Geographical background

2.1. Physical features

The peninsula of India taken in its broadest sense is distinct from the alluvial plains of Indus and Ganga in being composed of ancient rocks forming hills and the peninsular India refers to that region south of the Narmada river running along the western side of the peninsula are hills known as the Western Ghats, that appears as high sharp 'steps' above the western coastal plain (Figure 2.1.1). The Sahyadris as they are known reach elevations of over 1000 meters in Maharashtra between the Tapti river and the source of the Krishna and mostly have lower elevations in Karnataka. Further south, they become higher, culminating in the high elevations of the Nilgiri hills south of Mysore city.

The Bellary District is located in the centre of the Deccan Plateau, between latitudes 15°-58' and 14°-80' N and longitudes 75°-43' E and 77°-45' E. The western and the northern boundaries are formed by the river Tungabhadra, which separates it from the Bombay Presidency in the west and H.E.H. Nizam's Dominions in the north. In the south, it is bounded by Karnataka state. To the east is the Kurnool district of the Madras Presidency.

This small district consists of two widely differing natural divisions, an eastern and a western separated by the Sandur hill range
which runs right across the district for more than thirty miles in a north westerly direction, corresponding approximately to the two linguistic zones which comprise the district. The eastern division comprises the taluks of Adoni, Alur, Siruguppa, part of Hospet, Bellary and Rayadurg. These are almost treeless tracts, and mostly black cotton soil with characteristic outcrops of granatold hills like “islands out of the sea” overlooking the surrounding fields. The western zone consisting of parts of Hospet, Harapanahalli, Hadgalli and Kudligi taluks contains patches of black cotton soil and is broken up by constant successions of wild rugged hills (mostly of Schistose Dharwar type).

![Figure 2.1.1 Physical Map of South India](image-url)
Orography

The Sandur hills occupying the native state of that name in the centre of the District are the most noticeable physical feature of the District. The range touches the river Tungabhadra at Mullapuram and runs south-eastwards for about 30 miles and joins the Kudligi-Rayadru group of hills.

The other important range of hills is the 'Copper Mountain', which runs parallel to the Sandur range about six miles east of it, for a length of about 236 miles from Daroji in the Hospet Taluk to within four miles of the river Hagari. The most important range of hills is Mallappangudda range which runs about 30 miles west of Sandur hills in a S.E. direction for a length of nearly 25 miles in the District and crosses into the Karnataka state. For the rest the hills are found either in clusters or isolated throughout the District.

1. The most important of the groups of hills is the Adoni group running in south-easterly direction form Kosgi to the town of Adoni and little beyond as far as Emmiganur. This group contains the prehistoric and settlements at Adoni, Kotakallu, Gudekallu and Kosgi.

2. The second important group is the Alur group commencing form the confluence of the river Tungabhadra and Hagari and running in
a south-easterly direction as far as Chippigiri and Guntakal. This group harbour the prehistoric and protohistoric sites of Halekota, Kanchagara Belagallu, Holalgondi, Hosapetadevaragudda, Hattibalagallu, Ramdurgam, Arikere, Chippigir and Guntakal.

3. The third important group is the Rayadrug group which is really an extension of the Gudekota hills to the west running right across the tongue of Mysore territory which separates the Rayadrug and Kudligi taluka of the Bellary District. This group is cut into by the river Chinna Hagari, tributary of Hagari. Thus till small river valley accounts for the following sites: Hosahalli, Gudekallu, Brahmagiri, Siddapur, Jatingarameshwar, Mullapuram and Sadam. Other sites located in the same group of hills are: Rayadrug, Gallapalli and Addaguppa.

4. The last group of hills is Harapanhalli Uchchangidruga group of hills in the Harapanahalli taluk. In this group are located a number of minor sites.

Among the isolated hills, the most important are the two hills in the term of Bellary: the ‘Fort Hill’ and ‘North Hill’. About three miles to the north-east is the famous group of 4 hills; Sannarachamma, Sadasiva, Chaudamma and Herigudda (‘Kupgal’ hill), and around which the important prehistoric settlements of Sanganakallu and Kupgal are
located. This whole group indeed constitutes the two arms of a horseshoe shaped valley (valley of Sanganakallu).

These hills of the Bellary District combined with their favourable geological features, have contributed not a little to its cultural evolution. The hills served as abodes of pre- and proto-historic man and the intrusive trap dykes supplied raw material for his tools.

2.2. Geology and Soils

The peninsula of India is a large block of various igneous and metamorphic rocks broadly divisible into two regions

A northern and western one in which the Cretaceous Deccan Trap volcanic rocks dominate as bedrock and

The more southern and eastern one dominated by Archaean granites and gneisses.

The boundary between these geological regions lies in northern Karnataka in the Bijapur and Gulbarga districts, and runs north-south nearly on the western boundary of the state of Andhra Pradesh. On these Deccan Traps, deep black soils (known as “black cotton soil” or “regurs”) which are highly fertile have developed. These soils also occur in the granitic zone along the courses of the Bhima, Krishna and Tungabhadra rivers, thus covering much of the Raichur and Shorapur doabs. The black colouration is mostly due to the moisture retaining
nature of the soil and making it available to plants long after rains have stopped. The property of black soils of expanding and contracting to an unusual degree results in the thorough mixing of the soil vertically. The montmorillonitic nature of soil causes moisture retention and in turn causes it to be of a darker colour. The palaeo black soils formed due to the erosion of the Deccan Trap are transported by rivers like the Krishna and Tungabhadra and are deposited. Thus the deposited black soils are shallow when compared to the deep deposits of the Deccan Trap area.

The granitic terrain, which includes the Bellary, Anantapur and western Kurnool districts, is largely covered by lighter black soil (vertisols) mixed with red, sandy soils that form around the granite hills. The granitic super-region is criss-crossed by dykes of intrusive dolerite rocks, which served as the raw material source for the Neolithic ground stone industry.

The northwestern portion of the southern region (focusing on the Dharwad district) consists of greenstone formations (Dharwar schists, metavolcanics, etc.). The upper Tungabhadra, flows through this terrain. Light reddish loamy soils form on this geology, although this represents a narrow strip of soil bordered on the west by the laterite of the Western Ghats. The Dharwar schists contain exploitable deposits of iron.
Other schist belts in Karnataka contain deposits of gold, such as the Hutti-Maski Belt which extends through the western Raichur Doab and the Shorapur Doab, and the Kolar schist band in southeastern Karnataka. Ancient mining sites exist along the Hutti-Maski beds in the same general areas as Neolithic sites, suggesting that exploitation may date back to the Neolithic times.

The geological history of Karnataka is mainly confined to the two oldest eras; the Archaean and the Proterozoic. The later periods of the geological timescale from the Cambrian onwards are not represented in the geological history of Karnataka apart from some minor deposits of recent age in the Western Coast and the Deccan Trap. A large part of North Karnataka is covered by the Deccan Trap, the basaltic lava from the volcanic lava from the Cenozoic era.

According to Radhakrishnan and Vaidyanadhan (1997), there are four main types of geological formations in Karnataka:

The Archean complex made up of Dharwad schists and granitic gneisses: These cover around 60% of the area of the state and consist of gneisses, granites and charnockite rocks. Older Gneiss Complex is the basement for a widespread belt of schists.A younger group of gneissic rocks mostly of granodioritic and granitic composition is found in the eastern parts of the State. The next in the order of age are the schist belts
first the auriferous and then the Dharwar schists. The narrow belt of younger closepet granites mark the end of the Archaean era. Some of the minerals found in this region are dolomite, limestone, gabbro, quartzite, pyroxenite, manganese and iron ores and metabasalt.

The Proterozoic non-fossiliferous sedimentary formations of the Kaladgi and Bhima series: The Kaladgi series has horizontal rocks that run for 160 km in the districts of Belgaum, Raichur, Dharwad and Bijapur districts. The Bhima series that is present on either side of the Bhima River consists of rocks containing sandstone, limestone and shale and this is present in the Gulbarga and Bijapur districts.

The Deccan Trappean and Intertrappean deposits: This is a part of the Deccan traps which were formed by the accumulation of basaltic lava. This is made up of greyish to black augite-basalt.

The Tertiary and Recent Laterites and Alluvial deposits: Laterite capping are found over the Deccan Traps and were formed after the cessation of volcanic activity in the early tertiary period. These are found in many districts in the Deccan plateau and also in the coast.

The area of interest in this work lies in the heart of the Deccan Penninsula and the geology of the Bellary-Raichur is of much importance. This region like most parts of the Deccan Plateau has a basement of the Archaean Gneiss complex mostly of the Younger
Gneissic Complex with a composition of granodiorites and granites. These Gneisses are dated to 3.0–2.6 b.y and encloses the auriferous schist belts. There are four narrow auriferous schist belts, namely, Hutti-Maski Schist Belt, Mangalore Schist Belt, Hungund-Kushtagi Schist Belt and the Deodurg-Raichur Schist Belt. The metasediments in these schist belts include minor cherts, banded iron-formation, garnet-bearing rocks and biotite-schist. The gold mineralization in these belts has resulted in many ancient gold workings throughout the area. The belts are intruded by the younger granites. The Sandur basin in the region belongs to the schist belts of the Dharwar type and is characterised by manganiferous greywacke, phyllite and numerous bands of banded magnetite and haematite quartzite (banded iron formation). The basin is known for its rich accumulation of both iron and manganese ore. Like the Auriferous Schist Belts, the Sandur Basin also has intrusive younger granites.

A striking feature in the geological map of Karnataka is the occurrence of a long linear belt of granite extending in a N-S direction for nearly 500 km and keeping an average width of about 20 km. The linear aspect of the belt extends from Kabbal in the south to Bellary in the north for about 300 km and the granites spread out over a wider region north of Bellary. These granites lie between the Archaean
nucleus in the west and a younger remobilized and reactivated block of the Purana basins belonging to the Proterozoic era to the east. The granites generally form high hills and are abruptly demarcated from the surrounding gneissic plains. These lofty masses of granite with their characteristic weathering into spherical boulders of immense size, bare of vegetation, form some of the most picturesque hill masses of Karnataka. Physiographically, there is a clear-cut demarcation of the granite belt, the younger granite forming a hilly rugged country, in contrast to the featureless plains formed of the older gneisses. These younger granites hold the Sandur Schist Belt as an enclave, surrounding it on all sides.

The most characteristic rock type of these Younger Granites is the coarse-grained porphyritic granite with tabular and prismatic crystals of K-feldspar. These granites are the youngest intrusive in the Archaean complex of Karnataka with an age of around 2600 m.y. Coarse porphyritic grey and pink granites occur as oval to circular plutons and the rock is rudely foliated.

Towards the north of the Younger Granites consisting of the modern districts of Belgaum, Bijapur, Bagalkot, Gulbarga are the Purana Basins of Kaladgi and Bhima of the Proterozoic Era. Orthoquartzite (quartzitic sandstone), argillite (shale and mudstone) and
carbonates (including dolomite and limestone) are the principal sediments comprising the Kaladgi sequence. Conglomerates of cobble-sized quartzite, vein quartz and cherts, fragments of jasper and chert breccia are also found in plenty in the Kaladgi Basin. Parts of north and west of the Kaladgi Basins are covered by the Deccan Traps. The Bhima Basin extends over the modern districts of Bagalkot and Gulbarga Districts of Karnataka. The lithology of the region consists of shales, limestone, and sandstone and quartz conglomerates. The end of Archaean era saw dyke activity and thus the Purana Basins do not consist of any dykes. Dolerite dykes are abundant in the areas belonging to the Younger Gneissic Complex mainly the Closepet Granites.

2.3. River system

The gradual eastward slope of the interior plateau that extends to the east of the Western Ghats has resulted in the eastward drainage of all major rivers. The three largest drainage systems are the Godavari, Krishna and Kaveri. The Bhima, Tungabhadra, Malaprabha, Ghataprabha, etc. are the other major tributary streams. To the east of this, the eastern half of the peninsular south of the lower Krishna watershed is the Pennar River, including the Kunderu River as a tributary from the north.
The areas of land between the confluences of two major, roughly parallel rivers, is often referred to as a Doab, notably the Shorapur Doab west of where the Bhima joins the Krishna, and the Raichur Doab where the Tungabhadra joins the Krishna. The plateau area south of the Raichur Doab and Tungabhadra River is sometimes referred to as the Rayalaseema (the territory of the medieval Rayas of Vijayanagara).

The river Tungabhadra and its tributary Hagari form the principal drainage system of the Bellary District. Only a small portion of Adoni and Alur talukas in north-east and in the south-east drain into the River Pennar.

The river Tungabhadra, which acts as the boundary of the District for nearly 207 miles in the north and west, falls into the river Krishna in the Kurnool District. It enters the district in the south-western corner and flows between the high banks of red loam at a point 1730 feet above mean sea level. When it leaves the District it flows about 1000 feet above mean sea level accounting for a fall of nearly 730 feet in 200 miles.

Its chief tributary is Hagari which is joined by Chinna Hagari (from the Molkalmarru Taluk of Karnataka state) in the Rayadurg Taluk. It flows due north in a wide shallow sandy bed and joins the river Tungabhadra north of Siruguppa.
There is another small tributary called Chikka Hagari which flows through the Harapanahalli and Hadgalli taluks. There are a number of minor streams which fall into the river Tungabhadra.

2.4. Climate and Vegetation

The Indian Ocean monsoon system not only greatly influences the seasonality and climate in India but also ties together South Asia with other regions bordering the Indian Ocean such as East Africa and the southern Arabian Peninsula. The monsoon, together with patterns of sunlight and temperature, results in three seasons in most of India: the wet season (monsoon), roughly from June to mid-December, the 'cool' season from mid-December through February, and the hot dry season from March to the end of May/early June until the rains start. The wet season is further divisible into that of the advancing and retreating monsoons. The main monsoon advances from the southwest. During the late wet season/early cool season (October to December), the wind direction reverses towards the southeast. This is known as the retreating monsoon. This brings some additional rainfall, but the only large quantities come off the Bay of Bengal onto the southeast coast, especially Tamil Nadu and to a lesser extent southeastern Andhra Pradesh. Some rain also comes off from the Himalayas onto the northwestern subcontinent during this period.
The Southwest Monsoon strikes first in early June (maximum in July or early August) the Malabar Coast and the Western Ghats, which receives high quantities of rainfall, creating tropical evergreen forest conditions, whereas on the eastern side an extensive rain shadow area exists. It is in this rain shadow, east of the Western Ghats that the semi-arid savanna lands occur. This rain shadow effect is more pronounced towards the southern Deccan, e.g. Karnataka. The regional rainfall minima occur in the region around Bellary, where rainfall may not exceed 60 cm per annum. The driest region of the peninsula is that centered around Bellary (classified as sub-desertic with tropical tendencies, with a dry season of nine months), while the adjacent Chitradurga region to the south is somewhat wetter (Tropical Medium Dry, 5-6 month dry season), and the areas to the north, including Kurnool, Raichur and Shorapur are Tropical Accentuated Dry, with a 7-8 month dry season.

The eastward drop in rainfall, rising again east of the Bellary District, means that the peninsula of India (the northern and southern Deccan) can be divided into roughly north-south strips of rainfall zones, corresponding generally to vegetation zones.

The Bellary zone is essentially a dry zone, located as it is in the heart of the Deccan being closer to the high Western Ghats and so far
inland from the East coast. At present it is a dry tract with a rainfall of less than 25 inches per annum. Even in late prehistoric times, the climate could not have been much different, except in the Pleistocene when “the southerly latitudes of India had a succession of cold pluvial epochs.” In recent times, “a change in the prevailing winds is impossible so long as the present distribution of water exists.” But there is evidence even in very recent times of the effects of reckless deforestation, which accounts for the present conditions. Probably as in the historic period, the Sandur and other major hill ranges in the District would have been covered with greater forests. This would have slightly improved the rainfall. Even today in the western half of the District on the other side of Sandur hills, there is “a slightly heavier but light rain fall than the eastern zone.”

The flora brings out the contrast between the two zones. In the drier Eastern zone, the flora consists of such draught resisting plants as Euphor Bias, Asclapidas an Acacia Arabica, while the western zone shows a damper flora.

The region is characterized by dry heat. The temperature has a diurnal range. The cold nights and the burning mid-days have contributed to the peculiar rock weathering and fracture which is noticeable in the granatoid hills of the District.