Energy fluxes as function of topography, land management and landscape features under different latitudes

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Energy fluxes are important components of the land-atmosphere processes governing the rate and amount of water movement between the same. These fluxes are highly spatiotemporal variable dictated by various factors including land cover, available soil moisture/water, meteorological parameters (solar radiation, wind speed, vapor pressure) and also topography. Understanding the energy fluxes as a function of landscape physical properties, topography, land management for different latitudes is essential in estimating the water-energy exchanges between the land surface and atmosphere. This study presents the estimation and evaluation of latent and sensible heat fluxes for three different latitudes as a function of fractional vegetation cover and topography. The study areas are Mara River basin, Kenya/Tanzania, Kissimmee River basin, Florida and Glacial Ridge Environmental restoration site, Minnesota. The role of topography in the redistribution of moisture and hence energy fluxes is presented. Remote sending-based surface energy balance approach was used in estimating energy fluxes from Landsat and MODIS images. Topography information in the form of digital elevation model (DEM) was used to do a spatial correlation between topographic index and latent heat and sensible heat fluxes. The effect of fractional vegetation cover on the energy fluxes were also evaluated and analyzed. The use of energy fluxes in evaluating success in environmental restoration of wetlands in Florida and Minnesota and also in understanding the onset of drought and hence wildlife migration in Kenya/Tanzania is evaluated. The spatial correlation analysis shows that vegetation play a very important role in the partitioning of energy fluxes and the level of this effect was different at different latitudes.

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