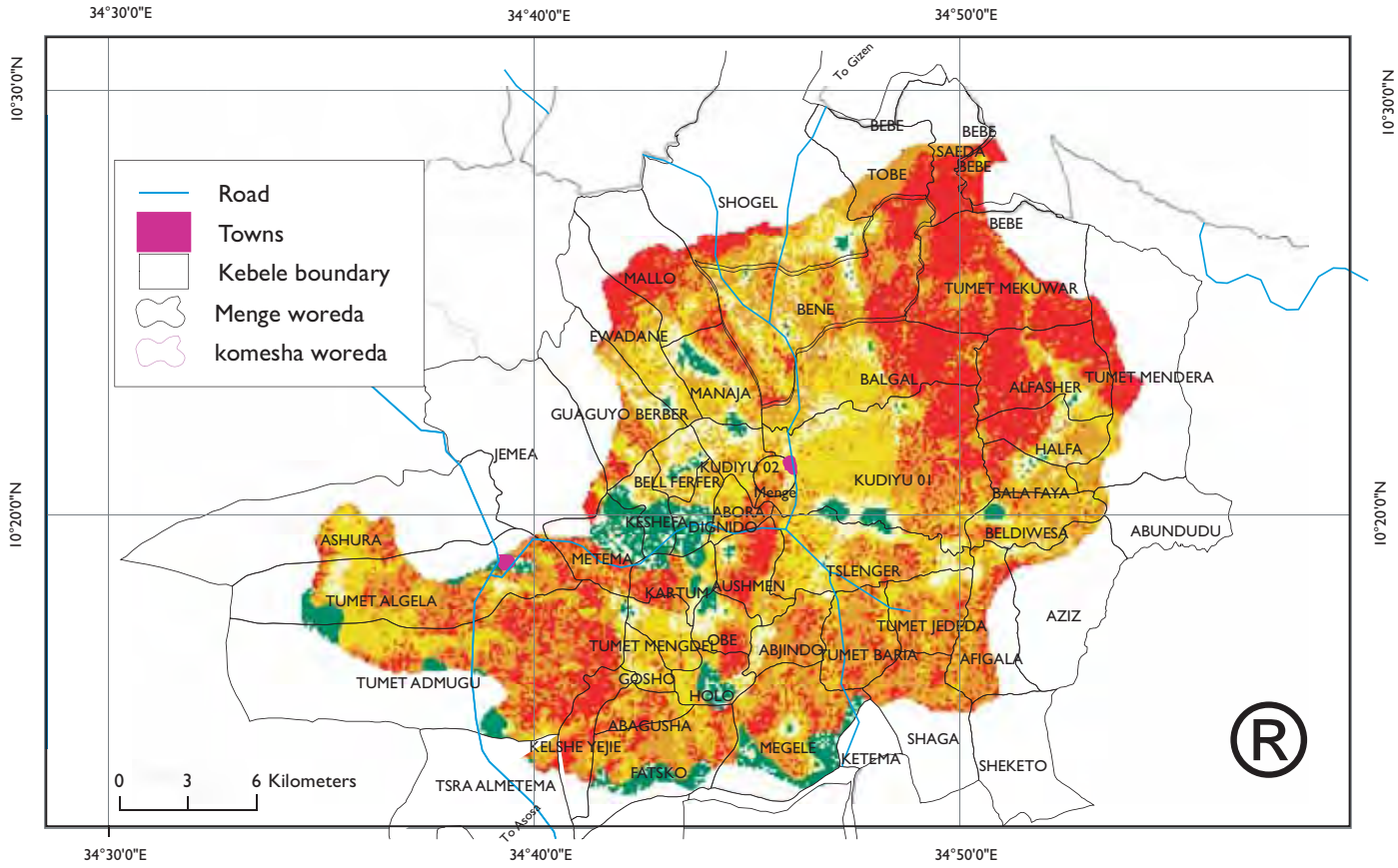
Groundwater potential of Upper Tumet catchment: A Guide for Groundwater Specialists

This is one of three fliers produced to illustrate how, based on the same information, different types of maps can target different types of users. We have three different users in mind: map developers such as GIS specialists, deep users (this present map), such as hydro-geologists who have a good technical understanding of the input data and shallow users such as planners who do not necessarily understand input data but need to use groundwater information for planning purposes.

This map shows the groundwater potential of Upper Tumet catchment. The map can help the planning and implementation of new water supplies, by indicating where groundwater resources are likely to be more plentiful, easier to develop, and sustainable throughout the year; The map also shows the kebele and woreda boundaries, the towns, and all-weather roads, so that information on population and water demand, and village access, can be combined with groundwater availability.



Groundwater potential	Explanation
Excellent	Moderate to high groundwater storage; groundwater easily found and can be successfully exploited for village supplies using hand-dug wells. Larger supplies likely to be possible from machine drilled or deep wells.
Good	Moderate groundwater storage; groundwater found relatively easily and in most cases can be successfully exploited for village supplies through hand-dug wells. Sometimes, machine-drilled shallow wells may be needed even for village supplies.
Moderate	Groundwater occurs only in certain areas, such as where weathering is particularly deep or where the rock is particularly fractured near a fault. Low to moderate groundwater storage; hand dug wells likely to dry up in longer drought periods and sometimes even in normal dry seasons, but machine-drilled wells can usually provide sustainable village supplies if carefully sited, e.g. using geophysical surveying.
Poor	Groundwater difficult to find; low and seasonal groundwater storage; careful siting needed to develop even hand-dug wells, and machine-drilled wells are unlikely to more successful. Wells typically dry up shortly after the rainy season ends.
Very poor	Groundwater difficult to find; very low and seasonal groundwater storage; even carefully sited hand-dug wells only provide small amounts of water during the rainy season, and dry up at the end of the rains. Machine-drilled wells are unlikely to be more successful.

Groundwater Potential

- Excellent groundwatwer potential
- Good groundwater potential
- Moderate groundwater potential
- Poor groundwater potential
- Very poor groundwater potential

This flier was produced by **Gezahegn Lemacha** based on his MSc work in Upper Tumet catchment, Menge and Komosha woredas, Benishangul-Gumuz region, Ethiopia for WaterAid Ethiopia and RIPPLE.

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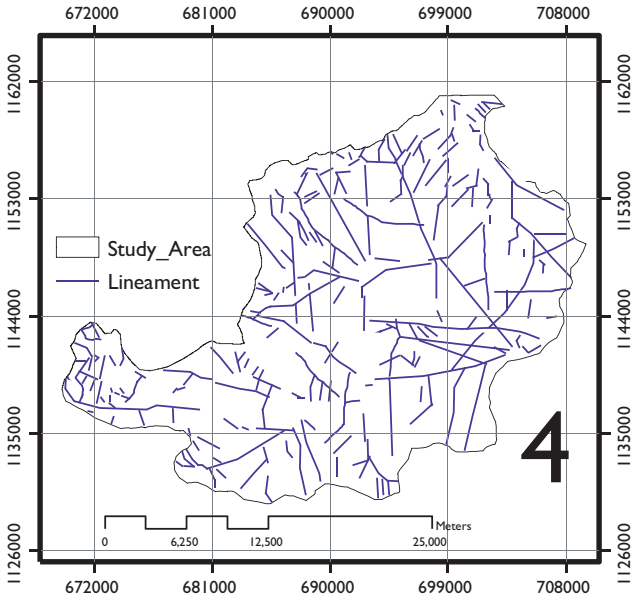
Main controls on groundwater potential

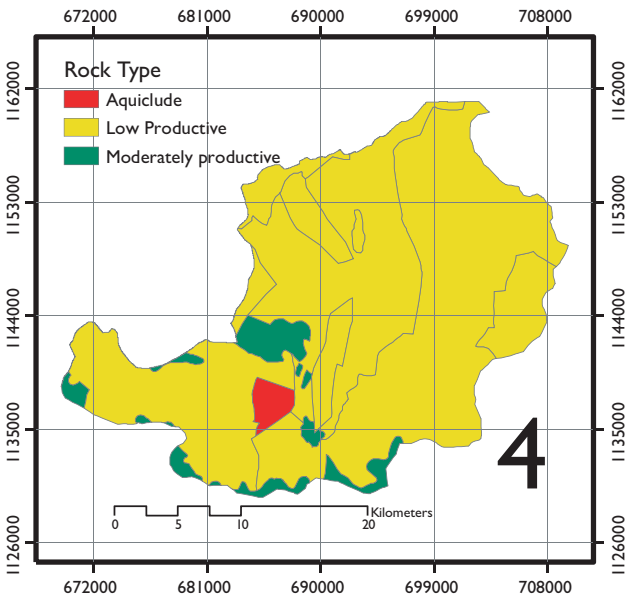
The groundwater potential map is based on a combination of eight different hydro-geological factors, but three of these factors are the most important at controlling groundwater potential: lithology, structural lineaments and the depth of weathering. These three input layers are shown and explained below.

Lineament Map



Lineaments are structural lines such as faults, which in many circumstances have created or increased secondary porosity and permeability by fracturing the rocks. Lineaments can therefore contain groundwater, even in rocks with low porosity and permeability.

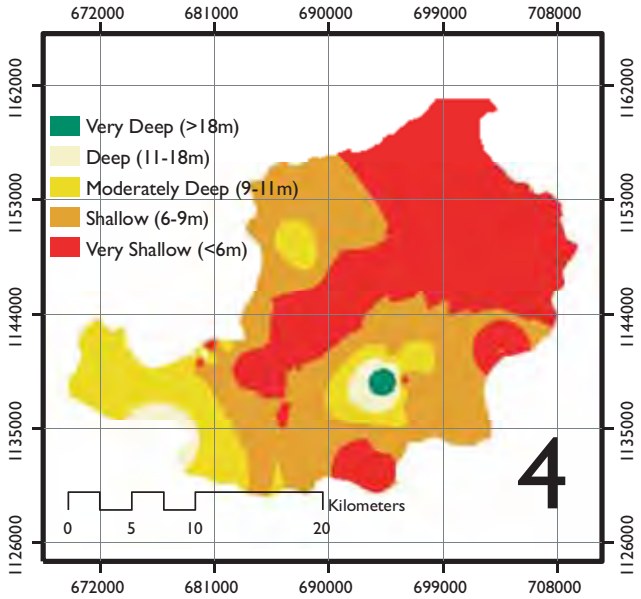
Lithologic Map



Groundwater is found in rock pores and/or fractures. The rock lithology (type of rock) is the main control on the primary porosity and permeability. Higher porosity contributes to higher groundwater storage, and higher permeability contributes to higher groundwater yields. In this catchment there are two main lithology types – crystalline.

Precambrian basement rocks (mainly schists and metagranitic rocks), which have secondary fracture permeability, form low productivity aquifers aor occasionally aquicludes (contains essentially no groundwater); and tertiary volcanics, which have primary permeability from vertical cooling joints, and which form moderately productive aquifers.

Depth of Weathering Map



In hard rocks with little primary porosity and permeability, groundwater can be found in weathered zoones which form in the uppermost parts of the rock, near the ground surface. The thicker the weathered zone is, the more groundwater can be stored and the better potential is for larger and year-round sustainable yields.

RiPPLE is a DFID-funded Research Programme Consortium. You can find out more about RiPPLE's work at:

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