6.0 Conclusions

The present research work provides new data on the age, palaeoecology, palaeobiogeography and palaeoclimatic conditions of Baripada Beds. The major conclusions drawn from the present study are given below:

1. The present research work produced some important fossil remains for the first time from Baripada Beds. The mammalian data include the record of a Late Miocene suid *Tetraconodon intermedius* and Rhinoceritidae sp. indet. Coprolites of crocodilian affinity were also recovered for the first time (Milankumar and Patnaik, 2010). Among the selachians recovered for the first time include: *Carcharhinus perseus, Carcharhinus* aff. *C. priscus, N. eurybathrodon, Rhizoprionodon* sp. indet and *Galeorhinus* sp. indet. The present documentation of batoid *Rhinoptera* aff. *R. sherburni* is also new from Baripada Beds. The family Rhyncobatidae is being reported here for the first time from Indian subcontinent, whereas it is the first report of the families Gymnuridae and Characidae from the East coast of India.

2. Previously, there were several views regarding the age of Baripada Beds ranging from Eocene to Pleistocene. The finding of *Tetraconodon intermedius* has constrained the age of the Baripada Beds between ~10-8 Ma (Sharma and Patnaik, in press).

3. Marine fishes of Baripada Beds constitute selachians (48%), batoids (31%) and teleosts (20%). The selachians are mainly pelagic and batoids are bottom dwellers. Therefore, based on the diverse fossil assemblage from these beds it has been suggested that these were deposited in shallow marine environment having close proximity to the continental environment, most probably representing the shallower part of the inner neretic.

4. Taphonomic study of the fossils indicates primarily a thanatocenosis mode of preservation of majority of the specimens, except for Oyster beds which clearly indicate an in situ formation (biocenosis). A taphonomic analysis of crocodilian coprolites suggest that their deposition took place in a stable low energy shallow marine regime with very little disturbance.

5. The similarity of the Miocene faunas of Baripada Beds with those of Burma, Sri Lanka, Portugal, New Zealand, North America and South Africa is indicative of the vastness of the Tethys Sea, an area stretching from South America to New Zealand. It could also be
because of the fact that there might be a remnant of water body that connected the Atlantic, Indian and Pacific Ocean after the partition of the Tethyan Sea. There may be a possibility of selachian migration through the Tethyan seaway as a means of transport between the larger waterways.

6. A comparison of the habitat of present faunal elements and their extant counterpart indicate the presence of a tropical to subtropical climatic condition. Most of fossil taxa were well adapted to a normal temperature of nearly 20°C isotherm.

7. Further, clay minerals were also useful in reconstructing the past climate. The results from the XRD data of clay minerals suggested that the major clay minerals from Baripada Beds consist of Smectite (49.52-68.3%), Kaolinite (6.65-29.32%) and Illite (10.5-34.3%). The relatively greater abundance of smectite over Illite and Chlorite is due to the combination of weathering in the catchment area and post depositional weathering in association with the function of ambient climate. Smectite are broad indicator of warm hydrolyzing climate with a precipitation ranging between 25-150 cm with the seasonality in the source region. Kaolinite forms when the Mean Annual Precipitation (MAP) is above 50 cm. Thus, the clay mineralogical proxy of the area in correlation with other proxy records from different parts of the world indicates that the area might have received an annual precipitation in the range of 50-150 cms.

8. The complete absence of Clay chlorite from the study area may probably be either due to extreme humid condition under which Chlorite can’t survive or lack of arid and cold climatic conditions. Thus the current climatic proxy of the study area is in conformity with the other regional and global climatic data indicating presence of a warm, humid and seasonally wet-dry climate in the Late Miocene, such as an intensification of Indian monsoon system.

9. Various workers have suggested that an intense tectonic activity that caused the rise of the Alpine-Himalayas, closure of the Tethys sea followed by a global climatic change during the Miocene period might have triggered an increase in the global biodiversity. The present diverse selachian fauna corroborate such an increase in global biodiversity during the Miocene.