

Scenic Evaluation of Western Doon of Dehra Utrakhand (India)

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ABSTRACT

The ever increasing demand of land due to explosive growth of population in one hand and rapid degradation and dereliction of land on the other had led the country to face serious setback in the field of economic development. It is now widely realized that landforms should be assessed and evaluated in respect of its recreational and nourishment potentialities. This will help in demarcating the most appropriate area for a particular use. The evaluation can be further investigated to formulate specific land use type in order to obtain the optimum return without disturbing the ecosystem. Western Doon of Dehra is very important, small geomorphic unit, which is important not only for water conservations, stability of lands but also a region of rich natural resources for the advantage of mankind. In view of this and realizing the void of geographical attention to the region; researcher has carried out the study of this region. The analysis of Doon has been carried out by using topographical maps, aerial photographs. Satellite imageries have been used to verify the results obtained from the analysis. Superimposition of various maps has been done for scenic evaluation of the area to bring out adhesive and non adhesive values/ranges of different relief parameters for different type of land uses. Study reveals that present land use practices in different units should undergo a change in order to obtain the optimum return and to conserve the natural environment.

INTRODUCTION

The ever increasing demand of land due to explosive growth of population on one hand and rapid degradation and dereliction of land on the other hand had led the country to face serious setback in the field of economic development. It is now widely realized that landforms should be assessed and evaluated in respect of its recreational and nourishment potentialities. Such evaluation of landscape is known as Scenic Evaluation. By doing such and exercise landscape can be converted into 'green belts', 'National Parks' wilderness

areas and protected landscape. This task can be helpful in making plannings regarding the development, conservation, preservation and protection of attractive countryside areas.

The area under study, Western Doon of Dehra is enclosed between $30^{\circ} 14' 10''$ N to $30^{\circ} 31' 32''$ N latitude and $77^{\circ} 34' 15''$ to $78^{\circ} 05' 39''$ longitude. Doon of Dehra is bordered by lesser Himalayas in the north and Siwalik hills in the south. It is bounded by Song water divide in East and Yamuna River in West and Northwest.

Geomorphologically, this area is an interesting one, having a strong structural control on the drainage pattern. The Mussoorie scraps characterized by steep slopes have been subject to human interference through deforestation, unauthorized mining of limestone and unplanned settlements in some areas, particularly after the formation of Uttarakhand. As a consequence, land in some areas has considerably degraded. Moreover, its population increased at a very fast rate after the designation of Dehradun as a capital of state. It is thus; felt that there is a need of Scenic Evaluation of this area.

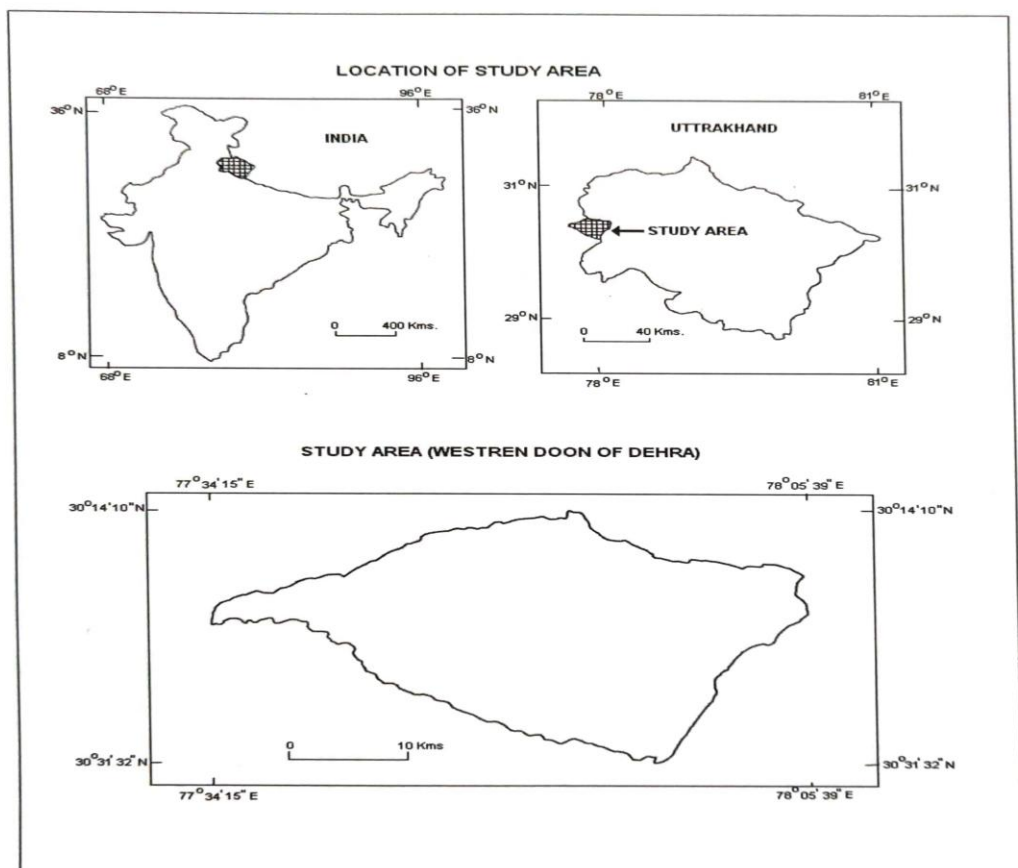


Fig-1

METHODS AND DATA BASE:

The analysis of doon has been carried out using topographical maps. Survey of India Topographical Sheet No. -53F/10, 53F/11, 53F/14, 53F/15 and 53J/3; on 1:50,000 scale has been used. Some aerial photographs and satellite imageries have also been used to verify the results obtained from the analysis. The procedures involved in the study is:

- Calculation of the area of various type of landuse grid-wise.
- Calculation the values of selected relief parameters grid-wise.
- Framing of adhesive and non adhesive values of physical parameters for different type of landuses.
- Superimposition of various maps to get composite adhesive character of different landuses.
- Assigning score points to find out adhesive properties of different landform elements for various landuses. The procedure for this purpose is explained below:

The category of morphometric attributes which has 60% or more land under cultivation is scored as '1'. Score 2 is assigned to those categories of physical attributes which has 20 to 60 percent land under agriculture. The category which has less than 20% land under cultivation is scored as 3. Score 1 indicates adhesive/favourable values of morphometric attributes for agricultural activities. Score '2' indicates intermediate suitability of morphometric attributes for cultivation. Score '3' indicates the less adhesive and non-adhesive values of morphometric attributes for agriculture. This procedure has been adopted for each morphometric attribute (table 1). Similar procedure has adopted to assign score for adhesiveness in respect of forested and barren lands.

Scores versus area under settlements in the categories of morphometric attributes is different from the previously adopted values of land use. Here, score '1' is given to those categories of morphometric attributes which occupy 5% or more area under settlements. This figure is 2 to 5% for score '2' and '3' score is assigned to those categories of morphometric attributes which occupy less than 2% area under settlements. Rest of the procedure for finding out composite adhesive character of morphometric attributes for the settlements is the same.

ANALYSES AND INTERPRETATION:

The economic activities –primary, secondary and tertiary develop on the most favourable sites of landscape, consequently, men make their settlements and do agricultural activities in these areas. So, basic parameters of cultural landscape- the cultivated area and the settlements are considered as basic criteria for Scenic Evaluation. These two basic parameters of cultural landscape are the very basis on which development and planning of such type of region rests.

The study in this research paper involves:

- Understanding various landuses in the area.
- To establish relationship between landuses and morphometric attributes.
- Framing of composite adhesive character of landuses for agriculture, settlements, barren lands and forests.

DISTRIBUTION OF VARIOUS TYPES OF LAND USES:**Cultivated land:**

The area has been divided into three board categories. High percentage (>60%) of cultivated land is found along both sides of Asan River and in the area between basin of Sitla and Yamuna River. Moderate percentage of cultivated land (20% to 60%) is distributed in upper part of alluvial plains and terraces. Low and extremely low percentage (<20%) of agriculture land to the total land is mainly confined to steep slopes of Mussoorie range. Some strips in these categories are totally deprived of agriculture land (fig. 2)

Forests:

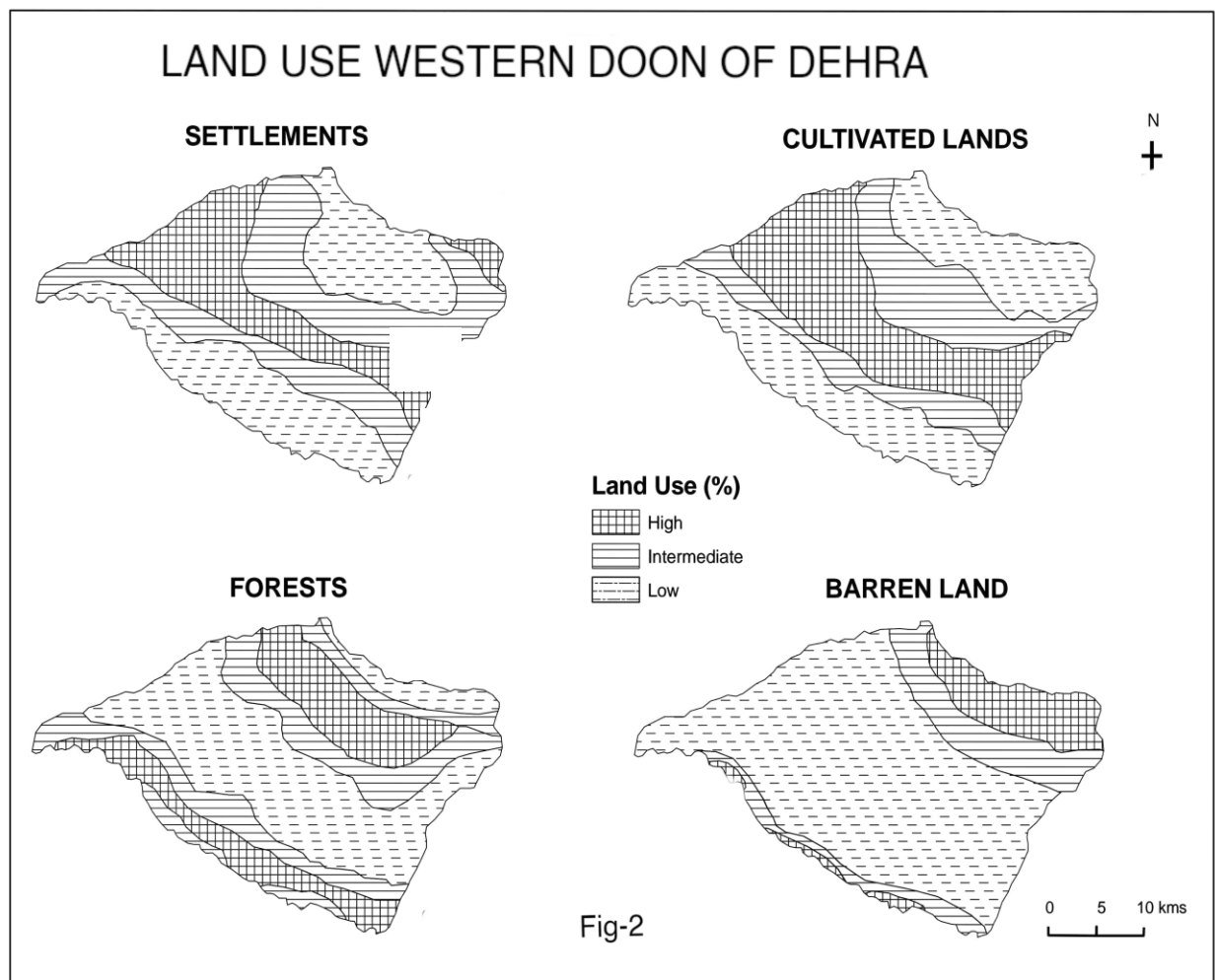
High percentage of forested land (>60%) of the total area of grid spreads on slopes of Siwaliks and lower slopes of Mussoorie range. Moderate percentage of forested land (20-60%) is confined to the plains of Yamuna and Asan, mid slopes of Mussoorie hills and crest area of Siwaliks. Steep slopes, high degree of dissection in Siwaliks and agricultural land in the plains restrict the growth and spread of forest in these areas. Low percentage of forested areas (<20% spread over upper slopes of Mussoorie hills, crest areas of Mussoorie and Siwalik hills (fig. 2). A vast area in the upper slopes of Mussoorie is totally deprived of forests. Scarp faces, very steep slopes, highly rugged topography in Mussoorie and ravenous zone in crest area of Siwaliks restrict the growth of forests in these areas.

Barren Lands:

High percentage of barren land (>60% of total land in the grid) is distributed in the areas of high absolute relief, high relative relief with steep slopes and high dissection index. This category is confined to the upper slopes of Mussoories and the crests of both the uplands – Siwalik and Mussoorie. Middle slopes of Mussoorie and Siwaliks are characterized by moderate percentage (20-60%) of barren lands. Plains and lower slopes of uplands have very low percentage of barren lands (fig. 2).

Settlements:

Densely settled area almost follows the densely cultivated areas. It extends on both sides of Asan River, areas bordering Yamuna and on the water divide of Asana and Song River (Ganga- drainage system). Sparsely settled areas are extended on middle and upper slopes of Mussoorie range, between the channels of Nun & Surna and on the slopes of Siwaliks. Moderately settled area lies in between these above mentioned two distributions of settlement (fig.2)



Relationship between land uses and Morphometric Attributes:-

As, it is assumed that settlements and cultivated lands are deciding criteria for Scenic Evaluation of the region, So it is essential to know the relationship between morphometric elements and the lands under agriculture and settlements. Such an analysis will bring out adhesive and non-adhesive character of different physical attributes (table-1). Efforts are also made to find out the values/ranges of different morphometric elements, which attract the forested and barren lands (table-1). Each morphometric elements, for this purpose has been categorized into various categories. Then, the area under various types of land uses has been calculated for each category of landform elements. This work has been done for selected morphometric attributes. Then, the score points were allotted to find out adhesive properties of different landform elements for various land uses. The procedure for the purpose has already been explained in methodology.

Composite Adhesive Character:

To get comprehensive and composite picture of adhesive and non-adhesive areas, the score points of each grid for the selected morphometric attributes viz. absolute relief, relative relief, average slope, drainage density and drainage frequency has been added together. Thus composite score for each grid has been obtained which ranges from 5 to 15. Then, the adhesive character of terrain units have been decided as per table given below:

Table(1): Adhesive character of land for agriculture

Score Values	Adhesive character of land for agriculture
5-7	Most adhesive
8-9	Adhesive
10-11	Moderately Adhesive
12-13	Less Adhesive
14-15	Very less or Non-adhesive

Similar procedure has adopted to find out the adhesive values /ranges of morphometric attributes for forests and barren lands and thus, maps of composite adhesive character of cultivated land, barren land and forested lands has been prepared (fig. 3 &4).

Composite Adhesive Character of Land for Agriculture:

Most adhesive (C_1) zone for cultivation in the area is distributed in the north western part of the basin. It is the alluvial plan of Yamuna and Asan. Gentle slopes, low dissection, fertile soil, availability of surface and ground water for agriculture may be the favourable factors for dense cultivation. Adhesive tracts (C_2) for cultivation extend on both sides of Asan River particularly in the east of confluence of Asan and Sitla Rao. Infact, here, it extends on lower terraces and younger plains of Asan River. Moderately adhesive (C_3) land for the cultivation is extended on upper terraces in the north of Asan River. This category also extends in the south of Asan on piedmont zone in form of long and narrow strip. Less adhesive (C_4) and very less or non-adhesive (C_5) land is extended on denudational structural hills of Mussoorie, dissected hills of Siwaliks. Ravinous zones, steep slopes, scarp faces etc. disfavours the agriculture practices in these areas.

Composite Adhesive Character of Land for Settlements:

Very adhesive (S_1) tract for the development of settlements is found in the plains of Asan and Yamuna. It is distributed in central part of Doon in form of strip extending in East-West direction (fig.3) Gentle slopes; less dissection index and availability of water etc. are the favourable factors for the high suitability of this zone for settlements. Strips of adhesive tracts (S_2) for settlements extend on both sides of S_1 Zone. Zone of low adhesiveness (S_4) and very low or non adhesiveness (S_5) extends on denudational structural hills of Mussoorie, moderately and highly dissected ravinous zone of structural hills of Siwaliks. Tract of moderately adhesive (S_3) extends on upper piedmont zone of Mussoorie and moderately dissected structural hills of Siwaliks. Although morphometric attributes seem to favour the moderate adhesiveness (S_3) in a long strip in moderately dissected hills of Siwaliks but due to shady nature of slopes in vast areas, very high dissection in some areas and unconsolidated earth material disfavours the moderate adhesiveness of tract. So this zone also has been less adhesive (S_4) or non-adhesive (S_5) for the development of settlements. The study of composite character of both cultivated land and settlements suggest almost same picture in respect of distributional aspects.

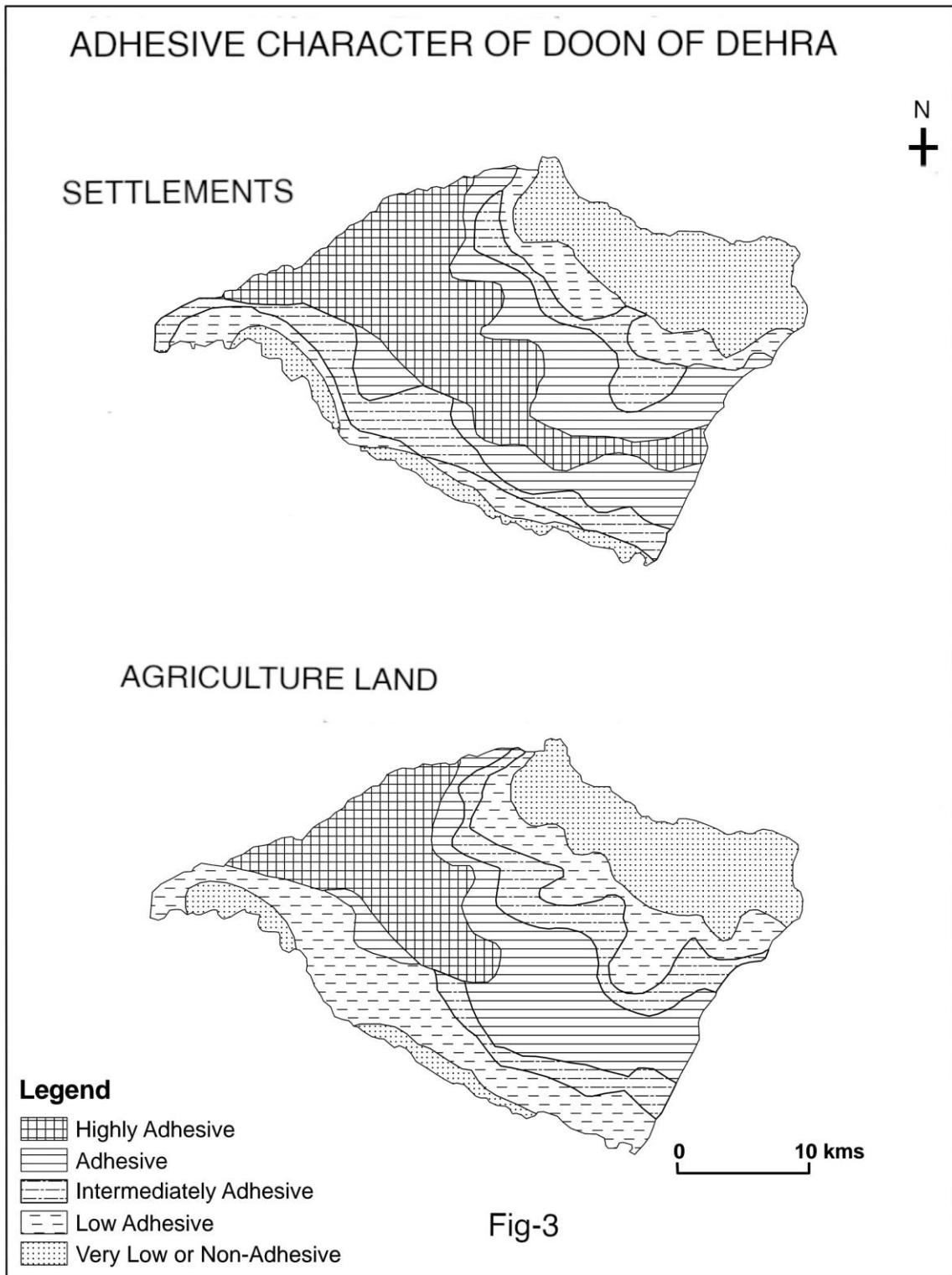


Table (2) : Suitable, Intermediately – Suitable and Non-Suitable Values of Physical Parameters for different Land uses

(Ar- absolute relief: Rr- Relative relief: As – Average stopes : Dr – drainage frequency Dd- drainage density)

Settlements

Score Points	Character	Ar (metres)	Rr (Metres)	As (degree)	Df No./km ²	Dd km/km ³
1	Adhesive	600-700	<20	<2 & 10-15	0-2	0-2
2	Intermediately Adhesive	<600 & 700-900	20-100	2-10	2-4	2-3
3	Non-Adhesive	>900	>100	>15	>4	>3

Agriculture

Score Points	Character	Ar (metres)	Rr (Metres)	As (degree)	Df No./km ²	Dd km/km ³
1	Adhesive	<500	0-20	0-2	0-2	0-1
2	Intermediately Adhesive	500-1500	20-100	2-15	2-6	1-4
3	Non-Adhesive	>1500	>100	>15	>6	>4

Barren Lands

Score Points	Character	Ar (metres)	Rr (Metres)	As (degree)	Df No./km ²	Dd km/km ³
1	Adhesive	>1200	>300	>30	>15	>6
2	Intermediately Adhesive	900-1200	200-300	25-30	9-15	5-6
3	Non-Adhesive	<900	<300	<25	<9	<5

Forests

Score Points	Character	Ar (metres)	Rr (Metres)	As (degree)	Df No./km ²	Dd km/km ³
1	Adhesive	600-1200	20-200	2-25	4-15	2-6
2	Intermediately Adhesive	<600	<20 & 200-400	25-30	2-4 & 15-18	1-2 & >6
3	Non-Adhesive	>1200	>400	<2 & >35	<2 & >18	<1

Composite Adhesive Character of land for Forests:

Composite adhesive character of this land use reveals that most suitable areas for growth of forests are upper piedmont zone of Mussoorie hills and moderately dissected slopes of Siwaliks. These are the zones of moderate values of morphometric attributes. As we move towards a Doon or peaks, the adhesiveness of lands for forests seems to be decreased. In real sense, the adhesiveness of land for forest decreases towards crests. The reason may highly dissected lands, scrap faces, very steep slopes, very thin layer of soil and climatic conditions etc. Plains and terraces have remained adhesive for growth of trees in these areas.

Composite Adhesive Character of land for Barren Areas:-

Fig. (4) reveals that the barren-lands of various intensities is distributed in denudational hills of Mussoorie. Infact, high values of morphometric attributes (Ar, Rr, Dd, Df, Slope, etc.) attract the barren lands. Identification or ranges/values of morphometric attributes which attracts barren lands may be of great assistance for scenic evaluation. Planning regarding the growth of shrubs, stunted trees/grasses may be carried out after consultation with specialists of other branches of knowledge.

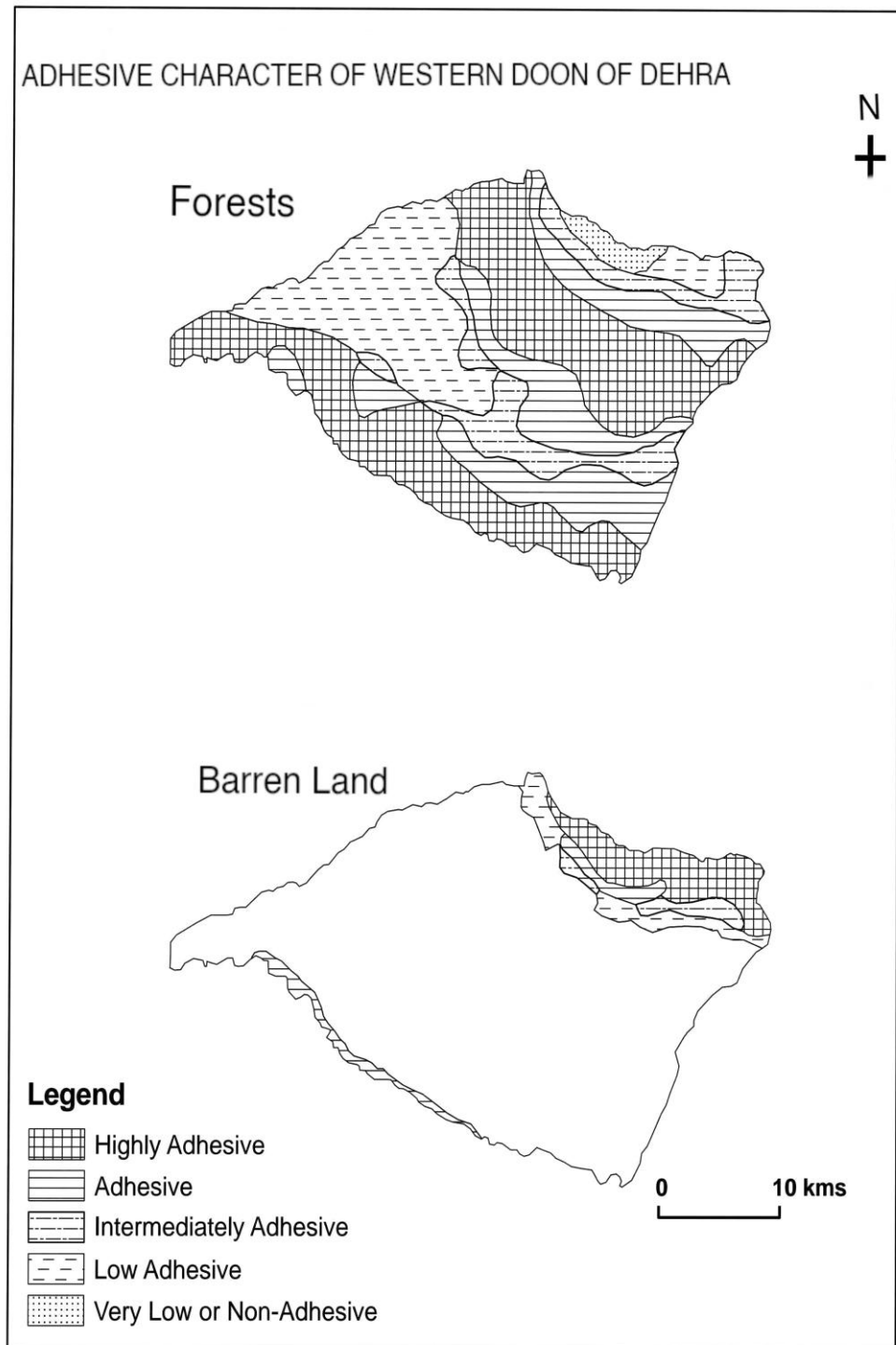


Fig-4

CONCLUSION:

Morphometric elements should be considered while planning the areas particularly in mountaineous region. As per morphometric parameters denude – structural hills of Mussorie, Moderately and highly dissected ravenous zone of structural hills of Siwaliks are not favourable areas for agriculture and settlements. A long strip in moderately dissected hills of Siwaliks seems to favour moderate adhesiveness for settlements but due to shady nature of slope in vast area and unconsolidated earth material disfavour the moderate adhesiveness of this tract for settlements. Adhesiveness of land for forest decreases towards crests. The reason may be highly dissected lands scarp faces, very steep slopes very thin layer of soil and climatic conditions Barren-lands of various intensities is distributed in denudational hills of Mussoorie. Infact, high value of morphometric attributes (Ar, Rr, Dd, Scope etc.) has contributed the existence of barren lands must be brought under shrubs, stunned trees/grasses after consultation with specialists of other branches of knowledge.

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