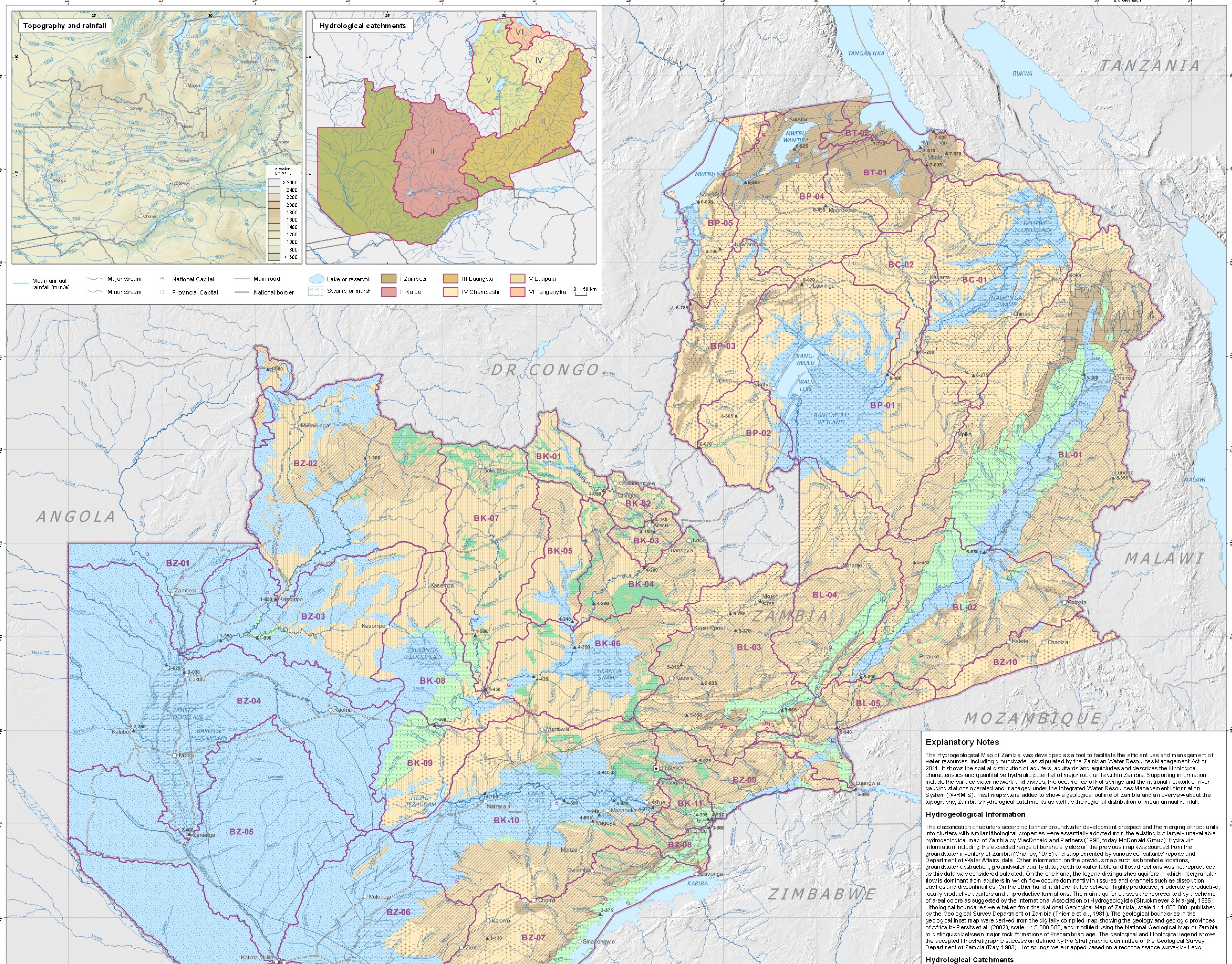
HYDROGEOLOGICAL MAP OF ZAMBIA
1 : 1 500 000

Edited by the Water Resources Management Authority (WARMA) Lusaka, Republic of Zambia and the Federal Institute of Geosciences and Natural Resources (BGR), Hanover, Federal Rebublic of Germany



Groundwater Development Prospect

Aquifers in which intergranular flow is significant

B — Moderately productive, intergranular, predominately unconsolidated aquifer (0,1 - 15 l/s) (mainly alluvial sands and gravels & Kalahari Group)

Aquifers in which flow is dominantly in fissures, channels or discontinuities

C — Highly productive aquifer (0,1 - 70 l/s) (mainly Upper Roan dolomite and Kundelungu limestone)

D — Moderately productive, fissured aquifer (0,1 - 15 l/s) (mainly Karoo sandstones)

E — Locally productive, fissured aquifer (0,1 - 10 l/s) (mainly undifferentiated Kundelungu, Lower Roan quartzites, Muva sediment granites)

Aquifers of limited potential or regions without significant groundwater

E - F — Stratum with intermediate characteristics (0 - 2 l/s) (mainly low yielding formations of Karoo basalts, Mine series shales and basement gneiss)

F — Unproductive formations (mainly Karoo shales, metamorphic and igneous rocks)

Lithology

Quaternary

Alluvial sandstones & gravels, clays near lakes — *Alluvium*

Tertiary to Quaternary

Fine sands, sandstones with some clays — *Kalahari Group*

Jurassic

Basalts & interbedded sandstone — *Karoo basalts (Upper Karoo Group, Karoo Supergroup)*

Upper Carboniferous to Jurassic

Sandstones, mudstones & siltstones — *Karoo sandstones (Upper Karoo Group, Karoo Supergroup)*

Mudstones, siltstones, sandstones and conglomerates — *Karoo shales (Lower Karoo Group, Karoo Supergroup)*

Neoproterozoic and lower Palaeozoic

Carbonate rocks with some shales — *Kundelungu limestone (Kundelungu Group, Katanga Supergroup)*

Shales, siltstones, sandstones — *Undifferentiated Kundelungu (Kundelungu Group, Katanga Supergroup)*

Dolomites, argillites — *Upper Roan dolomites (Mine series Group)*

Quartzites, argillites, dolomites & conglomerates — *Lower Roan quartzites (Katanga Supergroup)*

Quartzites, shales & conglomerates — *Mine series shales (Katanga Supergroup)*

Mesoproterozoic

Shales, mudstones, sandstones & quartzites — *Muva sediments (Muva Supergroup)*

Older Precambrian

Granitic gneiss, migmatites, schists — *Basement gneiss (Basement Complex)*

Various ages, mainly older Precambrian

Granite

Basic igneous & meta-igneous, amphibolites — *Other igneous rocks*

Metasediments & metavolcanics — *Metamorphic rocks (Basement Complex)*

Geological fault

Hydrology

IWRMIS gauging station

Hot spring

Basin block

Swamp or marsh

Lake

Reservoir

Minor river

Major river

Braided stream

Topography

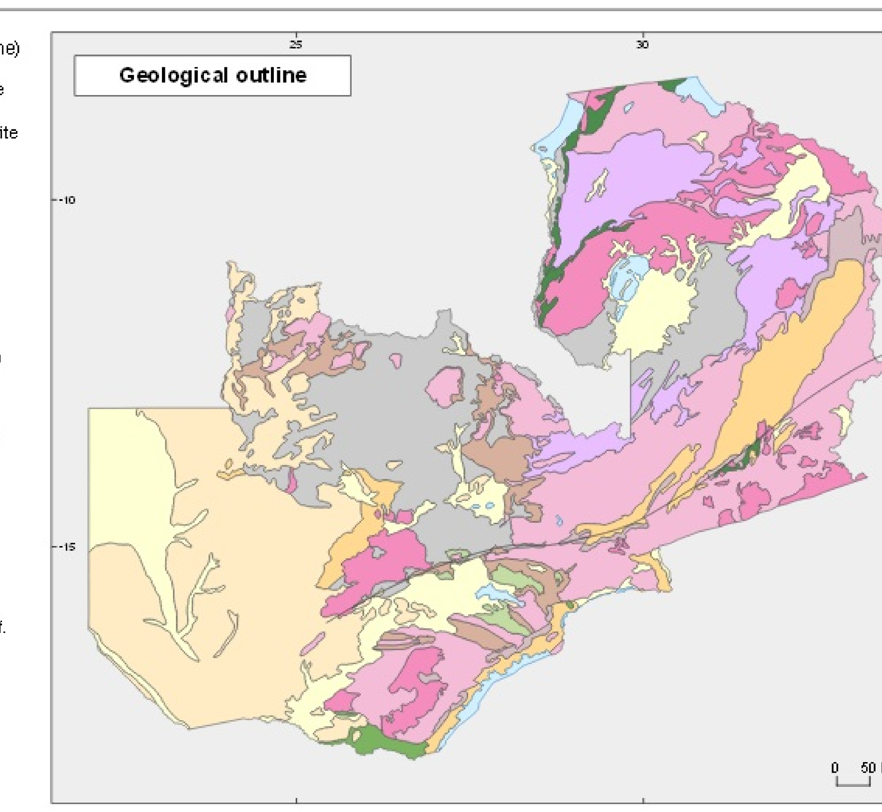
National capital

Provincial capital

District town

National border

Main road



Explanatory Notes

The Hydrogeological Map of Zambia was developed as a tool to facilitate the efficient use and management of water resources, including groundwater, as stipulated by the Zambian Water Resources Management Act of 2011. It shows the spatial distribution of aquifers, aquitards and aquicludes and describes the lithological characteristics and quantitative hydraulic potential of major rock units within Zambia. Supporting information include the surface water network and divides, the occurrence of hot springs and the national network of river gauging stations operated and managed under the Integrated Water Resources Management Information System (IWRMIS). Inset maps were added to show a geological outline of Zambia and an overview about the topography, Zambia's hydrological catchments as well as the regional distribution of mean annual rainfall.

Hydrogeological Information

The classification of aquifers according to their groundwater development prospect and the merging of rock units into clusters with similar lithological properties were essentially adopted from the existing but largely unavailable hydrogeological map of Zambia by MacDonald and Partners (1990, today McDonald Group). Hydraulic information including the expected range of borehole yields on the previous map was sourced from the groundwater inventory of Zambia (Chenov, 1978) and supplemented by various consultants' reports and Department of Water Affairs' data. Other information on the previous map such as borehole locations, groundwater abstraction, groundwater quality data, depth to water table and flow directions was not reproduced as this data was considered outdated. On the one hand, the legend distinguishes aquifers in which intergranular flow is dominant from aquifers in which flow occurs dominantly in fissures and channels such as dissolution cavities and discontinuities. On the other hand, it differentiates between highly productive, moderately productive, locally productive aquifers and unproductive formations. The main aquifer classes are represented by a scheme of areal colors as suggested by the International Association of Hydrogeologists (Struckmeyer & Margat, 1995). Lithological boundaries were taken from the National Geological Map of Zambia, scale 1 : 1 000 000, published by the Geological Survey Department of Zambia (Thieme et al., 1981). The geological boundaries in the geological inset map were derived from the digitally compiled map showing the geology and geologic provinces of Africa by Persits et al. (2002), scale 1 : 5 000 000, and modified using the National Geological Map of Zambia to distinguish between major rock formations of Precambrian age. The geological and lithological legend shows the accepted lithostratigraphic succession defined by the Stratigraphic Committee of the Geological Survey Department of Zambia (Ray, 1983). Hot springs were mapped based on a reconnaissance survey by Legg

Hydrological Catchments

The inset map shows the 6 major river catchments of Zambia which have been approved by the Ministry of Lands, Natural Resources and Environmental Protection of Zambia in 2016. These river catchments form the basis of the major administrative subdivisions of water resources management in Zambia. The delineated river sub-catchments, referred to as catchment blocks, are in accordance with the National Water Resources Master Plan of the Republic of Zambia (Yachiyo Engineering Co Ltd, 1995). Catchment boundaries were calculated using Arc Hydro Tools Version 2.0 based on the SRTM elevation data.

Topography and Rainfall

The underlying Digital Elevation Model is the void-filled Shuttle Radar Topography Mission (SRTM) 3 arc-seconds (approximately 90 meters) raster dataset courtesy of the U.S. Geological Survey. Isohyets were constructed based on a 30 year (1983 – 2012), temporally consistent rainfall data set for Africa (Version 2) known as TARCAT (TAMSAT Group, University of Reading [Tropical Applications of Meteorology using satellite and ground-based observations], African Rainfall Climatology and Time Series, Maidment et al., 2014; Tarnavsky et al., 2014). The rainfall data has been provided by the Maproom of the Zambian Meteorological Department. The original raster data were further processed in order to generate a smoothed set of isohyets.

Topographical and hydrological Geodata

All topographic base map features such as administrative boundaries, cities, rivers and lakes were compiled based on the topographic map series 1 : 250 000 and generalized for the final map scale of 1 : 1 500 000. Throughout the Zambian territory, only rivers whose total length exceeds 30 km are displayed. The shorelines of lakes, reservoirs and wetland areas as well as the river courses were updated based on the web map service of Google Map Satellite Images available at the time of map production. OpenStreetMap (OSM) data were used to update the administrative boundaries where other topographic data was not available. The delimitation of the Zambian national border shown on this map is not authoritative. The OSM dataset for Africa was used to compile the main road network within Zambia.

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DISCLAIMER: All boundaries and geographical names shown on this map do not imply any official endorsement or

Geodetic Coordinate Reference System:
World Geodetic System 1984
Datum: WGS 84, Angular Units: Degree

1 : 1 500 000

50 0 50 100 150 200 km