

Assessment of Regional Disparities in Distribution of Natural Resources (Water and Soil) –A case study of the South Karnataka

Rathnamma M D

Research Scholar, Department of Geography, Bangalore University, Bengaluru.

Dr. Ashok D Hanjagi

Professor and Chairman, Department of Geography, BU, Bengaluru.

Date of Submission: 18-11-2021

Date of Acceptance: 02-12-2021

Abstract: Regional Disparities are an unsolvable and burning topic all over the world. Maintaining the balance between the regions is no easy task for any of the governments. Natural resources are formed naturally without human interactions, but these resources are used by human beings for their wellbeing. Karnataka is located in the Southern Part of India and my study area is South Karnataka. Equally distribution of natural resources is not in our hands, but we can put effort into the sustainable management of the natural resources. I made an attempt to study the distribution of natural resources and their created imbalances among the districts. The secondary data have been used to do the research, data have been collected through various sources such as government departments, publications, census boards and others. To prepare maps GIS technology has been used and interpreted the data using the cartographic methodology. The research paper shows how natural resources are distributed district wise, reasons behind that distribution. The regions are having less natural resources and the areas are having more natural resources. The proper management of the natural resources towards the sustainability of the same.

Keywords: Imbalance, Sustainable, Management, GIS and Cartography.

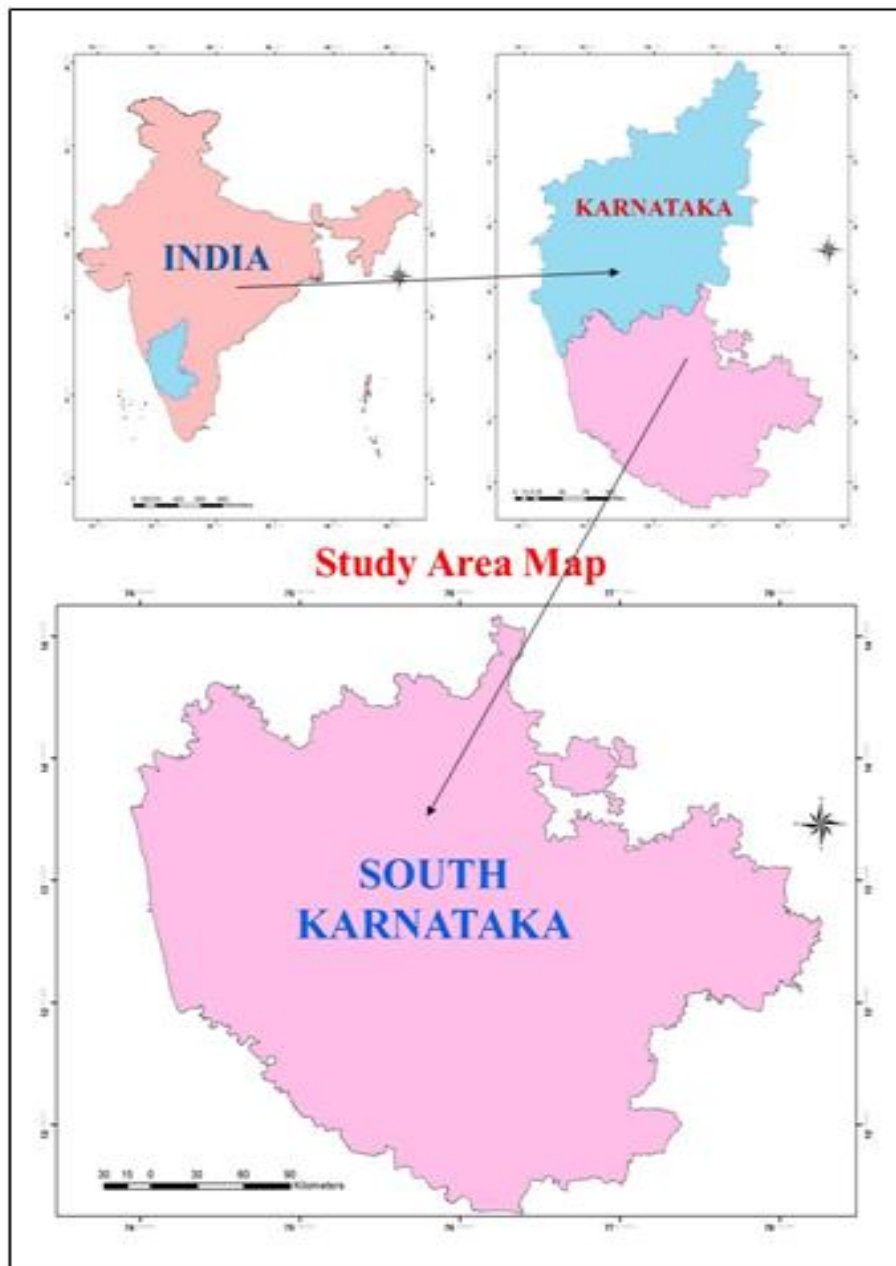
I. INTRODUCTION:

The Region is “an area having the homogeneity of the physical and cultural phenomena”. It has also been defined as an area that is differentiated from other areas according to the specified criteria. Every Country has its natural landscape which is superimposed by the cultural

landscape. While understanding these two landscapes leads to the concept of the Regions. A Region is the basic concept of the Geographer’s because many geographic elements are arranged in certain definite and constant relations. Regions have no individual entity or status being essentially a continuum. Changing priorities produces changing regional definitions, each one valid so long as it aids our understanding of the geographical relationships.

Regional Disparities: means difference in characteristics in terms of per capita income, literacy rates, health, educational services, industrialization, HDI, and many more. Regional Disparities in other terms called the Regional Imbalances. Maintain the balance between the Regions is always important because balances lead to the overall growth towards the development of the region. The government always plays a major role in removing disparities among the regions. Regional disparity means unbalanced spatial structures in some region or different regions “. Regional disparities are manifested in different conditions of life as well as in unequal economic and development potential. The contrast between city and rural areas can be also understood as a form of spatial disparity.

Location: The exact location of South Karnataka is 11⁰35’ North and 15⁰01’ North latitudes and 74⁰5’ East and 78⁰35’ East longitudes. The North and South extent of the state is about 380 km, and East and West extent of the state is about 400 km. The total geographical area of the study area is 93146 sq. km. and nearly 48 percent of the total state geographical area.



Map 1: Study Area Map - South Karnataka.

South Karnataka consists of two administrative revenue zones, including 17 Districts, 107 Taluks and 735 Hoblis. Bengaluru Urban district is the smallest district among the other districts and Tumkuru is the largest district in the study area. Tumkuru is having the highest taluks -10 in numbers, followed by Mysuru, Hassan and Chikkamagaluru 8 in number. Kodagu is having fewer Taluks, the average number of taluks in the study area is about 6 per Districts. The Study area is enclosed by chains of mountains and hilly ranges,

the plateau in Karnataka is having higher elevation of 600 to 900 meters above mean sea level. The land forms in west part of Karnataka is undulating and having many ravines. The average elevation of the plain land is less than 300 meters above MSL. Narrow Coastal lines towards the Arabian Sea, there are some peaks in western and eastern ghats with height more than 1500 meters.

Natural resources of a region include water, land, soil, mineral, forest, energy, biodiversity and ecosystems etc., Karnataka is rich in natural

resources among Indian states, Karnataka has a monopoly in many natural resources availability. Natural resources play a vital role in the development of the region because all areas do not have some quality and quantity of natural resources. Depending upon the availability of natural resources agriculture, communication, transportation, and industries can show their growth rate. Natural resource management is required to manage the resources in such a way as to maintain the same resources for the future. Hence sustainable development is followed according to judicious use of resources to supply both the present generation and future generations.

Objective: The objective of the research paper is to understand the availability of natural resources and its distribution, Sustainable usage of natural resources.

Data Sources: Spatial and Non-spatial data set have been used to write this research paper. Spatial data includes, vector layers of study area and relevant vector layers. Government’s records and other department published data sources have been used as the secondary and Non-spatial data. Basic statistical operation have been used and GIS software used to prepare maps.

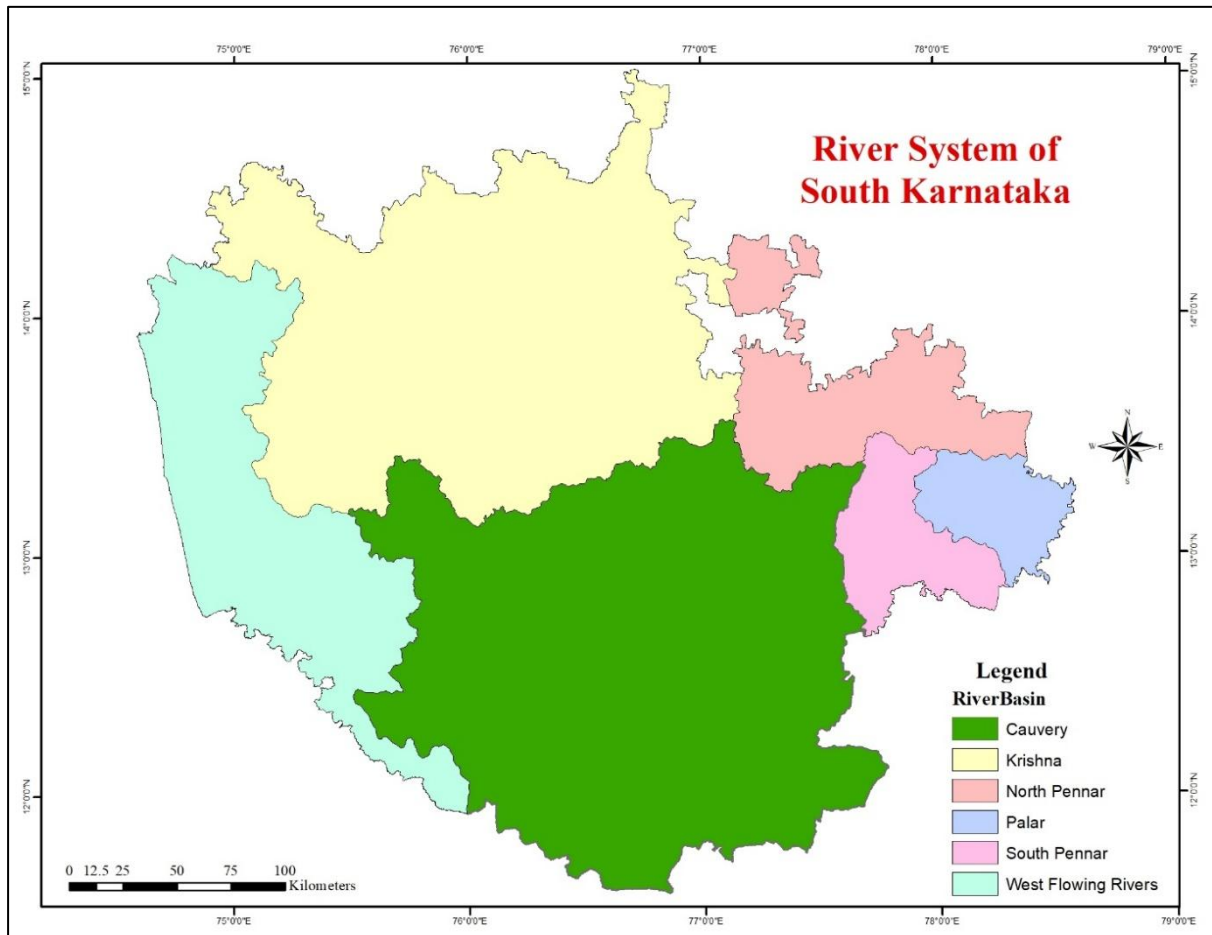
II. RESULT AND DISCUSSION:

Two major Natural Resources have been studied, those are Water and Soil.

Water Resources: Water resources are important for the development of the state, and it’s also the backbone of the economic prosperity of the state. The river systems of any region conform to the physiographic division, and it creates the water divide line. The rivers of Karnataka swell in the monsoon and in later months they don’t have sufficient water in the rivers. South Karnataka gives birth to east flowing rivers as well as west flowing rivers. South Karnataka is experienced by many river basins, but the Krishna river basin is shared by North Karnataka. Other river basins are part of the Southern Karnataka region. In South Karnataka, all the districts are drained by one or another river and its river systems. The availability of surface and groundwater will differ from district to district. After the monsoon season surface water scenario will change in some of the districts. The areas covered by Malanadu and the Coastal area in South Karnataka are rich in wildlife and flora, more small streams take birth in the monsoon and merge to the major rivers which makes heavy flow in the rainy season. The Western Ghats of the state is home to many rivers and small streams, it makes the state green. Krishna and Cauvery rivers are the major rivers systems of the South Karnataka regions.

Table 1: River system of South Karnataka

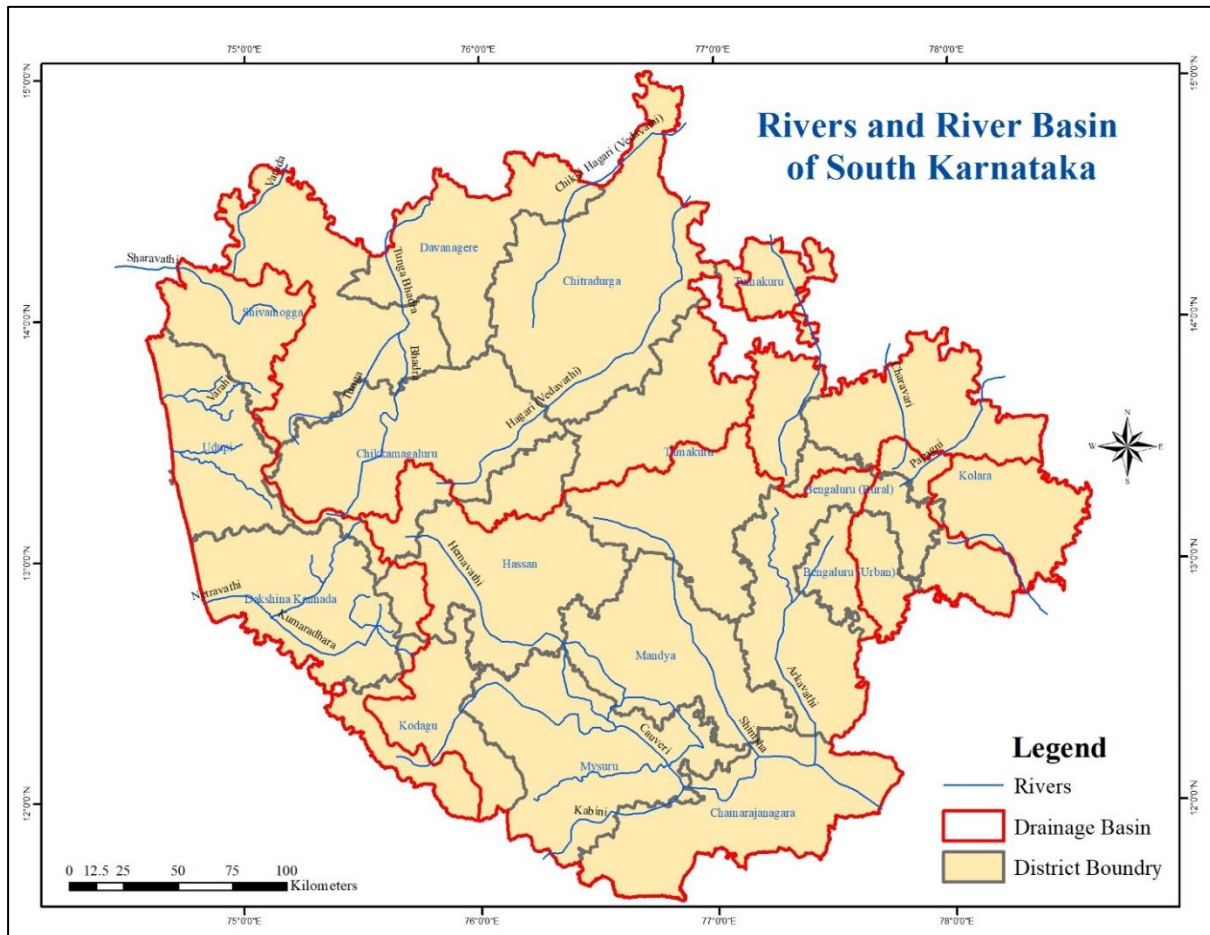
SI No	River System	Drainage Area	
		1000 sq. km	Percentage
1	Krishna River System	30.84	33.11
2	Cauvery	34.27	36.79
3	North Pennar	6.94	7.45
4	South Pennar	4.37	4.69
5	Palar	2.97	3.18
6	West Flowing Rivers	13.75	14.78
	Total	93.14	100.00



Map 2: River Systems of South Karnataka

The total geographical area of South Karnataka is 93146 square kilometers, it is covered by six river systems. The name of these river systems and their drained area details are mentioned in Table number 1, the main river systems are Krishna, Cauvery, North and South Pennar, Palar and West flowing rivers. The river Krishna and river Cauvery are two major inter-state rivers in South Karnataka. River Krishna shares 33% of the drainage area in South Karnataka, rest is 67% drains in North Karnataka. Tunga, Bhadra, Varada, Hagari are the main tributaries of River Krishna flows in South Karnataka. River Cauvery catchment area

covers Karnataka, Kerala, Tamil Nadu and Pondicherry. The Cauvery basin totally lies in South Karnataka, this is also known as Jeeva Nadi of Karnataka and Tamil Nadu. The major tributaries of river Cauvery are Harangi, Hemavathy, Kabini, Suvarnavathy, Shimsha, Arkavathy and Lakshmanathirtha. Rivers like North Pennar, South Pennar and Palar rivers also share some drains areas in Tamil Nadu and Andhra Pradesh. The majority of west flowing rivers took birth in the Western Ghats and flow towards the Arabian Sea. The major west flowing rivers are Sharavathi, Chakra Nadi, Varahi, Netravathy and Barapole rivers.



Map 3: Rivers of South Karnataka

The Krishna River Basin: The **Tunga River** is one of the important tributaries of River Krishna in South Karnataka, it was born in the Western Ghats on Varaha Parvata at Gangamoola. The river flows in Chikmagalur and Shimoga districts. It is 147 km long and merges with the Bhadra River at Koodli in Shimoga. **The Bhadra River** originates at Kudremukha, in the Western Ghats. It flows through the towns of Kudremukha, Kalasa, Horanadu, Huluvalli, Balehonnur and N R Pura. Across this river Bhadra dam has been constructed, finally, it reaches Tunga River. The combined Tunga and Bhadra River continues as Tungabhadra. The third important river in the Krishna basin is Hagari, it is also known as the **Vedavathi River**. River Vedavathi rises from Bababudangiri in Chikmagalur in Western Ghats. The Vani Vilasa Saagara reservoir was constructed across river Vedavathi in Chitradurga district. Krishna River Basin covers the districts of Chitradurga, Davanagere, North and Western part of Tumkur, Chikmagalur expects small portion in the south

of the district, North portion of Hassan and Shimoga expect western part of the district.

The Cauvery River Basin: The Cauvery rises at Talakaveri on the Brahmagiri range in the Western Ghats, it is in the Coorg district. It rises at an elevation of 1341 meters above mean sea level. The catchment area of the Cauvery river basin is 34000 sq. km. in South Karnataka this is the highest proportion of the area. Around 37% of the drainage area in South Karnataka is from the Cauvery River. The principal tributaries of Cauvery in South Karnataka are Harangi, Hemavathy, Kabini, Shimsha, Arkavathy, Suvarnavathy and Lakshmanathirtha. **The Harangi River** rises in the Western Ghats in the Coorg district, the length of the river is around 50kms. **Hemavathy River** starts in the Western Ghats at an elevation of about 1219 meters in Mudigere taluk of Chikmagalur district. It flows through Hassan district, it is having Yagachi River as a tributary, it joins Cauvery River near Krishnarajasagara. The total length of the river is 245 km. The Hemavathy dam was constructed in

1979 in Hassan district from the Yagachi confluence. **Kabini River** originates in Kavilumpara in Kozhikode district of Kerala. It enters Karnataka through the Mysuru district, joins the Cauvery River in Mysuru district. Near Sargur it forms the huge Reservoir, it is a famous backwaters spot in South Karnataka. **The Shimsha River** originates in the southern part of the Devarayanadurga in the Tumkuru district. The total length of the river is about 221 km. it flows from Mandya and Chamarajanagara and joins River Cauvery. The major tributaries of Shimsha River are Veeravaishnavi, Kanihalla, Chikkahole, Hebbahalla Mullahall and Kanva. **Arkavathi River** rises in the Nandi hills of Chikkaballapur district. Kumudavathi and Vrishabhavathi are the main tributaries of this river. It has Chunchi falls and near Mekedatu it joins River Cauvery. **Suvarnavathy River** originates in Chamarajanagar, it has two streams Niredurgihalla and Araikaduhall join the river at Badibadga. **Lakshmana Tirtha River** rises in the Kodagu district and flows eastward and joins River Cauvery in Krishna Raja Sagara. The Cauvery River basins covered the Chamarajanagar, Mandya, Mysuru, Ramanagara, Part of Bengaluru rural and urban district, Kodagu district, Hassan district expect some areas in the north part, Southern part of Tumkuru district.

The West Flowing River Basin: The West Flowing Rivers have good water resources in South Karnataka. These rivers produce almost half of the water resources of the state, but these rivers are short in length, and the flow of water level is tremendous. The major west flowing rivers are Sharavathi, Chakra Nadi, Varahi, Netravathy and Barapole rivers. **The Netravathy River** originates in Bangrabalige valley, Yelaneeru Ghat in Kudremukha in Chikkamagaluru district. It merges with the Kumaradhara River and flows to the Arabian Sea. The total length of the river is about 103 km. **Varahi River** takes birth in Kavaledurga in the Shimoga district, it is also known as Haladi River. The length of the river is 66 km. **Sharavathi River** originates in the Western Ghats in Shimoga districts. The length of the river is 122 km, the famous Jog falls is part of these rivers. The river itself and the region around it are rich in biodiversity, and home to many rare species. **Chakra Nadi River** rises in Kodachadri in the Shimoga district, and flows 52 km. **Barapole Rivers** originates in Brahamagiri Ghat reserve forest in Coorg, have a length of 110kms. Dakshina Kannada, Udupi, west of Shimoga and part of Kodagu comes under the west flowing river basin.

The other three river systems are not dominated by rivers, three river systems provide around 14% of the drainage area. **North Pennar** is also known as Uttara Pinakini, it originates in the Nandi hills of Chikkaballapur. The river basin lies in the rain shadow region of Eastern Ghats. Jayamangali, Kumudavathi, Chitravathy and Papagni are the major tributaries of the North Pennar River. **South Pennar River** rises in the Nandi hills of Chikkaballapur district. Flows towards Tamil Nadu. **Palar River** rises in the Nandi hills in Chikkaballapur district, it flows around 93 km. flows towards Andhra Pradesh and Tamil Nadu State. These three river basin covers Kolar, Chikkaballapur part of Tumkuru, the eastern part of Bengaluru rural and urban districts.

Soil Resources: The Soil definition given by Franklin D Roosevelt is mind blowing, “**The nation that destroys its soil destroys itself**”. Soil is one of the earth’s most important natural resource. It is important for agriculture, which produce the food for humans. It support the natural vegetation, which helps us for the development of the national economy. It is indirectly controls the climatic conditions of the regions.

Karnataka is an agricultural based nation, agriculture depends upon the quality of the soils available in the region. Regional disparities can happen because of soil availability. South Karnataka is the largest producer of coffee, raw silk, sandalwood, ragi and tomato, for all this humus soil required. There are 11 groups of soil orders are found in Karnataka, those are Entisols, Inceptisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, Aridisols, Vertisols, Andisols and Histosols. The other classification is made depending on the agricultural capability of the soil. Red soil, Black soil, Lateritic soil, alluvial soil and Coastal soils.

Red Soil: Most widely distributed soil in South Karnataka is Red soil. Almost 70% of South Karnataka is covered by Red soils. The soils occur as shades of red and pass on to yellow. Red soil is rich in P2O5 and their lime content varies from 0.1 to 0.8%, Iron and alumina are high, being 30-40%.

Black Soil: Black soils are huge distributed in North Karnataka, South Karnataka it is distributed in lesser parts. 5-6 patches of black soils are available in South Karnataka. It is derived from the Basalt rocks and eroding agents. This soil is locally called as Eremannu, this is rich in calcium and magnesium but has a deficit of phosphorous and organic materials.

Table 2: Types of Soils and its distribution in South Karnataka

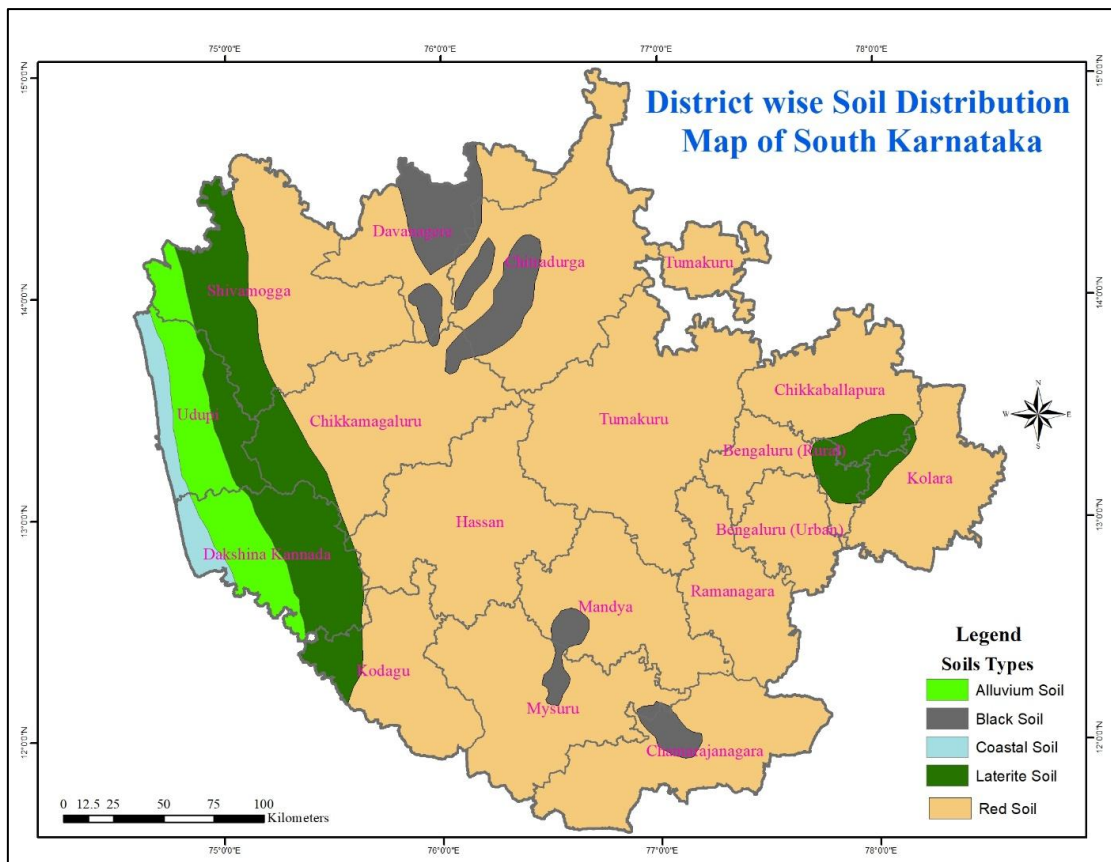
SI No	Soils	Distribution	Major Crops
1	Red soils	Mandya, Mysore, Tumkuru, Bangalore, Kolar, Shimoga, Ramanagara, Chikkaballapur, Kodagu, Chikkamagaluru, Chitradurga, Hassan.	Vegetables, Sugar cane, Banana, Rice, Cotton, Pulses, Castar seed, Ground nut, Arecanut, Jowar and Ragi.
2	Black soil	Part of Chitradurga, Davanagere, Mysore, Mandya and Chamarajanagar.	Jowar, Bajra, Pulses, Cotton, Oil Seeds, Groundnut, Onion.
3	Lateritic soils	Kodagu, Dakshina Kannada, Udupi, Hassan, Shimoga, Chikkamagaluru, Part of Kolar & Chikkaballapur	Rice, Sugar cane, Coconut, Cardamom, Cashewnut, Pepper, Coffee, Tea, Orange, Ginger, Arecanut.
4	Alluvial soil	Dakshina Kannada, Udupi	Paddy, Coconut, Arecanut, Banana.
5	Coastal soil	Dakshina Kannada, Udupi	Coconut, Arecanut, Banana.

Source: A Hand Book of Karnataka, published by GOK

Laterite Soil: It is a soil and rock type, rich in Iron and aluminium. Laterite soils are red coloration, because of high iron oxide. It is having the highest percentage of humus so these are highly fertile soils.
Alluvial Soil: These are the eroded and transported materials deposited in plain regions. It is good for

forests and grass. It contains iron oxide and lime in good percentage. Khaddar and Bhangra are the two types of these soils.

Coastal Soil: It is a problematic soil, such as saline, alkaline, acid sulphate, marshy and waterlogged soils.



Map 4: District wise Soil distribution map of South Karnataka.

III. CONCLUSION:

The distribution of rivers are not even, some districts that do not have a birthplace of Rivers, but whereas some districts have more than 5 rivers originates. In Shimoga, Chikkamagaluru, Udupi, Dakshina Kannada and Kodagu district having many rivers, the water potential is also good in this region. This district has good surface water as well as groundwater resources. Davanagere, Chitradurga and Bengaluru urban districts do not give birth to any rivers, but the river flows in these districts. Even though the Maidana region of South Karnataka faces a lack of water problems and sustainable water resource management. The availability of groundwater is estimated at 258 TMC in South Karnataka. The usage of groundwater is higher when compared to Coastal, Malanadu and irrigation command areas. The development of groundwater is not uniform in different districts. Based on the Rainfall received by the area and the network of rivers and streams also important to have a good groundwater table. Karnataka is an agricultural based state, water resource is important for irrigation facilities and other agricultural related activities.

The groundwater is available in all districts, but proper utilization of that groundwater is important. Out of 17 districts 8 districts have rich groundwater resources and 9 districts have poor groundwater or overly utilized groundwater. Dakshina Kannada, Udupi, Kodagu, Mysuru, Mandya, Hassan, Chikkamagaluru and Shimoga is the district having good underground water resources, because these districts receive good rainfall and recharge of groundwater is also good. These districts have huge river networks and streams. Whereas Bengaluru Rural and Urban, Chamarajanagar, Ramanagara, Kolar, Chikkaballapur, Tumkuru, Chitradurga and Davanagere have fewer groundwater resources because of less rainfall and surface water. To solve the disparities among the districts government prepared some master plans for different areas. These plans are known as multipurpose river valley projects. Bhadra, Tungabhadra, K R S, Linganamakki, Harangi, Shanti Sagara, Kanva and Vani Vilasa Sagara are some of the important rivers valley projects of South Karnataka. Irrigation project scheme and command area development scheme had been introduced by the government of Karnataka to reduce the imbalance between the districts, and make weaker districts compete with the stronger districts.

It is difficult to share the soil resources among the districts, as shared by water resources. The usage of the soil and maintaining its potentiality

is a major task for the department and governments. Studying soil as a natural resource, in regional disparities context will not make many differences. To avoid the disparities we need to maintain the conditions as it is available and sustainable development in soil resource is to take care. The Soil resources have many issues and problems, some important problems related to being South Karnataka are discussed here. Soil erosion is an important problem in South Karnataka. It is a natural process that affects all landforms. It involves soil detachment, movement and deposition. Top soils in this process moved to some other place and create the layers. The Western Ghats are having many rivers which flow towards Arabian Sea, these are the shortest rivers but the force of the river is good and worked as erosion agents. Every year top most layers of the soil will be eroded through these actions. Conservation of soils must be treated as a high priority issue, then only the result will be satisfactory. Soil conservation protects the soils from degradations. The Soil degradation is presently viewed as a serious and widespread problem. Soil degradation status of South Karnataka was assessed from the soil map having 121 soil units at the association of soil families with phases. Each mapping unit was assessed for the kind, degree and extent of degradation. The severity class was worked out based on the degree and extent of degradation.

Soil sustainable management is vital for enhancing and sustaining the productivity of soil, food, livestock, water quality and other related land resources such as desertification and soil erosion. The sustainability of soil resources can also increase the agricultural output. The proper utilisation of any resources does not happen without proper plans. The concept of soil sustainability will differ from government to government and region to region.

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