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Evapotranspiration Mapping using SEBAL Algorithms to account for agricultural water uses in the Upper Pangani, Tanzania

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Abstract Title: Evapotranspiration Mapping using SEBAL Algorithms to account for agricultural water uses in the Upper Pangani, Tanzania

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Abstract: To make informed decisions, river basin managers requires information on demands and actual usage from different sectors in the basin. Such water use information has to be adequate in terms of quantities used per sector, where and when. However, because of high costs of maintaining equipment for monitoring use, it is very difficult to obtain this information in developing arid and semi-arid areas of Sub-Saharan Africa. The use of proxy method such as calculation of evapotranspiration is proposed as a cheaper means for such data acquisition. Water consumption through crop evapotranspiration (ET) is a major component of water withdrawal, accounting for about 90% of the annual rainfall in arid and semi-arid areas, hence its estimation is crucial. In irrigated areas, ET is also a measure for the consumptive use of blue water (abstracted from rivers, reservoirs or groundwater) by agriculture. Spatial and temporal information of ET can thus help in the quantification of water use. The objective of this study is to test the utility of the new Surface Energy Balance Algorithm for Land (SEBAL 3.3) programmed in Python in estimating ET in the upper Pangani basin, Tanzania. SEBAL is a satellite based image processing model that estimates ET as a residual of a surface energy balance. The obtained results are compared against maps of the water abstraction schemes. From the results, we are able to identify the areas and land uses with higher evaporative losses. Such information is invaluable for the management of closing basin such as the Pangani.

Keywords: water accounting; surface energy balance and upper Pangani basin