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Effect of Forests and Forest Cover Change on Rainfall in the Central Rift Valley of Ethiopia

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Abstract : There are some scientific evidences and a belief by many that forests attract rain and deforestation contributes to a decline of rainfall. However, there is still a lack of concrete scientific evidence on the role of forests in rainfall amount. In this paper, we investigate the forest-rainfall relationships in the environmentally hot spot area of the Central Rift Valley (CRV) of Ethiopia. Specifically, we evaluate long term (1970-2009) rainfall variability and its relationship with historical forest cover and the relationship between existing forest cover and topographical variables and rainfall distribution. The study used 16 long term and 15 short term rainfall stations. The Mann-Kendall test, bi variate and multiple regression models were used. The results show forest and wood land cover continuously declined over the 40 years period (1970-2009), but annual rainfall in the rift valley floor increased by 6.42 mm/year. But, on the escarpment and highlands, annual rainfall decreased by 2.48 mm/year. The increase in annual rainfall in the rift valley floor is partly attributable to the increase in evaporation as a result of increasing temperatures from the 4 existing lakes in the rift valley floor. Though, annual rainfall is decreasing on the escarpment and highlands, there was no significant correlation between this rainfall decrease and forest and wood land decline and also rainfall variability in the region was not explained by forest cover. Hence, the decrease in annual rainfall on the escarpment and highlands is likely related to the global warming of the atmosphere and the surface waters of the Indian Ocean. Spatial variability of number of rainy days from systematically observed two-year's rainfall data (2012-2013) was significantly (R2=-0.63) explained by forest cover (distance from forest). But, forest cover was not a significant variable (R2=-0.40) in explaining annual rainfall amount. Generally, past deforestation and existing forest cover showed very little effect on long term and short term rainfall distribution, but a significant effect on number of rainy days in the CRV of Ethiopia.

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