Research explores hidden benefits of intensive rainfall in East Africa

November 12 2012, by Maggie Clune

(Phys.org)—New research by Martin Todd, Professor in Climate Change at the University of Sussex, Dr Richard Taylor (University College London) and colleagues from the Tanzanian government and British Geological Survey in semi-arid Tanzania has found that very heavy rainfall that accompanies the El Niño phenomenon is vital for recharging underground aquifers in the region.

In central Tanzania, there is near total dependence upon groundwater resources for public water supplies.

The research, published today (Sunday 11 November 2012) in the journal *Nature Climate Change* shows that groundwater resources are replenished, on average, just twice each decade. Although pumping of groundwater from wells depletes the aquifer outside of these events, replenishment from periods of extreme rainfall is so far sufficient to sustain intensive groundwater use.

The new findings, supported by the Department for International Development (DFID), build on earlier work by members of the team published this year that revealed that freshwater stored in subsurface aquifers greatly exceeds that which is found at the surface in lakes and rivers.

However, a key uncertainty was replenishment rates. These new findings have begun to provide an answer.

Professor Todd says: "Groundwater resources are essential to livelihoods all over the world. However, water resource and climate change studies often overlook groundwater because representing groundwater processes in models is challenging, not least because observed data are generally poor.

"Our analysis provided some insights into the timescales of groundwater recharge and its relationship to climate variability and potentially to longer term climate change. Further work is necessary to provide more realistic projections of the future."

Dr Taylor says: "Rainfall and river flow in east and southern Africa are among the most variable on the planet. Reliable, safe sources of freshwater found underground are consequently of critical importance. Variability in rainfall is projected to increase in the future – threatening food production and increasing the risk of flooding, yet the long-term historical record from Tanzania that we've compiled indicates that this more variable rainfall may favour the replenishment of groundwater resources."

Further investigations by the team will be needed to define how and where heavier rains replenish groundwater, but communities and their farmers may be able to adapt to climate variability and change by exploiting these reservoirs and promoting rainwater harvesting schemes that enhance the capture and storage of heavy rainfall.

More information: Taylor, R., Todd, M. et al., Dependence of groundwater recharge on intense seasonal rainfall: evidence from East Africa. *Nature Climate Change*. November 2012.

Provided by University of Sussex