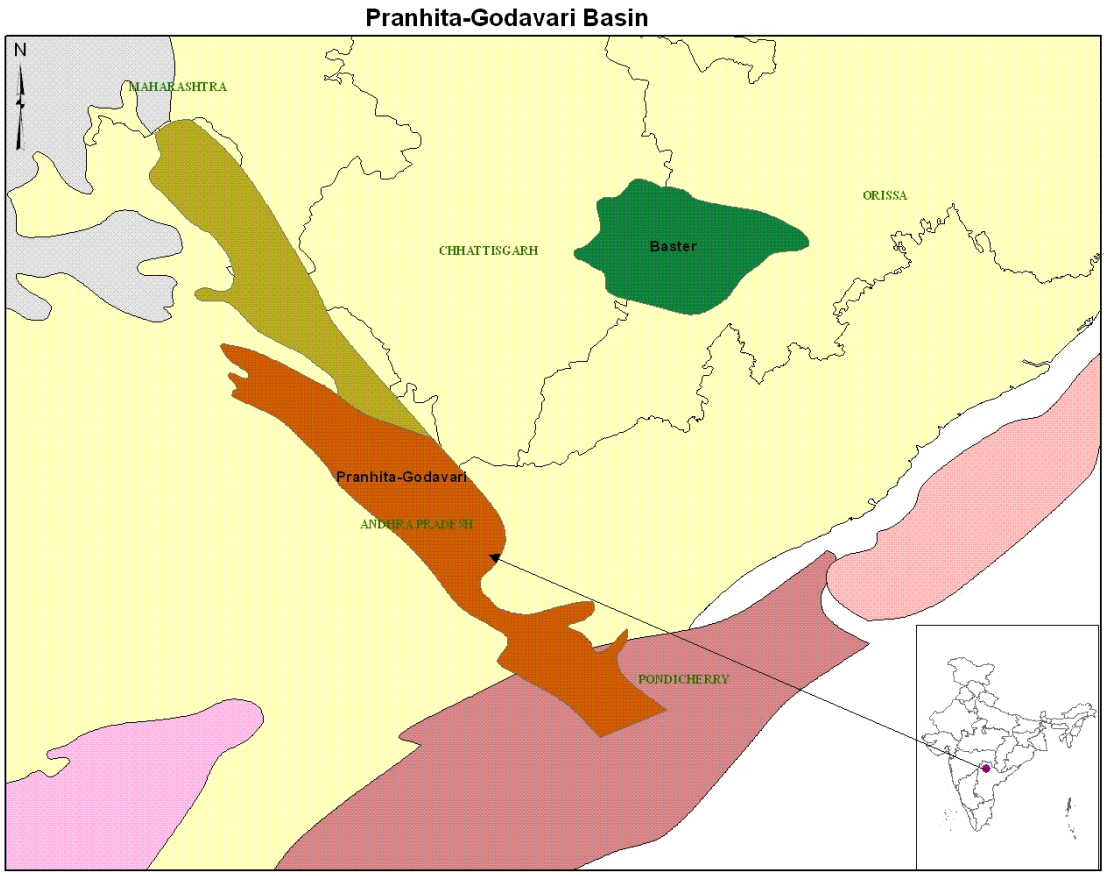
Basin Introduction :



The NW-SE trending Pranhita-Godavari Valley is unique as it preserves about 3000 m thick sediments deposited in a time span of 200 Ma from late Carboniferous/early Permian to Cretaceous. Most of the coalfields are located along the western margin at Sirpur, Bellampalli, Mandamari, Ramagundam, Chelpur, Pasra, Lingala, Kothagudem, Yellandu and Sattupalli, whereas Cherla and Manuguru are located in the east.

Generalised lithostratigraphic succession of the Godwana sediments includes Talchir, Barakar, Barren Measures, Kamthi (Lower Godwana Group), Maleri, Kota, Gangapur and Chikiala formations (Upper Gondwana Group).

Resting uncomformably over the Precambrian basement, Talchir Formation, 200-370 m thick, includes diamictite, rhythmite and light green sandstone in that sequence. Palaeocurrent direction is towards northwest. Glacial, glacio-lacustrine and glacio-fluvial depositional environments are favoured. The Barakar Formation is about 350 m thick and made of pebble beds and coarse feldspathic sandstone in the lower part and local-bearing finning-upward cyclothems in the upper part. In addition to Glossopteris sp., Gangamopteris, Schizoneura sp. and Vertebraria sp., Grey shale has yielded rich microfloral assemblage dominated by Indotriradiites, Rhizamospora, Faunipollenites and

Scheuringipollenites of Early Permian affinity. A 60-800 m thick, middle to late Permian Barren Measures Formation overlies the Barakar Formation with a normal contact. Light yellow feldspathic sandstone, siltstone and grey shale are prominent lithounits. Glossopteris flora and microflora characterised by Densipollenties and Crescentipollnites are recorded.

The Kamthi Formation, named after Kamptee in Maharashtra, is known to have widespread distribution and covers over two-thirds of the basinal area. However, recent surveys have revealed that about 7000 sq. km. area earlier marked as Kamthi Formation is now found to be as assortment of all the Gondwana stratigraphic units of the area. The Kamthi Formation shows 'overstep' nature over the older Talchir, Barakar and Barren Measures Formations. The thickness of the Kamthi Formation ranges from 50-400 m and contains conglomerate, conglomeratic sandstone and shale of early Triassic age.

The Upper Gondwana Group begins with 250 m thick Maleri Formation comprising reddish brown to greenish grey clay, siltstone, argillaceous sandstone and lime-pellet rock along with middle to late Triassic fauna. The succeeding Jurassic Kota Formation includes large-scale cross-bedded sandstone along with Glossopteris flora in the lower part, fish and dinosaur-bearing limestone in the middle and upper sandstone and clay with Ptilophyllum flora. White sandstone, buff siltstone and light grey clay along with well-diversified Ptilophyllum flora of Neocomian-Aptian age characterise the Gangapur Formation. Lithoassemblage of the Chikiala Formation includes unfossiliferous conglomerate sandstone and ferruginous sandstone of post-aptian (?) age.

The Pranhita-Godavari Gondwana basin consists of a series of NNW-SSE grabens and half-grabens. Three prominent fault patterns are identified viz. (i) NNW-SSE trending syndepositional faults that controlled sedimentation and graben/half-graben development, (ii) NW-SE faults that imparted en echelon fabric to southwestern margin and (iii) the NE-SW transverse faults, oriented parallel to the grain of the Eastern Ghat Mobile Belt transecting the Godavari valley basin into different sub-blocks. It is considered that the progressive subsidence of these blocks in a southeasterly direction paved the way for the deposition of Coastal Gondwana track, a three-armed radial rift system in which the Godavari Valley remained as aborted rift or aulacogen in Early Cretaceous, while drifting about the remaining two arms led to the development of the east coast of India. A 3000 m thick Gondwana lithic fill consisting of multifacies associations is preserved in this NW-SE oriented intracratonic basin set across the Eastern Ghat Complex (EGC). The depositional environments varied from glaciolacustrine to highly sinuous fluvial.

Phased uplift of the EGC during Mesozoic imparted changes to the Permian intercontinental drainage system, which started supplying increased amount of detritus to the basin. Basinal marginal faults were first formed at the beginning of the Triassic. The early Jurassic uplift of the Mailaram high in the north imparted westerly shift to the braided rivers during the

Kota sedimentation. Due to the prominence of Kamavarapukota ridge in the south by early cretaceous, the drainage pattern become centripetal, and short-lived high sinuous rivers debouched into the basin. The silting up of the Chintalapudi sub-basin with the sandstone-claystone sequence of the Gangapur Formation marks the culmination of the Gondwana sedimentation, perhaps coinciding with the break up of India from the Gondwanaland along the east coast. An interesting outcome of a detailed study of the Chintalapudi sub-basin and the Coastal Gondwana basin in the Krishna-Godavari tract is the recognition of the Godavari Triple Junction and a sequence of events, which trace the transformation from continental Gondwana to coastal Gondwana.

Pranhita-Godavari (P-G) basin (Fig. 5.12), occurs in two parallel NW-SE trending sub-basins (the western and the eastern), situated at the junction of Dharwar and Bastar cratons, and developed after amalgamation of the cratons in Palaeoproterozoic. The western sub-basin is called the Pakhal belt or Mallampali belt and the eastern sub-basin as the Albaka belt. The P-G basin extends for a length of ~ 400 km with a width of ~ 100 km, which includes the width of ~ 40 km for Godavari graben of Gondwana sediments occurring in the middle and separating the two sub-basins. The aggregate thickness of the sediments of the P-G basin is estimated as about 6000 m. The basin has three prominent outliers on the granitic basement, viz., the Sharnavala outlier linking up with the Cuddapah basin in the south, the Kadam outlier branching off from the missle of the Pakhal sub-basin as Putnur and Lohara outlier near Chandarpur. There are also three major inliers of the basin within the Gondwana basin viz., Mailaram inlier in the south, Chinnur group if inliers in the middle and Chandarpur inlier in the north. The Pakhal and the Albaka belts may have been once continuous and now separated by the Gondwana basin, or formed as two independent basins with different cratonic provenances, the Pakhal belt resting uncomformably on the Archaean dharwar craton and the Albaka belt lying with a tectonic contact on the Bastat craton. The Pakhal belt extends from Khammam in the south to Adilabad in the north and is the better studied of the two. The Albaka belt extends from Bhadrachalam in the south to Chandarpur in the north. Limestone, dolomite and building stones are important resources of the P-G basin, besides minor marble, barite and iron stone.

W. King did pioneering work in the P-G basin in 1881. In 1949 A.M. Heron, and C. Mahadevan provided summaries, which were followed by periodic overviews of stratigraphy and sedimentation by Basumallick (1967), Venkateswara Rao (1977), Subbaraju et al. (1978), Sreenivasa Rao (1987, 1996, 2001), Srinivasa Rao (1987), Chaudhari and Chanda (1991), Chakraborty et al. (1996), Saha and Ghosh (1998), Chaudhari (2003), Sengupta et al. (2003) and Chaudhari and Deb (2004).

The sediments of Pranhita-Godavari (P-G) basin, called the Godavari Supergroup by Chaudhari (2003), are divided into four major groups, namely Mallampali, Mulug,

Penganga and Sullavai, separated by three regional uncomformities. The correlation of these groups between the Pakhal and Albaka belts is only tentative because of their complex stratigraphic history.