

Temperature rise in the Bharathapuzha river basin, southern India

Global warming and its impact on life on earth have been of great concern among people of various occupations: scientists, economists and decision-makers since the later half of the 19th century. It was after Kyoto meetings in 1997 that studies have been undertaken all over the world on various aspects of climate, to examine and cross-examine the global as well as local climate anomalies. According to IPCC¹, the global mean surface temperature has increased by 0.4–0.8°C since the late 19th century. A recent update by Dash *et al.*² reported an increase in annual surface air temperature of about 1°C over the Indian peninsula.

As part of our environmental analysis of the Bharathapuzha river basin, southern India, we examined the trend of temperature in the basin for a period of 36 years (1969–2005). It shows an overall upward trend in annual and daily

temperatures (Figure 1). The temperature during winter, and the southwest (SW) and northeast (NE) monsoon also showed significant increase. We used gridded daily temperature dataset from the India Meteorological Department. A best linear trend line was added to the pooled data series to demonstrate the inclination. Temporal changes in the seasonal and daily temperature for the four principal seasons, the SW monsoon (June–September), the NE monsoon (October–November), the pre-monsoon months (March–May) and the winter months (December–February) were analysed using Mann–Kendall's rank correlation statistics. To demonstrate the occurrence of temperature trend in the four decade-long timescale, wavelet analysis was also carried out. The mean annual temperature of the basin during the period was 24.30°C, with a standard deviation of 0.3°C.

Further, wavelet analysis showed significant periodicity of 16 years timescale ($R^2 = 1$) in temperature in the basin.

The increase in the annual temperature in the state and particularly in the basin presumably would have an impact on rainfall and local climate. It was found that the annual rainfall in the state in general³ and the basin⁴ in particular shows a decreasing trend. Urban pressure is higher in various parts of the basin.

The land-use land-cover analysis⁵ using LANDSAT imageries for the period 1973–2005 showed a drastic increase in urban area in the basin. The basin has undergone large-scale deforestation due to construction of several dams in the pristine forest areas located in its upper reaches. Notable decrease in the area under natural vegetative cover was also reported from the basin⁵. These land-use changes, largely tending towards built-up area, may have also played a significant role in the local temperature changes.

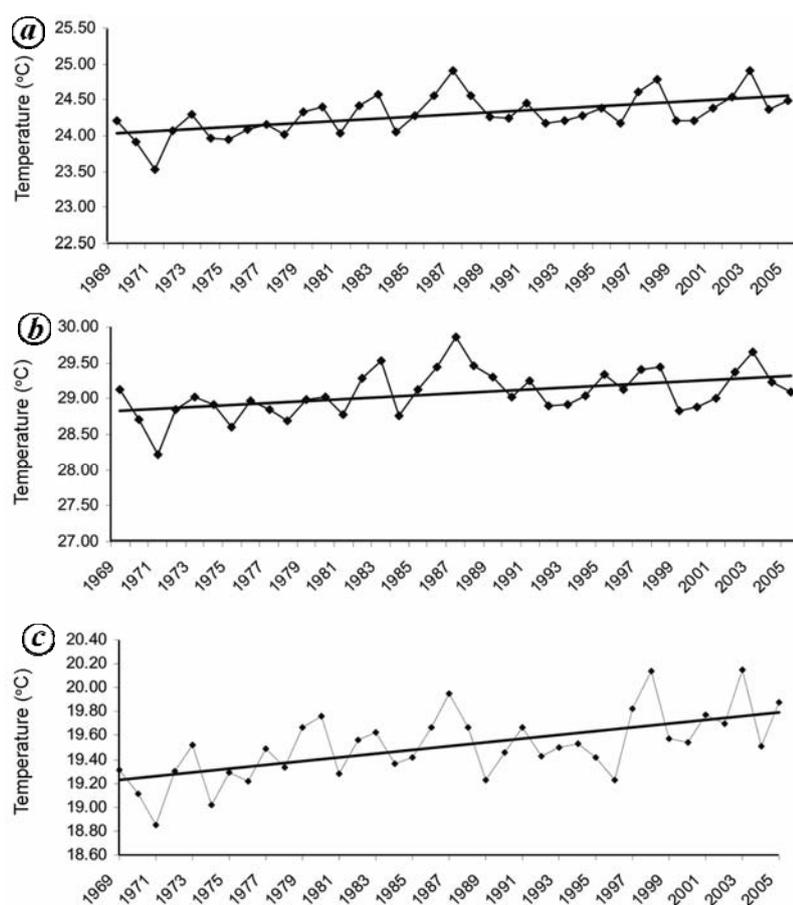


Figure 1. Annual mean (a), maximum (b) and minimum (c) temperature in the Bharathapuzha river basin.

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