Groundwater Recharge In Africa: Identifying Critical Thresholds

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The recent publication of maps of groundwater storage and expected borehole yields for Africa has intensified interest in the use of groundwater for improving health, reducing poverty and increasing food security. However this study did not consider the role of groundwater recharge, especially the distinction between renewable modern groundwater which forms the basis of sustainable development, and palaeo-groundwater, derived from wetter past climates, which is non-renewable. Groundwater recharge remains one of the most difficult parameters to measure in the assessment of water resources yet is critical for reliable projections of sustainable resource development. In this study we provide a review of more than 200 individual recharge studies for Africa. The studies have been reviewed, geo-located and where possible the data extracted, to identify relationships between rainfall and recharge, and in particular examine evidence for thresholds controlling recharge. The review has highlighted the importance of using a range of recharge methods appropriate to the particular environment of study, and of recording recharge as decadal, rather than annual averages. Although broad relationships exist between average rainfall and recharge, this relationship becomes non-linear when long-term average annual rainfall is less than 1000 mm. In these areas, there is evidence that the intensity of rainfall events is more important than average rainfall or soil moisture. Given the forecasts of future rainfall intensification with climate change, deeper understanding of the role of episodic high intensity rainfall events in governing recharge will become increasingly important.