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Land Surface Dynamics and Hydrologic Connectivity

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Abstract

Climate change and water shortage are challenges for humanity as population keeps on growing. The need for more farmland, grazing land, settlement, and biomass energy has resulted in decline of greenery, wetlands and water bodies. Surface energy balance and the hydrologic cycle shows that such losses result in adverse change in regional hydrology and climate. The Sahara Desert is expanding southward at a rate of 5 km/yr following land degradation and the loss of vegetation and diminishing the initiation of the rainfall process. Over grazing and deforestation have altered the ecohydrology many parts of the world. Surface energy fractionation of solar energy reaching land surface is presented to show the difference between wet and vegetated surfaces. Wet surfaces as wetlands and water bodies, and vegetation, appropriate more solar energy to latent heat (evapotranspiration) while on dry surfaces more energy is appropriated to sensible heat (surface temperature increase). Evapotranspiration has cooling effect and is part of the hydrologic cycle. Surface characteristics determines the amount of solar energy reflected back to the atmosphere or retained on the surface. There is enough evidence that landscape change has impact on regional energy and water balance resulting in regional climate change, and climate change propagates further landscape change. There are studies to show the urgent need of landscape preservation and restoration to combat decline in regional rainfall. Studies of wetland loss impact on regional hydrology of the Everglades wetlands in south Florida, U.S., is presented. The importance of preserving wetland and increasing greenery in the Nile Basin, with the preservation of the Sudd marshes, water bodies and vegetation coverages is reported.

Keywords: Landscape change, climate change, wetland loss, the Sudd, Nile Basin

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