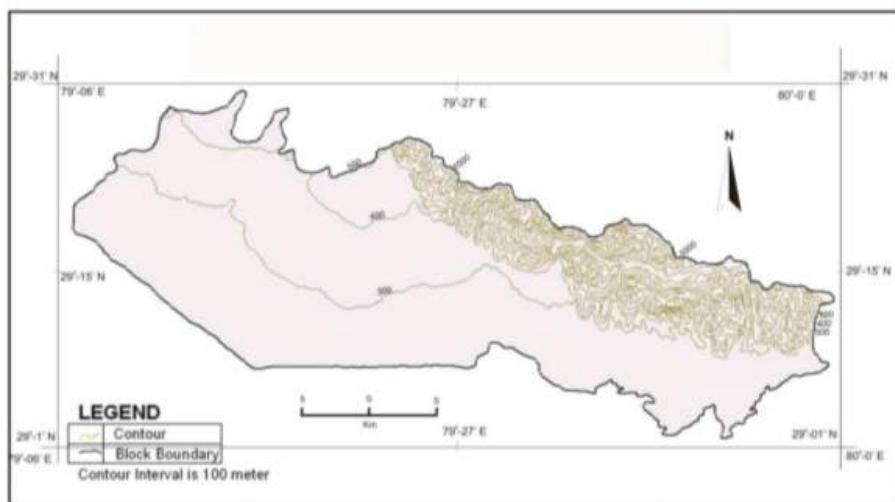


Fig.1 : Contour Map of Haldwani Block

The foothills exhibit forest area while the Central parts are cultivated areas. At the bottom of the forested area towards South and in the Southern part of the area built up area are observed (Fig. 2).

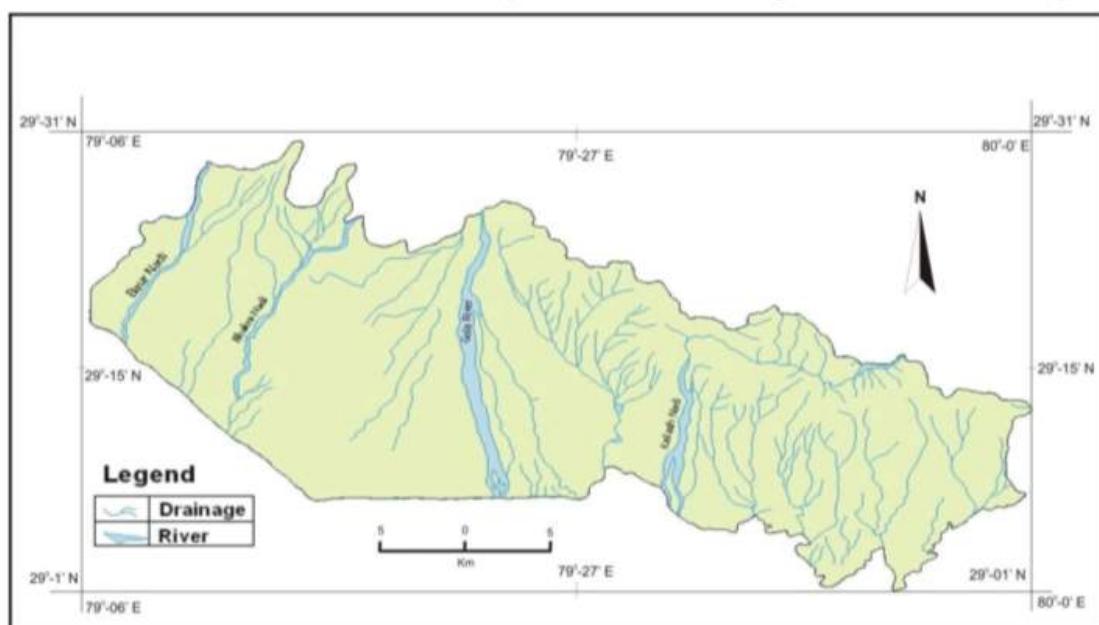


Fig. 2 : Drainage Map of Haldwani Block

Relief and Slope : On the basis of detail study of the contour map the study region is classified into three relief regions (Fig. 3).

1. High relief region i.e. 1000m and above,
2. Medium relief i.e. 1000 to 300 m, and
3. Low Relief/Plain i.e. 300 m and below

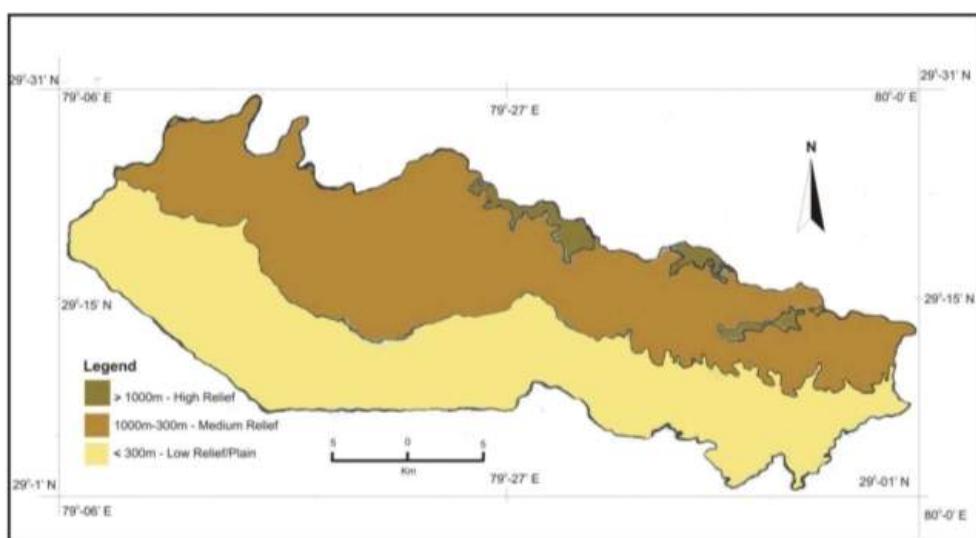


Fig. 3 : Relief Map of Haldwani Block

On the basis of contour and relief factors the slopes of the region has been deciphered by applying Henry and Raize, and Wentforth methods. The whole area has been classified into three slope regions namely,

1. In the extreme north steep slope along the foot hills of Siwalik is observed (8 to 16°).
2. Moving down to south in the alluvial region, moderate slope is observed (2-8°).
3. In the South which forms roughly half of the study region gentle slope to flat (less than 2°) is observed (Fig. 4).

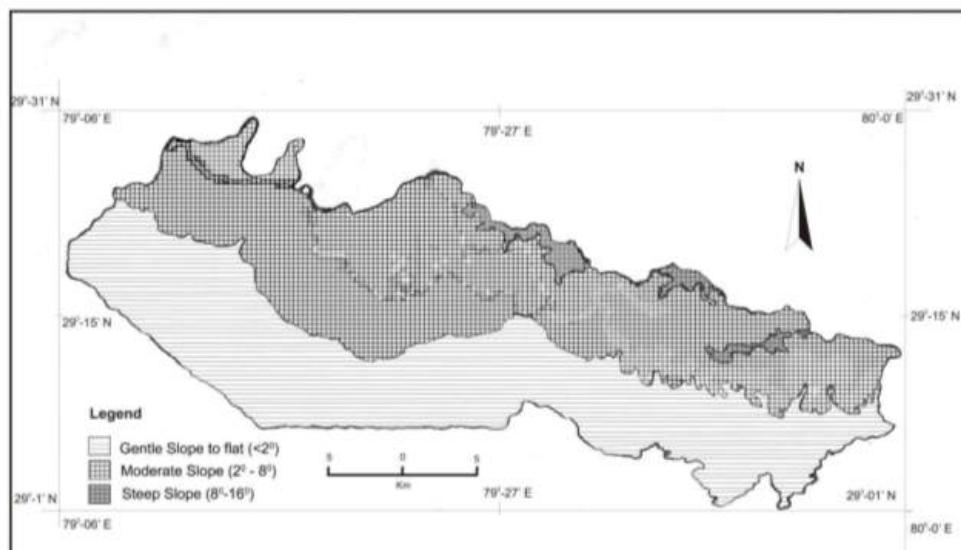


Fig. 4 : Slope Map of Haldwani Block

Geological Structure : The study region is being divided into two physiographic regions, *viz.*, (i) the Siwalik submontane hill tract consisting of middle and lower Siwalik Formations, and (ii) the alluvial plains.

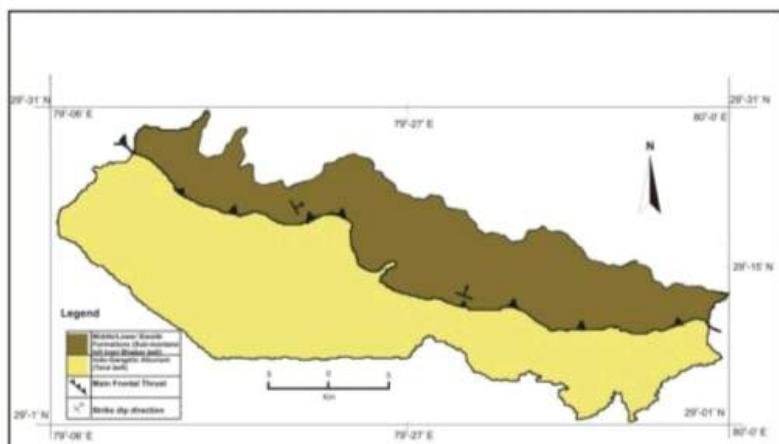


Fig. 5 : Geology (Structure, Lithology and Soil) of Haldwani Block

Drainage : Drainage Basin map (Fig. 6) exhibits the following features.

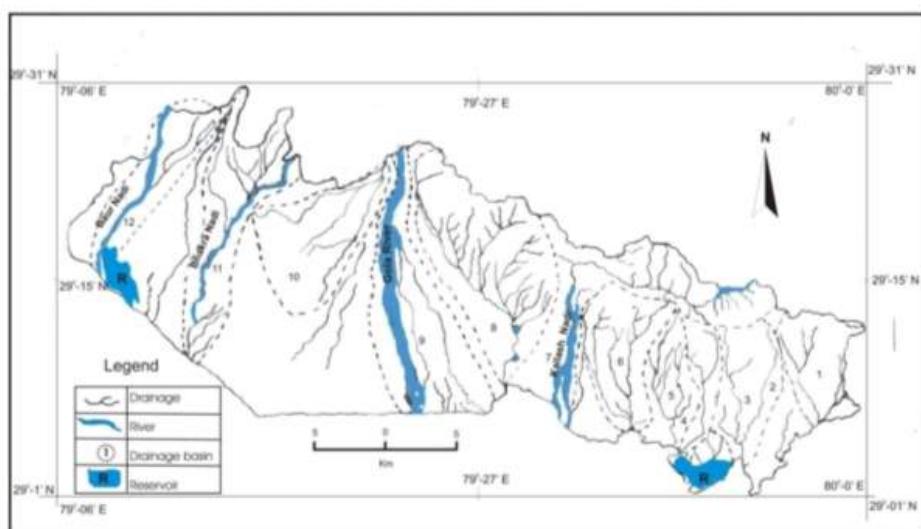


Fig. 6 : Drainage Basins of Haldwani Block

Vegetation and Climate

The extreme and varied conditions of climate combined with equally wide and adverse conditions of topography have naturally produced a highly variegated vegetations (Fig. 7).

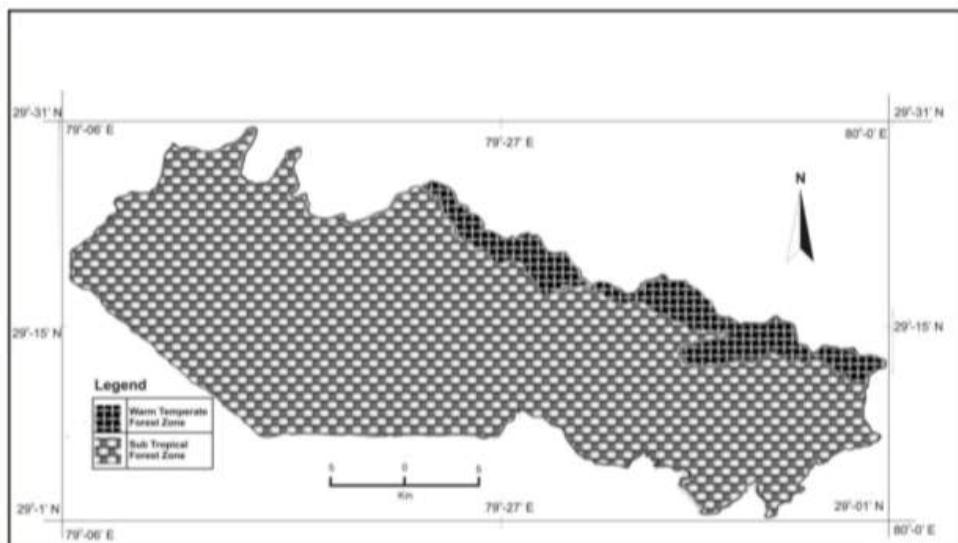


Fig. 7 : Vegetation and Climate of Haldwani Block

Table 1 : Broad Climate and vegetation zones of Haldwani Block

S. No.	Climatic Zone	Altitude (m)	Temperature (°C)			Average Rainfall (mm)			
			Mean Annual	Mean June	Mean January	Annual	Monsoon	Winter	Warm
1.	Warm Temperature Forest Zone	800 – 1000	13.9 – 18.9	21.1 – 27.2	6.1 – 11.1	190.01	500.1	19.75	73.75
2.	Sub-Tropical Forest Zone	300- 800	18.9 – 21.1	27.2 – 29.4	11.1 – 13.3	187.66	471	19.25	72.75

Warm Temperate Forest Zone : These forests are generally found between 800 and 1000m. The Chir (*Pinus longifolia*) is the dominant tree of this zone and occupies all geological formations. At places, the pine is the sole dominant tree. On northern aspect where there is more moisture in the soil, scattered trees of all species can be observed. The ground surface is covered with various species of grasses. Above chir forest, the mixed vegetation of broad-leaved varieties, such as oak, are found. Out of the three principal oaks, Banj (*Quercus incana*), Moru (*Quercus dilatata*) and Kharsu (*Quercus semecarpifolia*). The Banj- oak forms the lowest belt while the Kharsu oak occupies the highest zone (Table 1).

Sub-Tropical Forest Zone : This forest zone occurs in the Sub-Himalayan tract of the region below 800m and is the Northward extension of the sub-deciduous forest belt of the Bhabar. Sal (*Shorea robusta*) forms extensive forests and is highly gregarious. These forests are commonly found up to about 650m on the Southern and 800 m on the Northern slopes. In excessively dry location, it gives way to more xerophytic species. Other important species mixed with Sal are Kanju (*Holoptelea integrifolia*), Semal (*Bombax ceiba*), Haldu (*Adinacorda folia*), Khair (*Acacia catechu*), Sissu (*Dalbergia sissoo*),

Tun (*Cedrela tuna*) and Sain (*Terminalia tomentosa*). In the moist localities and wet hollows, the cane breaks and bamboo breaks (*Dendrocalomus strictus*) are generally found. At places where lopping and browsing have been excessive, the forest rapidly deteriorate into a shrubs composed of *Carissa opaca*, *Rhus parviflora* and *Woodfordia fruticosa* (Table-1).

CONCLUSION

The study area, Haldwani block has three major townships namely Haldwani, Kathgodam and Lalkuan. The present study lays an emphasis on morphometric analysis of landforms. Each morphometric attribute, i.e., relief, drainage and slope has been assessed, analysed and regionalized. Finally, these boundaries have been checked by the author's personal observations in the field.

The Siwalik includes first order and second order streams. There are two prominent water bodies in the south-west and south-east part of the area. Broadly the foothills forming the northern plain is forested while the central part is cultivated and the southern part consists of build-up area. The relief and slope of the area which have been worked out through contour map and Henry Raize and Wentforth methods exhibit the following. The maximum height of the region is around 1000 m in the North and 300 m in the South. The author has divided the region into high relief region (≥ 1000 m), medium relief (200-300 m), low relief/plain (≤ 300 m) coinciding with these three regions. The author has worked out three slope regions i.e. steep slope ($8-16^\circ$) in the north, moderate slope ($2-8^\circ$) toward south and further south gentle slope to flat ($\leq 2^\circ$). The rivers which have been divided into 12 drainage basin indicate dendritic pattern at the origin and the third order streams exhibit parallel drainage pattern. The soil of the region includes Bhabar belt which occurs in the submontane hill tract of Siwalik including unassorted boulders and pebbles at Siwalik Formations in the south. The Terai belt has fine sand, silt and clay. The vegetation of the area is of two types i.e. in the south subtropical forest zone having sal, Kanju, Simal, Haldu, Khair, Sissu, Tun and Sain while towards North warm temperate forest zone with chir, oak (Banj), Moru and Carsu.

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