CHAPTER 2
GENERAL GEOLOGY

2.1 INTRODUCTION

The Narmada Basin is an intracratonic rift basin and has the most complete record of the Cretaceous Period from Berriasian? (Shitole et al., 2021) to Maastrichtian (Prasad et al., 2017) comprising the rocks of Bagh Group, Lameta Group, and the Deccan Traps. The Narmada Basin is bounded by a several strike-slip faults and formed due to the reactivation of the Narmada Son Lineament during Early Cretaceous (Biswas, 1987). The Cretaceous Bagh Group rocks are exposed in the Lower Narmada Valley and unconformably overlie the Precambrian rocks. They are overlain by the rocks of Lameta Group, Deccan Traps, and Quaternary sediments. The chapter gives an overview of the tectonic history, evolution, and geology of the Narmada Basin.

2.2 GEOLOGY OF THE WESTERN LOWER NARMADA BASIN

Narmada rift basin extends from the western margin to the interior of the Indian peninsular and comprises Precambrian, Mesozoic, and Tertiary rocks, which are overlain by Quaternary sediments. Narmada and Tapti Rivers originate in Amarkantak (Anuppur district) and Satpura range in the Gawligarh hills of the Deccan plateau (Betul district) in Madhya Pradesh, respectively, are the two main rivers in the study area with course close to the Son-Narmada-Tapti (SONATA) lineament. Most of the area between the Narmada and Tapti River is covered by the Deccan Traps. The Cretaceous sedimentary rocks (Bagh Group and Lameta Group) underlie the Deccan Traps and occur as isolated patches over the Precambrian basement (Fig. 2.1). The Narmada valley is divided into two, eastern and western parts along its strike, and the divide is around Barwaha in Madhya Pradesh (Ghosh, 1976). The Bagh Group rocks are limited to the western part of the Narmada Valley (also referred to as Lower Narmada Valley). The Narmada River flows through Deccan Traps, Bagh Group rocks, and Quaternary deposits in the western part. In contrast, in the eastern part, it cuts the Gondwana, Vindhyan, Bijawar, and Archean rocks. The generalized stratigraphic succession observed in the study area is given in Table 2.1. The Narmada Son Lineament (NSL) is the conspicuous feature in the Indian Subcontinent (Tewari et al., 2001). West (1962) pointed out that Gondwana's are restricted to the south of NSL and Vindhyans to the north. In the central part/ELNV, both Vindhyans and Deccan Trap are exposed to the north and south of NSL.

2.2.1 PRECAMBRIAN

The Precambrian rocks in the Lower Narmada Valley comprise Archean unclassified granites and gneisses, Proterozoic metasedimentaries, Bijawars, and Vindhyan Supergroup. The Precambrian rocks observed in the Western Lower Narmada Valley can be categorized into the Pre-Champaner unclassified granites and gneisses, Aravalli Supergroup, and Post-Delhi igneous intrusive. Jambusaria (1970) suggested the unconformable relation of the overlying Champaner Group of rocks with the granites and gneisses and considered it the basement. The Aravalli Supergroup consists of Jharol, Rakhabdev Ultramafic suite, Lunawada, and Champaner; however, only the Lunawada and Champaner groups are exposed in the study area (Merh, 1995). The rocks of Lunawada and Champaner groups are considered an extension of the southern Aravalli Mountain Belt (SAMB) and comprise metasedimentaries. The Lunawada Group is divided into Kalinjara, Wagidora, Bhawanpura, Chandanwara, Bhukia, and Kadana formations in ascending order. It consists of mainly phyllites, mica schists, chlorite schists, meta-siltstones, meta-semipelites, meta-protoquartzites, petromict meta-conglomerate, manganiferous phyllite, dolomitic limestone, and phosphatic algal dolomite (Gupta et al., 1980, 1992). Only Kadana Formation represents the Lunawada Group in Gujarat. Recent geochemical studies of the calc-silicate rocks occurring in the Kadana Formation of Lunawada Group suggest calcareous sandstone with minor clay as the protolith and a low-moderate weathering of the source rocks in cold and arid climatic conditions (Akolkar and Limaye, 2020). Studies of Mamtani (1998) suggest that rocks of Lunawada Group have undergone metamorphism up to lower amphibolite facies.

The overlying Champaner Group of rocks occurs as isolated patches but has gained attention due to manganese and phosphorite deposits in it. The manganese deposits occur in the Shivrajpur Formation and the phosphorite deposits in the Khandia Formation. The metasedimentary rocks of the ChampanerGroup are folded and consist of dolomites, quartzites, phyllites, metaconglomerate, metagraywacke, mica schist, and dolomitic limestones. Studies of Jambusaria and Merh (1967); Das et al. (2009) suggest that Champaner Group rocks are metamorphosed up to green-schist facies. Only the Godhra Granite is exposed in the study area of the Post-Delhi igneous intrusive. The age of the Aravalli Supergroup is bracketed between 2000-2500 Ma,whereas the Godhra granite is dated 955±20 Ma (Gopalan et al., 1979).

2.2.2 BAGH GROUP

'Bagh Beds' is named after the type locality in Bagh town of Dhar district, Madhya Pradesh. The area is famous for its rock-cut monument-PanchPandoo caves, also known as Bagh caves. The caves are carved in the basal sandstone-dominated unit of the Bagh Group by the Buddhists during the 4^{th} -6^{th} century AD (Fig. 2.2). The first mention of the lithology of the caves can be found in the work of Captain Dangerfield in 1818, which describes the sandstone having an argillaceous cement intervened by layers of claystone at the top and a six feet thick claystone unit overlying this at the top. Later Stewart (1821) described the lithology encountered on the route from Mhow in Madhya Pradesh to Baroda in Gujarat via Dhar, Tila, Parrah (Para), and Rajpur. Impey (1856) described the Bagh caves and the rocks in them. Based on fossils contained in the rocks, Carter (1857) and Keatinge (1856) assigned the rocks Neocomian and Cretaceous age, respectively. Later Duncan (1865) correlated the fauna of Bagh Group with the European Upper Greensand and Lower Chalk fauna. Blanford, in 1869, was the first to systematically study the rocks belonging to formations of Lametas, Coralline Limestone, Deola and Chirakhan Marl, Nodular Limestone, Nimar Sandstone, and Mahadeva and were assigned as "Bagh beds." Later, Medlicott (1875) showed the Mahadevas belonging to Gondwana Supergroup. Bose (1884) resurveyed the area between Nimawar and Kawant and gave a detailed account of the Geology of the Lower Narmada Valley based on the primary database of Blanford (1869). The study area was split into Nimawur-Barwai, Bag Malesar, and Rajpur-ChotaUdepur and divided the Upper Cretaceous rocks into three units, namely Nodular Limestone, Deola and

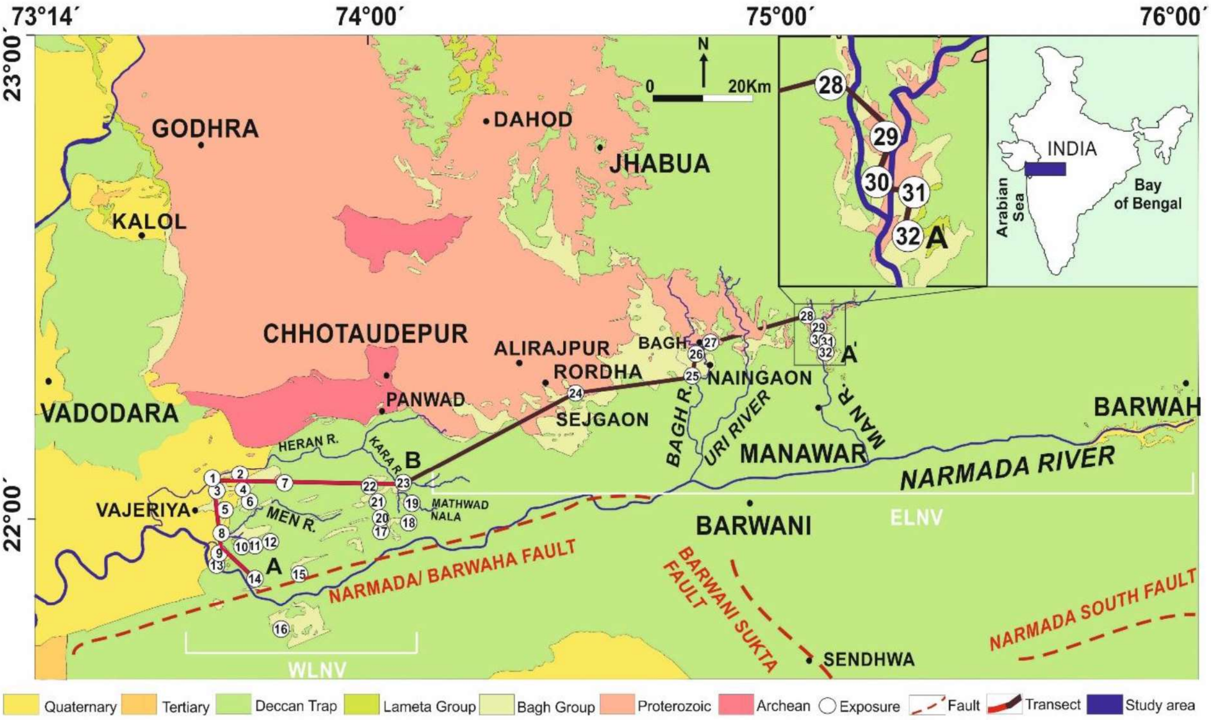

Figure 2.1 Geological and Tectonic map of the Lower Narmada Valley (Shitole et al., 2021; Abdul Azeez et al., 2013 and Jain et al., 1995) with studied localities of the Bagh Group: 1. Songir, 2. Ghantoli, 3. Chosalpura, 4. Chametha, 5. Vajeria, 6. Agar, 7. Naswadi, 8. Devaliya, 9. Uchad, 10. Sultanpura, 11. Bilthana, 12. Bhekhadiya, 13. Bhadarwa, 14. Navagam, 15. Gulvani, 16. Mathsar, 17. Karvi, 18. Ambadongar, 19. Vajepur, 20. Mogra, 21. Chikhli, 22. Galesar, 23. Mohanfort, 24. Sejagaon, 25. Rampura, 26. Risawala/Gayatri Temple, 27. Bagh Section (SE Bagh Town), 28. Borghata/ Ratitalai, 29. Dhursal, 30. Badia-Karondia, 31. Avral, 32. Sitapuri. Abbreviations: WLNV, Western Lower Narmada Valley; ELNV, Eastern Lower Narmada Valley; R, River. Localities no. 28 to 32 are shown in an enlarged view. A-B-A′ represents section lines across the Narmada Basin.

Chirakhan Marl, and Coralline Limestone. The occurrence of igneous, metamorphic, Bijawars, Vindhyans, Gondwanas, Lower Cretaceous Nimars, Upper Cretaceous (Nodular Limestone, Deola and Chirakhan marl, Coralline Limestone, and Lametas are described in detail in all three areas.

The Bagh Group rocks are exposed from Barwah (Madhya Pradesh) in the east to Vajeriya- Songir-Chosalpura (Gujarat) in the west (Fig. 2.1) along the Narmada-Son Lineament. The Bagh Group rocks of WLNV are mostly exposed to the north of the Narmada River, but few exposures are also observed southward at Mathsar, Vandri, and Kanji villages of the Gujarat and Maharashtra states. The Bagh Group rocks rest unconformably over the Precambrian rocks (Tripathi and Lahiri, 2000) and are capped by the Lameta and/or Deccan Trap formations. The exposures of the Bagh Group of ELNV are more or less continuous while they are patchy in WLNV, covered mainly by Deccan Traps (Fig. 2.1). The rocks overlie the Precambrian Bijawars in the ELNV (Bhattacharya and Jha, 2014), whereas in the WLNV, the rocks overlie quartzites and phyllites of the Precambrian Aravalli Supergroup. The propagation of the Narmada rift progressively advanced to the east, depositing the thickest sediments in the WLNV. The Cretaceous succession of WLNV comprises a fluvio-marine sequence. The Bagh Group in the ELNV can be grouped into Nimar Sandstone, Nodular Limestone, and Coralline Limestone, whereas in the WLNV, the rocks are, till date, informally grouped as Songir Formation, Calcareous Sandstone, Bilthana Oyster Bed, and Navagam Limestone. The Deola-Chirkahan Marl and Coralline Limestone of ELNV disappear towards the west, and the Bilthana Formation becomes a distinct unit. The basal unit, also known as Nimar Sandstone/ Nimar Formation/ Songir Formation, comprises conglomerate and sandstone-dominated rocks with siliciclastics derived from older Precambrian rocks. The lower part of the clastic sequence is deposited in a fluvial environment during the Early Cretaceous, whereas the upper part represents estuarine facies (Tandon, 2000). The basal clastic-dominated unit is derived from a cratonic source of low-grade metamorphic origin (Madhavraju et al., 2004). The marine Late Cretaceous (Turonian) succession, also known as Nodular Limestone/Navagam Limestone/Bilthana Oyster Bed, is dominated by mixed siliciclastic-carbonate rocks with sandstones, shales, and limestones. These rock types show lateral variation except the Nodular Limestone, a persistent unit in the basin with variable thickness. These transgressive deposits are overlaid by sandstones and mudstone of the Coniacian age, having a significant hiatus at the top represented by an unconformable contact with the Lameta Formation and the Deccan Traps of Maastrichtian age. According to Biswas (1982), the basin has a short geological history limited to Cretaceous with the basal Nimar Formation deposited in fluvial conditions deposited by a river flowing along the Narmada lineament grades to deltaic facies towards the western margin of the basin. The valley later opened into a rift basin and deposited the marine sediments in the Late Cretaceous, which was abruptly terminated with regional uplift followed by Deccan volcanism.

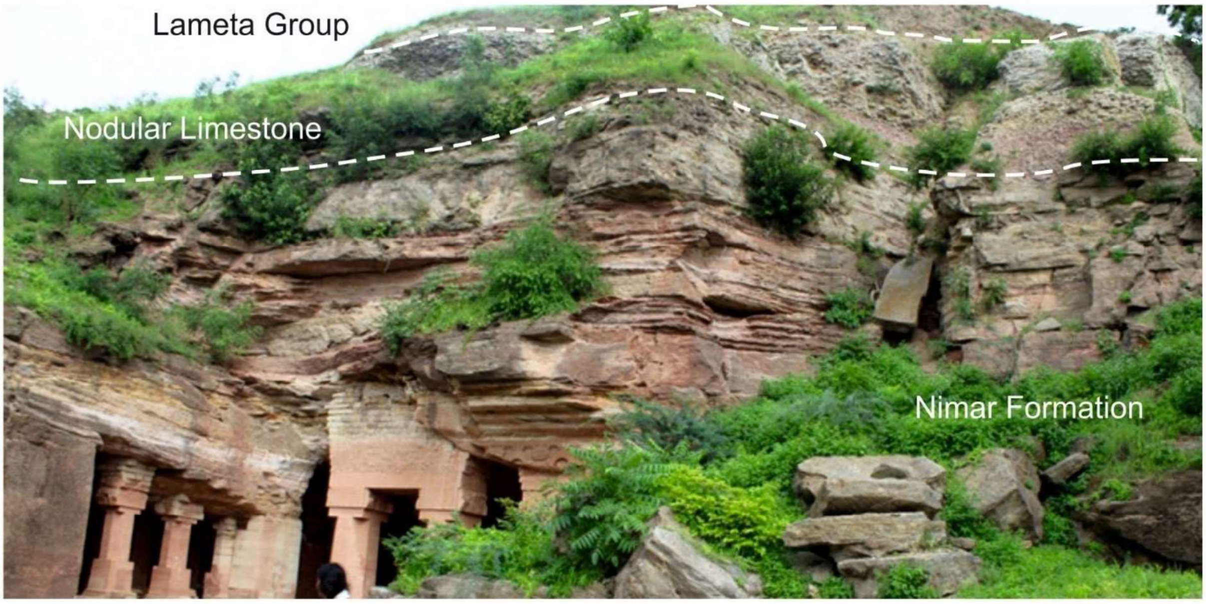

Figure 2.2 An almost complete sequence of the Bagh Group (ELNV) exposing the basal Nimar Formation and Nodular Limestone capped by the younger Lameta Group. Note: Buddhist caves in the Nimar Sandstone at Bagh village, Dhar district of Madhya Pradesh.

2.2.3 LAMETA GROUP

Lameta Group of rocks occurs as isolated patches in Gujarat, Madhya Pradesh, and Maharashtra states of India and is famous for the containing dinosaur fossils. The Lameta Group of rocks is extensively studied for the paleontological evidence of the K-T boundary extinction event. Along with dinosaurian eggs and bones, several other animal and plant fossils, like crocodile bones, algae, lizard eggs, fish remain, frogs, and palynomorphs, are also reported from the unit, which strongly points towards the Maastrichtian age. Recently, Prasad et al. (2017) elevated the status of the Lameta Formation to the group and divided the sequence into two formations, namely Hatini Limestone and Katkut Sandstone. The Hatini Limestone comprises calcareous sandstone, limestone with chert concretions, and dinosaur fossils. The Katkut

Sandstone is characterized by ferruginous red sandstone and chert with wood logs. In WLNV, the Lameta Group of rocks is found lying unconformably over the Men Nadi Limestone Member of Uchad Formation (Shitole et al., 2021) in localities like Bhekhadiya, Vajepur, and Bhadarwa, whereas in ELNV, they unconformably overlie the Coralline Limestone. At the Rampura section in ELNV, the Coralline Limestone of Bagh Group is found conformably passing into the Cherty limestones of Lameta Group. The Hatini Limestone and Katkut Sandstone are characterized by friable ferruginous sandstone with silty clays and calcareous sandstone with chert replacement, respectively. Abundant dinosaurian fossils are recovered from the unit, both from the eastern and western sectors of the Lower Narmada Valley. Sauropod dinosaurian bones of *Antarctosaursseptentrionalis*and theropod dinosaurian bones *Rajasaurusnarmadensis* (Jain and Bandhopadhya, 1997; Wilson and Upchurh, 2003; Wilson et al., 2003, see Mankar and Srivastava, 2019) and nesting sites of *Megaloolithuscylindricus, M. jabalpurensis, M. megadermus* and *Fusioolithusbaghensis* (Dwivedi et al., 1982; Mohabey, 1983, 1991; Sahni, 1995; Loyal et al., 1999; Vianey-Liaud et al., 2003; Fernández and Khosla, 2015, see Mankar and Srivastava, 2019) are reported from the Balasinor and Rayoli of Kheda district in WLNV. It is considered to be deposited in fluvio-lacustrine environment during the end-Cretaceous.

2.2.4 DECCAN TRAP

According to Merh (1995), the outpour of huge volumes of Deccan basalt marks the Cretaceous-Tertiary boundary, and it was the time when the Indian plate was moving northward at a fast rate, the breakup of Madagascar (80 MY) and Seychelles (65-60 MY) from India and the early collision of Indian plate with Eurasia is the plate tectonic events coinciding with the stages of Deccan volcanism. The Deccan Trap represents the most significant episode of continental flood basalt volcanism in the Phanerozoic releasing 5×10^{17} moles of CO_2 in the atmosphere, disturbing the carbon cycle of the atmosphere and a likely trigger of the Iridium anomaly and K-T boundary extinction (McLean, 1985).

It covers about 5,00,000 sq. Km. of the Indian subcontinent comprising mainly of tholeiitic basalts. The magmas in decreasing order of abundance in the WLNV are tholeiitic, rhyolitic, alkali-olivine basaltic magma, carbonatite-alkalic, and ultrabasic dykes representing the

Age	Super Group	Group	Formation	Member
Quaternary	Quaternary sediments			
Paleogene	Deccan Trap			
Maastraichtian		Lameta	Hatini Limestone	
			Katkut Sandstone	
Coniacian-Berriasian		Bagh	Rajpipla Limestone	
			Oyster Bed	
			Calcareous sandstone (Upper Nimars)	
			Nimar Sandstone	
Neoproterozoic	Post-Delhi Igneous intrusive	Godhra Granite		
Paleoproterozoic	Aravalli	Champaner	Rajgarh	
			Shivrajpur	
			Jaban	
			Narukot	
			Khandia	
			Lambia	
		Lunawada	Kadana	

Table 2.1 Lithostratigraphy of the Western Lower Narmada Valley (Gupta et al., 1992; Merh, 1995; Godbole et al., 1996; Gopalan et al., 1979; Dassarma and Sinha, 1975; Prasad et al., 2017).

final phase of Deccan volcanism (Merh, 1995). In WLNV, the Deccan Trap occurs as hills, plateaus, inliers, and outliers. According to Gwalani et al. (1993), the late stage of Deccan volcanism was accompanied by alkaline magmas, and the occurrences of igneous rocks in the WLNV can be divided into 1. Phenai Mata in the northern part of the study area comprises alkaline rocks associated with layered tholeiitic gabbro-anorthosite- granophyre intrusive complex 2. Lamprophyres and tinguaites characterize the Panwad-Kawantsubprovince lying east of Phenai Mata. 3. Bakhatgarh-Phulmahalsubprovince east of Panwad-Kawant consisting of ultrabasic dykes 4. Siriwasan-Dughasubprovince lying south of Kawant consists of trachytic rocks. 5. Amba Dongar lying south of Siriwasan and north of Narmada River, is characterized by a carbonatite ring complex. The Ambadongar Carbonatite Ring Complex (ACRC) is located within the Narmada Rift Zone and is the most voluminous alkaline intrusion in the LNV, yielding economic mineral deposits like fluorite and REE's. The Bagh Group rocks are deformed and uplifted due to emplacement of the ACRC. The ENE-WSW trending dikes dominate the Narmada and Tapti valleys with subordinate NE-SW and NW—SE trends (Nair et al., 1985). The Paleogene to Neogene rocks of the adjacent Cambay Basin is exposed in the WLNV, which comprises Olpad, Cambay Shale, Kadi, Kalol, Tarapur, Babaguru, Kand, and Jhagadia formations in ascending order.

According to Raju et al. (1971), Deccan Traps forms the floor to the oil-bearing Paleogene rocks in the Cambay Basin, located on the western margin of the Indian shield suggesting the formation of Paleogene-Neogene Cambay basin post-Deccan lava eruption. The courses of Narmada and Tapti Rivers represent fault trends and are parallel to the Satpura lineament.

2.2.5 QUATERNARY DEPOSITS

The Narmada basin to the north and Tapti-Purna basin to the south form the two depocenters for quaternary sedimentation in the Son-Narmada-Tapti (SONATA) lineament. The Deccan basalts and Tertiary rocks are exposed south of the Narmada-Son Fault (NSF), whereas north of it, the sediments lie in the subsurface and are overlain by Quaternary sediments (Chamyal et al., 2002). The NSF remained active since the Late Cretaceous, and the continued subsidence deposited Cenozoic sediments (Biswas, 1987). Chamyal et al. (2002) divide the Lower Narmada valley into upland consisting of Basalt and Bagh Group rocks, lowland consisting of Tertiary rocks, alluvial plains, and coastal zone consisting of mudflats. The glacio-eustasy and paleoclimate factors played a combined role in controlling and preserving the Quaternary sediments in Gujarat (Merh and Chamyal, 1997). About 350 and 400m of alluvium is recorded from the Narmada and Tapti valley borehole data, respectively (Nair et al., 1985). The east-west trending Jhagadia-Rajpipla seismic profile shot south of Narmada River suggests 3500m Quaternary sediments at Jhagadia in the west, decreasing gradually towards the east, attaining a thickness of about 150m at Rajpipla (Murty et al., 2011). The north-south Sinor-Valod seismic profile across the Narmada and Tapti Rivers suggests the occurrence of 600-700m of Quaternary sediments near Sinor, north of Narmada River pinches towards Valod in the south. East-west trending Panoli-Junamasda seismic profile lying between the Narmada and Tapti Rivers suggests the occurrence of about 1200m Quaternary sediments at Panoli, pinching towards the east (Murty et al., 2014). Merh (1995) referred to the Quaternary sediments deposited in the Cambay and Narmada graben of fluvio-marine, fluvial and Aeolian origin as 'Gujarat Alluvium.'

2.3 TECTONIC HISTORY AND EVOLUTION OF NARMADA BASIN

The crustal stretching prior to the continental breakup cuts the pre-rift succession, and the crystalline basement forms elongated crustal depression bounded normal faults called rift basins (Holz et al., 2017). The Late Triassic breakup of Pangea resulted in the development of rifts that propagated southwards between Africa and India-Madagascar and between India and Australia, thus starting the breakup of Gondwanaland (Royer et al., 1992). India, along with Africa, occupied a central position within Gondwanaland until its separation from the joint landmass of Antarctica and Australia at 130 Ma (Besse and Courtillot, 1988; Krishna, 2017; Powell et al., 1988; Veevers and McElhinny, 1976), and from Madagascar in the Late Cretaceous due to spreading in the Mascarene Basin (Storey et al., 1995). During Early Cretaceous (~132 Ma), India-Madagascar separated from Australia-Antarctica (Powell et al., 1988; Brown et al., 2003; Fig. 2.3). India-Seychelles separated from Madagascar during Late Cretaceous at around 90-85 Ma, (Storey et al., 1995; Torsvik et al., 2000), and western India witnessed a regional uplift. This separation of India from Gondwana in the Cretaceous period played a major role in reactivating the Precambrian ENE-WSW trending Satpura lineament and gave rise to extensional events.

According to Biswas (1982), the reactivated movements along the Precambrian trends and development of western marginal basins (Kachchh, Saurashtra, Cambay, and Narmada) in the Indian subcontinent are closely related to the drifting of the Indian subcontinent.The Saurashtra arch subsided in the Early Cretaceous along the eastern margin fault of Cambay Basin and formed and formed a depositional platform in continuation with the Kachchh shelf and Narmada region on which thick deltaic sequence was deposited (Biswas, 1987).

The rifting progressively developed from north to south, opening the Kachchh Basin during the Early Jurassic along the E-W trending Delhi trend, the Early Cretaceous Cambay Basin along the NNW-SSE Dharwar trend, and finally the Narmada Basin in Late Cretaceous along the ENE-WSW trending Satpura lineament (Biswas, 1982).The Narmada rift basin opened due to the tension created by the counterclockwise drift of the Indian plate (Biswas, 1982, 1987). Rifting along thePrecambrian lineament created a series ofsub-basins, in which the Bagh Group sediments got deposited. This was when the encroachment of anarm of Palaeo- Tethys Sea laid down a thick marine sequence (Biswas, 1987). Western India's Narmada basin and other pericontinental basins (Kachchh, Cambay and Saurashtra) evolved during Jurassic-Cretaceous deposition time of the Late Gondwana (Biswas, 1999).

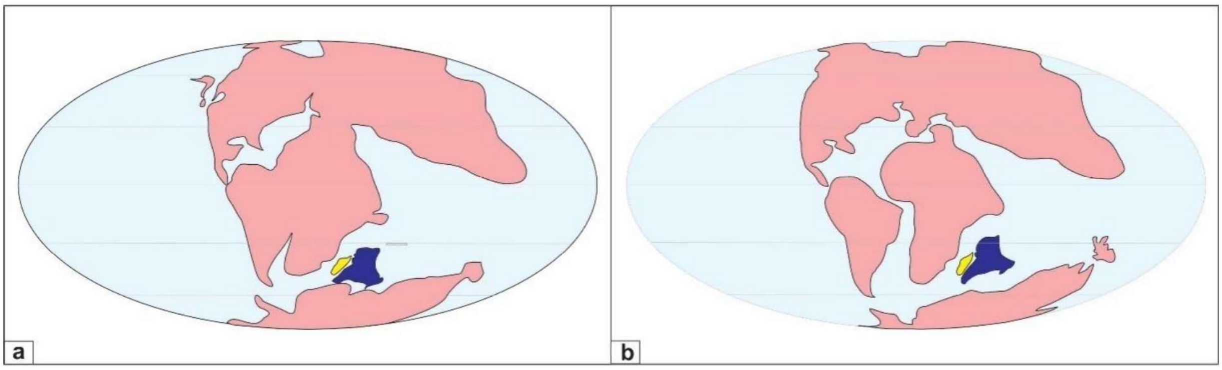

Figure 2.3 Cretaceous paleogeography highlighting the position of India (blue) and Madagascar (yellow) during a. Berriasian-Aptian and b. Albian-Turonian (Boucot et al., 2013).

The Narmada Basin, lying on the western margin of the Indian Peninsula, is an example of crustal stretching and preserves imprints of Cretaceous Gondwana breakup, its passage over the Réunion hotspot, sea-level rise, and an extinction event preserving in its rock record. The propagation of the Narmada rift progressively advanced to the east with deposition of the thickest sediments in the WLNV and created a series of sub-basins, in which the Bagh Group sediments were deposited. Tripathi (1995) identified three linear belts as sub-basins, in which the Cretaceous marine rocks were deposited, namely Bagh-Zirabad, Jobat-Dahod, and Kawant. The Narmada basin extended offshore towards the south of Saurashtra, the anticlockwise movement of India created extensional faulting, which opened the western part of the lineament. In contrast, the strike-slip movement along the lineament created compressive stress in the eastern part (Biswas, 1999). During Late Cretaceous, the uplift of the Gondwana basin in the eastern part of the Narmada-Son Fault ended the sedimentation while the transgression in the western part of the basin was initiated. The basins occupy the grabens, which are bounded by faults and open seaward.

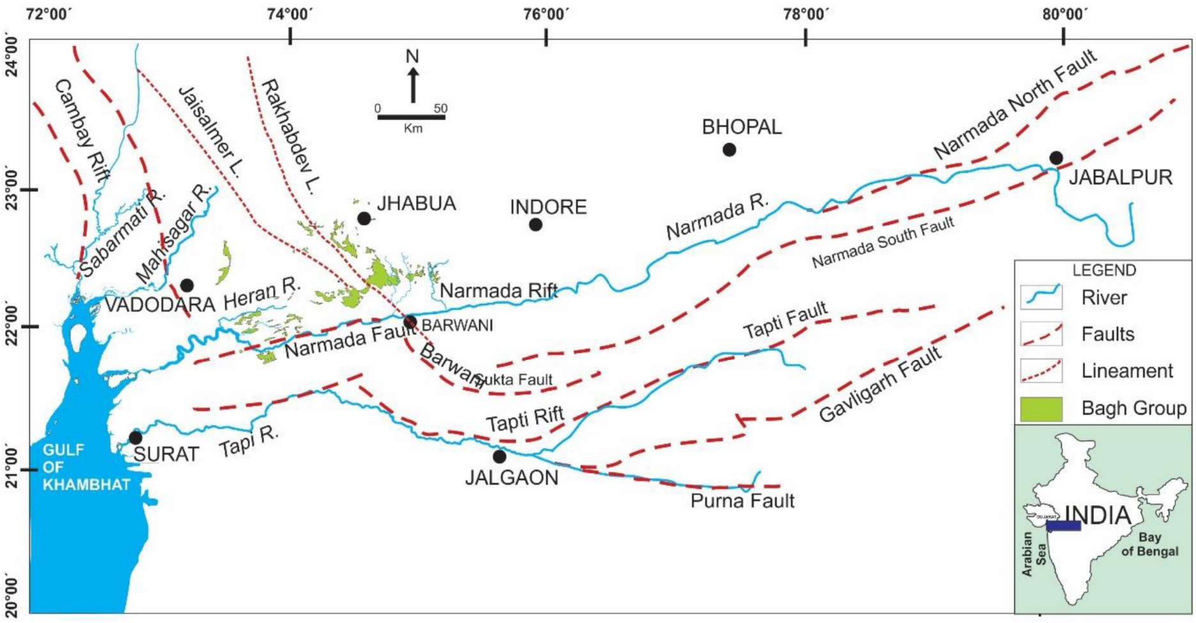

Figure 2.4 Tectonic Map of west-central India showing major faults, lineaments, and exposures of the Bagh Group, Narmada Basin (modified after Abdul Azeez et al., 2013; Jha et al., 2016).

The Bagh Group rocks rest unconformably on the Precambrian rocks (Tripathi andLahiri, 2000) and are exposed in Barwah (Madhya Pradesh) in the east to Vajeriya-Songir-Chosalpura (Gujarat) in the west (Fig.2.1) along the Narmada-Son Lineament. This Narmada-Son Lineament (Choubey, 1971) is a northern part of the Central Indian Tectonic Zone (Acharyyaand Roy, 2000).The Narmada rifting initiated in Early Cretaceous time along the ENE-WSW Satpura lineament divides the Indian shield into southern and northern foreland blocks (Biswas, 1982, 1987). The Narmada Son Lineament (NSL) is an ancient feature trending ENE-WSW located in central India along a paleo-rift and is intermittently active due to the tectonic movements (Choubey, 1971). The NSL is also considered a zone of crustal upwarping through which lava intruded (Auden, 1949). It is bounded by the active Son-Narmada North Fault (SNNF) to its north and the Son Narmada South Fault (SNSF) to its south. The region between SNNF and SNSF consists of Archaean greenstone. The SNNF further extends from Hoshangabad in the west to Markundi in the east (Jain et al., 1995). The Narmada Fault (Abdul Azeez et al., 2013) was referred to as the Barwaha Lineament and considered a possible extension of the SNNF by Jain et al. (1995). The Narmada-Son geofracture has a big role in the evolution of Gondwana rift basins (Biswas, 1999). The Son-Narmada and Tapti valleys exhibit a horst graben-horst structure between 20°-25° latitudes in the Indian sub-continent (Nair et al., 1985). Patro et al. (2005) suggested that north of Narmada River is a highly disturbed zone with faults trending E-W/ ENE-WSW whereas, between the Narmada, and Tapti Rivers, the BarwaniSukta Fault, South Narmada Fault, Gavligarh Fault and Tapti Fault (Fig. 2.4) are recorded.