On the use of satellite data to implement a parsimonious ecohydrological model in the upper Ewaso Ngiro river basin

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Drylands are extensive, covering 30% of the Earth's land surface and 50% of Africa. Projections of the IPCC (Intergovernmental Panel on Climate Change, 2007) indicate that the extent of these regions have high probability to increase with a considerable additional impact on water resources, which should be taken into account by water management plans.

In these water-controlled areas, vegetation plays a key role in the water cycle. Ecohydrological models provide a tool to investigate the relationships between vegetation and water resources. However, studies in Africa often face the problem that many ecohydrological models have quite extensive parametrical requirements, while available data are scarce. Therefore, there is a need for assessments using models whose requirements match data availability.

In that context, parsimonious models, together with available remote sensing information, can be valuable tools for ecohydrological studies. For this reason, we have focused on the use of a parsimonious model based on the amount of photosynthetically active radiation absorbed by green vegetation (APAR) and the Light Use Efficiency index (the efficiency by which that radiation is converted to plant biomass increment) in order to compute the gross primary production (GPP). This model has been calibrated using only remote sensing data (particularly, NDVI data from Modis products) in order to explore potential of satellite information in implementing a simple distributed model. The model has been subsequently validated against stream flow data with the aim to define a tool able to account for landuse characteristics in describing water budget. Results are promising for studies aimed at the description of the consequences of ongoing land use changes on water resources.