CHAPTER 4

Physiographic Reclassification and Delineation of Southern Karnataka

4.1 Introduction

4.1.1 Existing Physiographic classification of Karnataka

Basically Karnataka falls under sub-tropical climatic zone, wherein, south west monsoon rainfall is predominant over the entire state. As per the relief concerned, the previous physiographic classification has been done more are less on a generalized manner, taking in to consideration only the location and situation, without giving due importance to actual elevation and its impact on climate. With respect to coastal plains there is no ambiguity, but, the other three physiographic regions such as Malnad, the northern maidan and the southern maidan are crudely classified. Although Malnad possess relief between 200 to 1500 meters with varying micro climatic condition existing within it, has been classified as one unit of relief which is not correct.

In the case of northern and southern maidan, the northern maidan relief varies between 200 to 600 meters, which is possessing undulating terrain and it is also wrongly nomenclated as table land and plateau. The land possessing 200 meters of elevation adjacent to a land having mountainous topography of 200 meters can’t be classified as plateau or table land. There are many pockets in the northern Karnataka, where the relief is highly undulating with intermittent dissected hillocks. So this certainly can’t be called as the northern maidan or plateau. Similarly the southern Karnataka has been nomenclated as southern maidan where, relief varies between 600 to 1000 meters. It is eminent that, variation of 400 meters can’t be called as maidan at all. In the southern part of Karnataka also there are many intermittent hillocks rising more than 1000 meters. Realizing the actual lacuna existing in the previous physiographic classification it was considered reasonable to reclassify.
4.2 The Necessity of Reclassification

The Necessity of Reclassification of Physiographic Division of Karnataka struck my mind, when the remote sensing data was compared with the already existing physiographic divisions of Karnataka. This anomaly was brought into light when demarcation of southern Karnataka was taken up. Since the research is focused on the comprehensive regional agriculture planning of southern Karnataka taking district as a unit of analysis, the demarcation was found irrational. On account of this it was decided to reclassify the Physiographic division so that it can be a new contribution to the field of geography in particular and also for general purposes. The existing physiographic divisions do not comply with elevation nor the climate nor the administrative boundaries. Realizing at this anomaly which will be a great error in future research work reclassification was done.

Secondly, although advanced technologies were available to us, relying upon the old classification which is based on topographical mapping was not up to the level of accuracy. What has been achieved from the latest images such as Shuttle Radar Topographical Mission (SRTM) and Advanced Space borne Thermal Emission, Digital Elevation Model (ASTER DEM) data, these images provides a distinctive and accurate classification.

Thirdly, the climatic conditions and physiographic conditions were not that much in detail or at a micro level. Hence, it was felt that without correlating between climate and relief there won’t be a reasonable classification. Keeping in mind the above lacuna in the existing physiographic divisions. It was decided to give one time solution evoking by geospatial data.

4.3 Methods of Reclassification:

The methodology adopted for reclassification of Physiographic division of Karnataka was based on ASTER DEM data, 30 meters resolution. The entire scenes covering the Karnataka state were downloaded from open source websites and each scene was mosaicked and a digital elevation map was generated. As well as the contour were drawn to exact demarcating contours of different relief in Karnataka. On the basis of contour six (6) Physiographic divisions have been extracted.
Physiographic Reclassification Divisions of Karnataka State
Elevation in meters (MSL)

LEGEND
Physiographic Reclassification Divisions of Karnataka (in meters)
- 0 - 200
- 201 - 450
- 451 - 600
- 601 - 1000
- > 1000

State Boundary
Physiographic Reclassification Divisions of Karnataka State

Elevation in meters (MSL)

LEGEND

Costal and Far reach Coastal Plains
North Eastern Territorial Plains
North and North Central Undulating Upland
Southern, Northwestern and Southeastern Undulating Upland
Mountain Peaks
State Boundary
Physiographic Reclassification Divisions of Karnataka State
(overlay with Taluk Boundary)

LEGEND
Physiographic Reclassification Divisions of Karnataka (in meters)
- Costal and Far reach Coastal Plains
- North Eastern Territorial Plains
- North and North Central Undulating Upland
- Southern, Northwestern and Southeastern Undulating Upland
- Mountain Peaks

State Boundary
4.4 Forms of Reclassification:

The contours interval fixed to generate the contours was 50 meters. It was a difficult task to exactly identify the contour, which demarcates different forms of physiographic boundary. In especially Malnad and Deccan plateau, the challenging task was to select appropriate contour. Therefore, equal interval between contour were discarded and were fixed to suite the objective of employed. On this method the following are the reclassification.

- 0 - 200 Costal Plains and far reach coastal plains
- 201- 450 North Eastern Territorial Plain
- 451 - 600 North and North Central undulating low land
- 601 - 1000 Southern, North Western and South Eastern undulating upland
- More than 1000 meters Mountain peaks

4.4.1 Coastal Plains and far reach coastal plains (0 - 200 meters Elevation)

The coastal plain of Karnataka stretches on the western direction from south west to north east. There is no greater variation in the elevation between the adjoining undulating topography with low elevation and coastal plains. In order to avoid the marginal difference contributing to greater between Maland and true coastal land 100 to 200 was classified as far reach coastal plains. The district is that come under this divisions Dakshina kannada, Udupi and Uttara Kannada. The major Taluks are Sulya, Puttur, Belthangadi, Bantwal and Mangalore of Dakshina Kannada district, Udupi, karkala and kundapura of Udupi district and Bhatkal, Kumta, Honnavara and Karwar of Uttara kannada districts are falling under coastal and far coastal plains. And it covers total geographical areas of 10186 sq.km and in percentage of total area is 5.31%.(Map No- 4.3)

4.4.2 North Eastern Territorial Plains (201- 450 meters)

The North East territorial plains are a unique land locked at the mid of Deccan plateau of south India, but lie in the north eastern part of Karnataka. Although the elevation of this division is comparatively low, which is not on par with the average elevation of Deccan plateau, the exact contour between 201 - 450 meters represents this land. This divisions covers part of Sindgi and Indi taluks of Bijapur Districts, Afzalpur,
Physiographic Reclassification Divisions of Karnataka State
(Clipped and overaly with each division and taluk boundary)

Legend

Costal and Far reach Coastal Plains

State Boundary
Gulburga, Chithapur, Sedam, Jevargi of Gulburga district, Shorapur, Shapur and Yadagir of Yadagir district, Sindhur, Manvi, Devadurga and Raichur taluks of Raichur districts, Siraguppa, Bellary and Hospet of Bellary district. It covers total geographical areas of 23775 sq.km and area of total in percentage 12.40%. (Map No: 4.5)

4.4.3 North and North Central undulating upland (451 - 600)

The North central undulating upland stretches in a different direction from the mid of northern Karnataka towards the west. There are pockets of other physiographic condition that is termed as southern and south eastern upland. This region experiences a transitional climatic condition with harsh temperature. Taluks of Aurad, Balki, Bidar, Basavakalyana and Homnabad of Bidar Districts. Aland, Gulburga, Chincholi, Sedam and Jevargi of Gulburga district, Lingsur of Gulburga District. Koppal, Kustagi, Yelburga and Gangavathi of Koppal district. Shirahatti, Munadragi, Rona and Nargund taluks of Gadag district, Navalgund and Kalagatagi taluks of Dharwad district, Hungund, Badam and Bagalkot, Bilgi, Jamakahandi and Mudhol taluks of Bagalkot, Muddebihal, Basavana Bagewadi, Sindgi, Indi and Bijapur taluks of Bijapur district, Chikodi, Rayabag, Athani, Gokak and Ramdurg taluks of Belagavi district, Supa, Haliyal, Yellapur, Mundagod, Sirsi, Siddapur taluks of Uttara Kannada, Savanur, Hanga, Haveri, Ranebennur and Hirekerur of Gadag district, Hadagali, Hagaribommanahalli, Hospet of Bellary district, Harappanahalli, Harihara, Davanagere and Honnalli of Davanagere district, Sorab, Sagara, Bhadravathi of Shivamogga district, Molakalmuru, Challakere of Chitradurga district. part of Kollegal, Malavalli and Kanakapura taluks are Chamarajanagara, Bangalore rural and Mandya districts respectively. It covers total geographical area of 61,076 sq.km and total area covers in percentage 31.85%. (Map No: 4.6)

4.4.4 Southern, North Western and South Eastern undulating upland (601 - 1000)

Compare to Northern, North Eastern territorial and North central undulating uplands, the Southern and south eastern undulating upland is found at greater elevation varying between 601 to 1000 meters. As a result, the temperature is comparatively mild. This land falls under transitional climatic condition. This particular physiographic condition, although largely existing in the southern parts of Karnataka it is also seen
in pockets in the central Karnataka covering taluks such as Gundulpet, Chamarajanagara, Yelandur and Kollegala taluks of Chamarajanagara District. H.D. Kote, Periyapatna, Hunsur, K.R. Nagara, Nanjangud and T. Narasipura of Mysore District. Virajapet, Madikere and Somavarpete of Kodagu District. Srirangapatna, Pandavapura, Nagamangala, Maddur, Mandya and Maddur taluks of Mandya district. Parts of Bangalore Rural District, Bangalore City, Chikkaballapur, Kolar, Hassan, Tumkur, Chitradurga, Chikkamagalur, Shivamogga, Gadag, Dharwad Districts, and the north western and western part of the state covering most part of the taluks of Belagavi district. This region possesses a unique characteristic feature dry semi arid condition and dry semi arid condition between 60 to 75 cm of rainfall per annum. It covers total geographical area of 92,864 sq.km and area in percentage 48.42%. (Map No: 4.7)

4.4.5 More than 1000 meters Mountain peaks

The land above 1000 meters is classified as mountains, which are a part of Malnad. The undulating low to high land topography is called Malnad. Since this undulating low to high land elevation topography falls under the classification representing 200 to 1000 meters, that particular physiography has been demarcated separately on the basis of degree of slope and kept as a mixture of varied elevation with high degree of undulation and series of hillocks. Within this, the land which is stretching more than 1000 meters of elevation have been classified as mountain peaks of Karnataka. These mountain peaks are found not only in the western ghats but also in the southern part of Karnataka that is Gopalswamy Betta, Biligirirangana Betta and MM hills of Chamarajanagara district Brammagiri, Mullahyanagiri are the major peaks. The culmination of northern undulating mixed elevation land and the southern mixed elevation land is found at Bababudangiri hills of Chikkamagalur District. This has a unique climate and worldwide famous known as Bababudangiri coffee. (Map No: 4.8)

There are few hillocks distributed in a scattered manner over the southern region between the southern and southeastern undulating topography such as Maddhugiri. It covers total geographical area of 3890 in sq.km. The total area in percentage is 2.03%.  

55
Physiographic Reclassification Divisions of Karnataka State
(Clipped and overlay with each division and taluk boundary)

Mountain Peaks

LEGEND
Physiographic Reclassification
Divisions of Karnataka (in meters)

Mountain Peaks

State Boundary

Map No - 4.8
4.5 Conclusion:

The newly reclassified physiographic classification of Karnataka has been done not only on the basis of elevation, but also taking into consideration climatic conditions. It is a known fact that elevation determines the temperature, such, there is a huge variation in land use and cropping pattern. There are incidences where, although certain places like Balehonnur situated amidst of Maland, high temperature prevails because of low elevation, it actually experiences a typical Malnad climate apart from rainfall. So in order to wipe out such physiographic and agricultural variations, the present classification is a solution for all such type of discrepancies that exist in the previous classification. (table and fig. 4.1)
### Table No: 4.1 Physiographic Reclassification Divisions of Karnataka

<table>
<thead>
<tr>
<th>Relief in Meters</th>
<th>Area in Sq.km</th>
<th>area in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 200</td>
<td>10186</td>
<td>5.31</td>
</tr>
<tr>
<td>201 - 450</td>
<td>23775</td>
<td>12.40</td>
</tr>
<tr>
<td>451 - 600</td>
<td>61076</td>
<td>31.85</td>
</tr>
<tr>
<td>601 - 1000</td>
<td>92864</td>
<td>48.42</td>
</tr>
<tr>
<td>&gt;1000</td>
<td>3890</td>
<td>2.03</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>191791</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: ASTER Data Classification and Compiled by Author

### Fig: 4.1 Physiographic Reclassification Divisions of Karnataka State
Methodology for Delineation of Western Ghats

To obtain the western ghat from the entire Karnataka, three steps extraction has been executed.

1. Based on the slope:

There was no possible chance to extract on the basis of elevation, since it posses elevation varying between 200 to 2000 meters. Hence slope was the only option, on the basis of only slope westernghat can be demarcated and separated from rest of the physiographic land features. Keeping this as the demarcated parameter, different degree of slope were tried like, >3°, 4°, 5° degree of slope, 5° - 20° and 4° - 19° etc., At last 4° was fixed. The land extracted possessing >4° was extracted. (Map No- 4.10, 4.11, 4.12)

2. Based on the >200 - (2000) meters

The land having >4° slope was intersected by elevation data i.e., > 200 - 2000 elevation in meters. Thus only landforms possessing >4° slope and > 200 - 2000 meters elevation were considered. There were landforms outside the Western Ghats limit. To avoid the land outside of the Malnad region both on the west coast and eastern side a demarcating contour was such as picked up such as 200 meters elevation towards western side of western gh at on the eastern side 800 to 820 meters contours was taken.

3. Sub Classification

The obtained high degree slope land of western Ghats ware classified into 4 classifications on the basis of elevation, such as 200 to 450 as coastal foot hills, 451 - 600 mid mountains, 601-1000 elevated mountains and 1000 - 1900 as peaks.

Among the classification that has been done for Western Ghats 601 - 1000 meters Elevation Mountain occupies a major area of 15448 sq. km and 62% of land occupied. followed by 451 - 600 mid mountain with an area of 4273 sq.km and 17% of land covered, 200 - 450 elevation with an area of 2587 Sq.km and 10% of land occupied. Based on these three steps the western Ghats demarcation was generated.
Karnataka State
Delineation of Western Ghats on the basis of Relief and Slope using ASTER DEM

LEGEND
Western Ghats: Relief in meters

- < 200
- 201 - 450
- 451 - 600
- 601 - 1000
- > 1000

state boundary

Map No - 4.10
Karnataka State
Delineation of Western Ghats on the basis of Relief and Slope using ASTER DEM
(overlay with taluk and district boundary)
Western Ghats overlay with Physiographic Reclassification
Divisions of Karnataka

Relief in meters

- < 200
- 201 - 450
- 451 - 600
- 601 - 1000
- 1001 - 1900

Legend:
- Western Ghats
- State boundary

Map No - 4.11
Physiographic demarcation of southern Karnataka was not clear as per the previous classification. Most of the researchers have demarcated southern Karnataka on their own, just by choosing the district boundary as demarcation boundary. Based on this method there was no fixed boundary propagated by proper method. Each scholar has used different district boundary to demarcate. To overcome this problem remote sensing based classification was performed. On an average the land falling between elevation of 601-1000 meters from mean sea level was found most appropriate relief...
Delineation of Southern Karnataka
(based of Physiographic Reclassification Divisions of Karnataka)
overlay with taluk and district boundary

**Legend**
- district boundary
- state boundary
- Southern Karnataka

Map No - 4.10
to demarcate. As per this relief the entire southern districts such as Chamarajanagara, Mysore, Kodagu, Mandya, Hassan, Ramanagara, Bangalore Rural, Bangalore City, Kolar, Chikkaballapur, Tumkur, and Chikkamagalur, entirely fall within this limit. Whereas Shivamogga, Davanagere and Chitradurga and Bellary districts cover partial area under this elevation. Therefore, the classification of southern Karnataka is totally based on elevation factor rather than the district boundary. It is also true on ground that the elevated land and low land region possess different physiographic, language, culture and agricultural practices. Apart from this districts, there are few patches of the same elevation exist in the northern districts of Karnataka, (such as Kanapur, Belgaum, Hukeri, Sampagaon, Savadatti, Dharwad, Hubli, Kundgol, Hubli, Shiggaon, Gadag, and Kustagi) Whereas the northern district of Karnataka possess on an average 451 - 600 meters elevation. Much lesser elevation is found towards the north eastern side of territorial part of Karnataka, that is between 201 to 450 meters, such as taluks Afzalpur, Chitapur, Sedam, Yadagir, Shapur, Shorapur, Devadurga, Raichur, Manvi Sindhnur, Gangavathi, Siraguppa and Bellary taluks. (Map.No:4.10)

Within in the southern Karnataka, **western ghats** have also got culminated with the elevation varying between 400 to 2000 meters, as such these lands have been demarcated on the basis the degree of slope which were kept separate as land of classification. (Table and Fig No. 5.1)