

Paleoenvironments in south India: Monsoon records from rainfed reservoirs



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Reconstructions of paleoclimates/paleoenvironments in south India have been largely restricted to montane (Sutra 1997), oceanic and mangrove sites (Prabhu et al, 2004, Kumaran et al, 2005). There is very little information from modern and fossil terrestrial sites on the peninsula except for some studies in central India (Chauhan, 2002). This lack is significant from the viewpoint of a regional scale climate or environmental reconstruction. Hence, the focus of our research on the paleoenvironments of south India at the French Institute of Pondicherry (IFP) is to address these data gaps. The questions underlying our research are:

- (i) Is it possible to generate pollen data from a network of modern sites, covering diverse vegetation types, distributed over distinct climatic regimes in south India?
- (ii) Is it possible to identify suitable terrestrial sites for paleoclimatic reconstruction in this region influenced by the monsoon regimes?

We are currently carrying out two projects to address these questions:

The first project, on modern and fossil pollen studies in the Eastern Ghats, is in partnership with the National Remote Sensing Agency. Remote sensing helps by adding a spatial dimension to the temporal one provided by palynology and geochronology (for which we use radiocarbon and luminescence chronology depending on the site, time interval and sediment record).

The second project, on reconstruction of paleomonsoonal changes using sedimentary records from rainfed irrigation reservoirs (tanks) in south India, is in partnership with Indian Space Research Organization. It aims to ascertain the magnitude and frequency of the southwest and northeast monsoons, to compare recent events with long-term rainfall data in order to generate a calibration curve, to compare sediment records from 3 different monsoon settings (only southwest, only northeast and both southwest and northeast), and to delineate the influence of human activity on the tank systems using remote sensing.



Figure 1: **Left:** View of a rainfed irrigation tank, with an ancient stone sluice, historically dated to the 5th century. **Middle:** Coring in a tank with a ~ 500 yr history at foothills of Eastern Ghats. **Right:** Trenching at another historical tank with a 13th century stone inscription.

In the vast geographic area covered in these projects, remote sensing plays a very important role in shortlisting both modern pollen sampling sites and paleosites, namely irrigation tanks or water bodies. From the first short list, historical and archeological records (stone inscriptions) are used to further narrow down the choice to sites that have a well-defined historical date assigned to them, and finally ground truth is essential for selecting a given site for study. With this approach, essentially field-oriented, using a multiproxy research methodology (Anupama et al, 2002) that is inevitably multidisciplinary and incorporating new technologies like remote sensing and the human dimension through history and archaeology, the first phase of our project has succeeded in identifying suitable sites and generating quantitative data. We are currently analyzing these data for a synthesis aimed at delineating both monsoon behavior and human impacts over the last two millennia in south India.

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