



The Western Ghat as the water tower of the South Indian Rivers : a stable isotope investigation on the origin of water and factors affecting the water cycle.

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The long stretch (1600 km) of Ghats on the western side (Western Ghats) of Peninsular India separates relatively wetter west coast from drier eastern coast. The western and eastern sides of the Ghats are having distinct isotopic signatures indicating unequal distribution of the moisture sources. South India is characterized by having moisture source for southwest monsoon from Arabian Sea and northeast monsoon from Bay of Bengal. The wetter side of Peninsular region is covered by combination of evergreen tropical forest and grass lands, termed as Shola Forests which support higher vapor recycling process. Very few isotopic studies have been undertaken in these areas, except few places, mainly along the coast lines. This study presents the stable isotope results on rivers and groundwater of the Western Ghats covering Agumbe (Karnataka) to Ooty (Tamil Nadu) and its west coast river basins as observed for the three year period. The stable isotope results on the surface, subsurface and deep water pools show that the mean $d^{18}O$ value range from -4‰ to -2‰ on the west slope, and from -5‰ to -4‰ on the east slope, with quite no altitude or amount effect up to 2000 m asl. The more depleted values are found only in higher elevation, like the Doddabeta in the Nilgiri (2637m), with $d^{18}O$ close to -9‰ which is exceptional for a tropical area. The hills on the west slope of the Western Ghats as well as in the mountainous Shola forest exhibit strong water vapor recycling as evidenced by high d-excess values. On the contrary on the eastern slope, the drier condition and the numerous impoundments and river damming support strong evaporation process. Thus, the study identifies the profound effect of tropical vegetation and anthropogenic factors on the recharge functioning of river and groundwater pools in Southern India.