

# Reconstruction of Late Holocene Northeast Monsoon from pollen analysis of sediment sections in a rain-fed irrigation reservoir, Tamil Nadu, India

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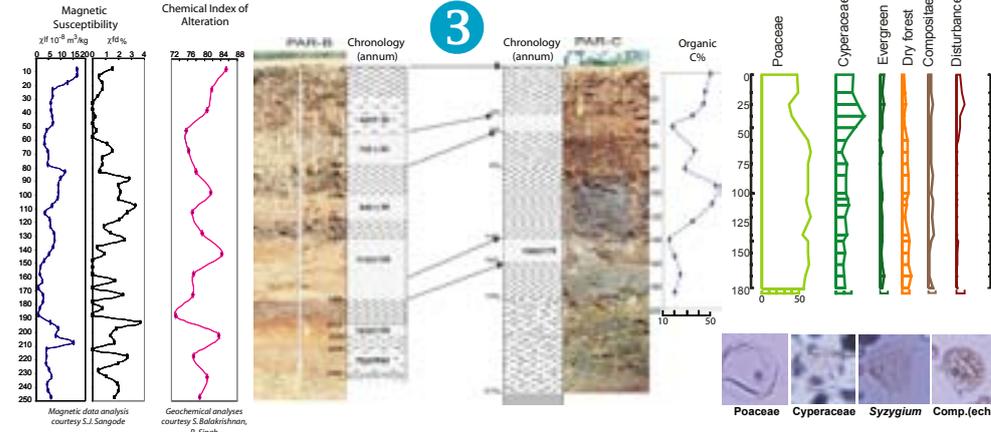
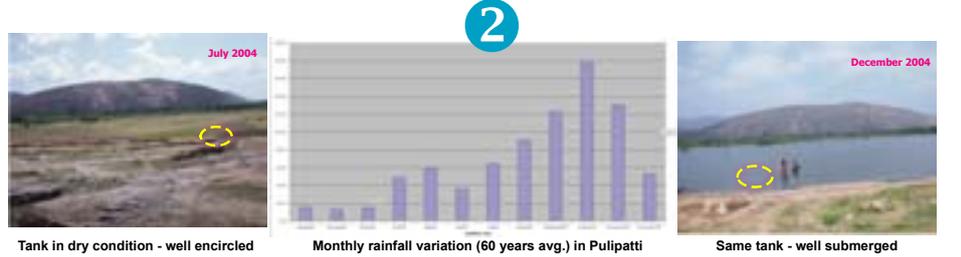


The study site, Parambu Kanmai (PAR) is located in southern Tamil Nadu, India (1) influenced by the Northeast monsoon (2). This rainfed basin is a closed system bounded by the Somagiri and Muri hillocks and the Alagar hills (1); a 13th century inscription found on the natural rocky waste weir mentions that the bund has been raised in order to increase the storage capacity of the reservoir. The present day vegetation in the catchment and basin consists of scrub thickets, dry deciduous and semi evergreen forests in the eastern slopes of the Alagar hills as well as agricultural fields of paddy and millets, plantations and grassy wastelands.

## Model of sediment transport in this closed system

Sediment gets transported from the surrounding hills and upper slopes and gets deposited in the basin. Because of the standing water in the reservoir, sand is generally deposited as soon as it enters the standing water and the finer sediments are transported deep in to the center of the basin. Depending on the weakening and intensification of rainfall, the lake level and spread of water will fluctuate which will determine the type of sediments at a place. Thus generally, finer sediments dominate the center of the tank while flanks will have coarser sediments during weak rainfall periods and finer sediments during strengthened rainfall periods.

Two trenches (PAR B: 250cm, closer to the flanks and PAR C: 275 cm closer to the centre) were excavated (1&3). Sediments were dated using OSL and multiple proxies analyzed in the 2 sections. Results of variations in environmental magnetism and geochemical proxies are presented for PARB and pollen and % organic matter for PARC (3). Sedimentology of the 2 sections validates the hypothesis stated above.



## Main Results

The chronology of the reservoir sediments indicates a continuous deposition from 1600 years ago to present. The sedimentology of the deposits at the two trenches indicates a fluctuating monsoon regime.

The pollen spectrum is representative of the present day vegetation in the hills and hillocks around as well as the vegetation in and around the tank bed.

Cyperaceae, indicative of wet and more stagnant conditions is increasing towards top of the section. Correspondingly evergreen markers, such as *Syzygium* also increase in the topmost horizon. Hence a strengthened monsoon is inferred towards recent period. A corresponding decrease in the dry forest elements such as Melastomataceae/ Combretaceae, *Randia* and *Haldina* further supports this inference

There is a significant increase in the markers of disturbance and human impacts such as *Dodonaea* and *Apiaceae* around 450 years clearly marking the human settlement around the tank. The overall decrease in the forest taxa markers, evergreen and deciduous during the more recent times has a climatic as well as anthropogenic significance.

The total organic carbon shows an increase in the levels 0-40cm and 80-140cm levels. The level 0-40 cm (approx 450a) in conjunction with the pollen results is interpreted as a wet period and 80-140cm level (approx 750 - 1500a) as a stabilized period with more steady rains which helped the insitu organic carbon to increase.

These inferences are supported by results from magnetic studies and chemical data.

Overall the data suggest a drier period at around 1500 years; a drier but with stabilized rains from 1500 to 750 years; comparatively drier phase at around 750 years and a wet phase (increased monsoon) from around 450 years to present.

## Acknowledgements

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