

# **Groundwater Potentials Assessment of Langtang Area Plateau State, North Central Nigeria.**

**By**

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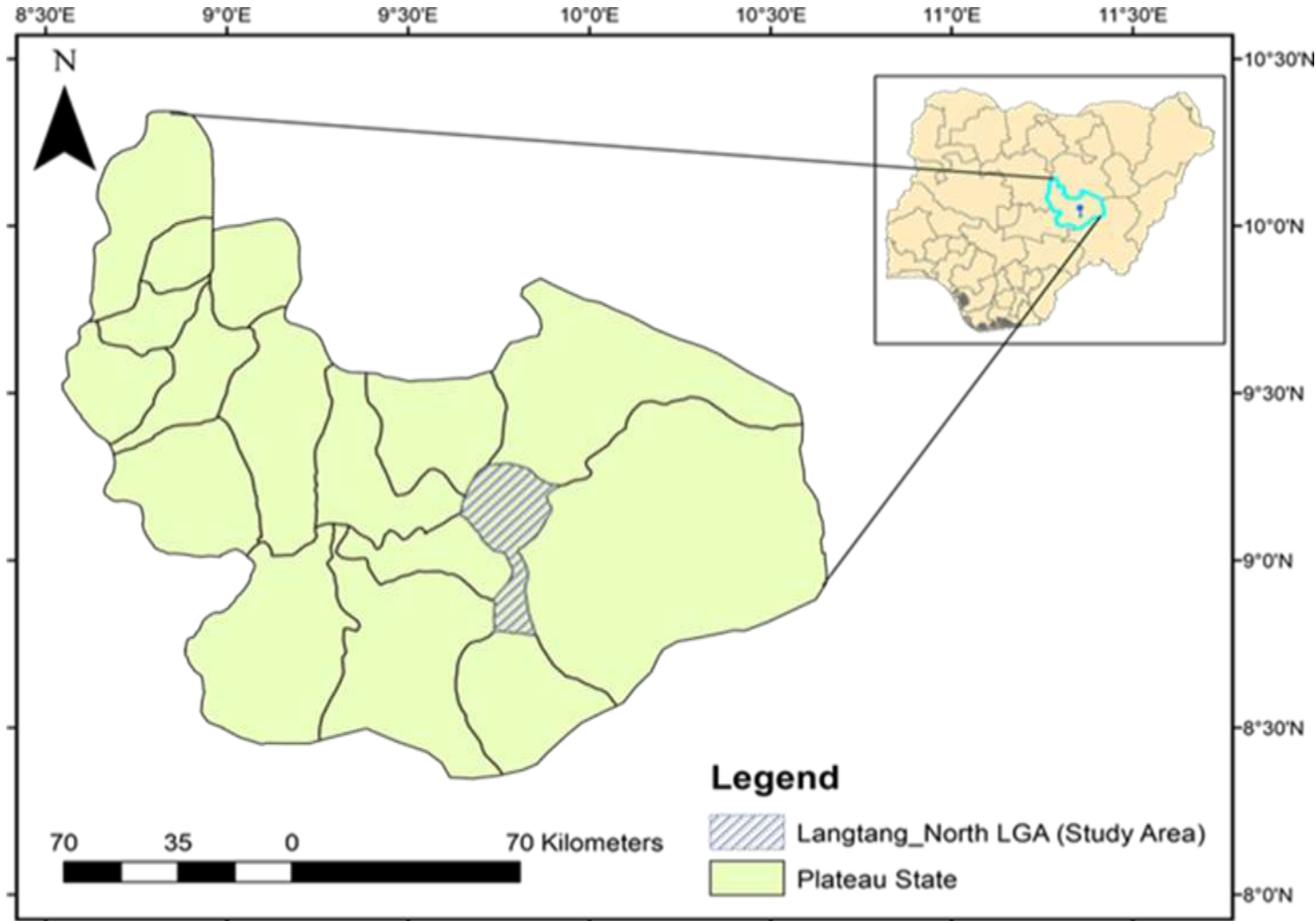
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# INTRODUCTION

Water – Rock interaction is among the leading mechanisms responsible for groundwater chemistry (better known as hydro-geochemistry).

The subsurface geology and materials making up the aquifer are important parameters in determining the characteristics of an aquifer and the value of an aquifer as a spring of water depends largely on two inherent potentials: the capacity to retain (**Storativity**) and transmit water (**Transmissibility**).

# INTRODUCTION cont'd



# RESEARCH PROBLEM

- Statistics from inventory of water points in Langtang area shows that **most wells** and boreholes **dry up completely** or provide little water for domestic uses **during the peak of dry season**.
- Ground water development in basement complex terrain therefore needs **proper knowledge** and understanding of the aquifer characteristics to enable the Hydrogeologists with the right tools.
- There is visible evidence of **dental fluorosis** in the inhabitants of the study area, hence the need to carry out water quality assessment to **define the sources of contamination of the groundwater**.

# MATERIALS AND METHODS

- Mapping

- GPS Device
- Topographic base map
- Lineament map of the study area

- Sampling Kits

- Water sample bottles
- Sample bags
- pipet
- conc. HCl

- Record

- Field notebooks,
- Water-proof marker pens

- Tools & Instruments

- Geological Hammer
- pH meter
- Electrical conductivity and TDS meter,
- Thermometer, measuring tape

# MATERIALS AND METHODS cont'd

- Pumping Test data for **25 boreholes** was collated and analysed for hydraulic properties such as; **Yield (Q)**, **Transmissivity (T)**, **Hydraulic Conductivity (K)**, **Storativity (S)**, Specific capacity ( $S_c$ ), and Static Water Levels (SWL).
- The **Cooper-Jacob's** non-uniform straight line equation was adopted

$$T = \left[ \frac{(2.30Q)}{(4\pi\Delta s)} \right] \times \left[ \log_{10} \left( \frac{t_2}{t_1} \right) \right]$$

$$S = 2.25 \frac{Tt_0}{r^2}$$

$$K = \frac{T}{B}$$

\*\*T= Transmissivity; B= Aquifer thickness

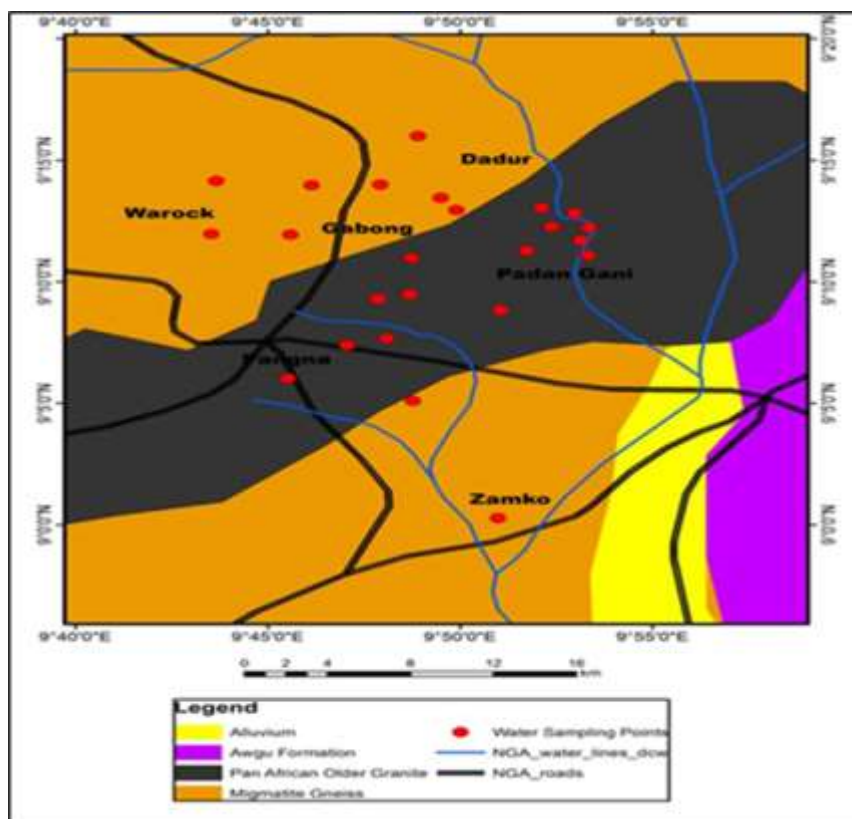
# RESULTS AND DISCUSSIONS

Aquifer Hydraulic Parameter	Value
Yield ( $\text{m}^3/\text{d}$ )	50 – 555
Transmissivity ( $\text{m}^2/\text{d}$ )	0.89 – 14.5
Storagivity, S	0.02 – 4.94
Specific Capacity, $S_c$ ( $\text{m}^2/\text{d}$ )	4.86 – 57.14
Hydraulic Conductivity, K ( $\text{m}/\text{d}$ )	0.3 – 2.43
Static Water Level, SWL (m)	2 – 15.42

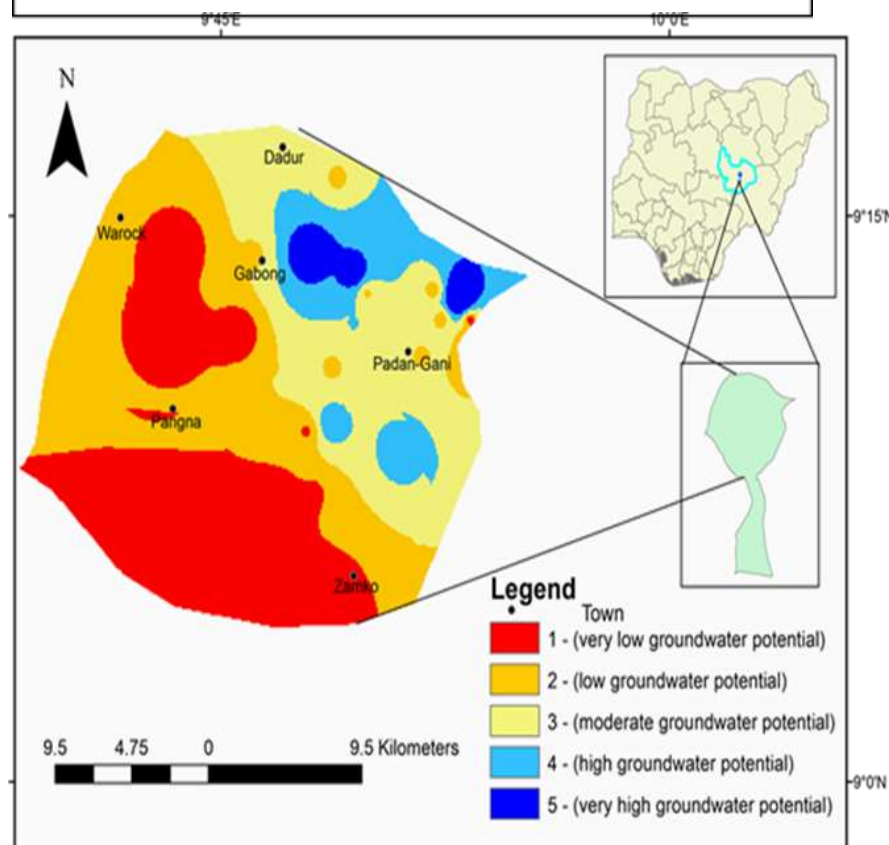


# RESULTS AND DISCUSSIONS cont'd

## GEOLOGICAL MAP

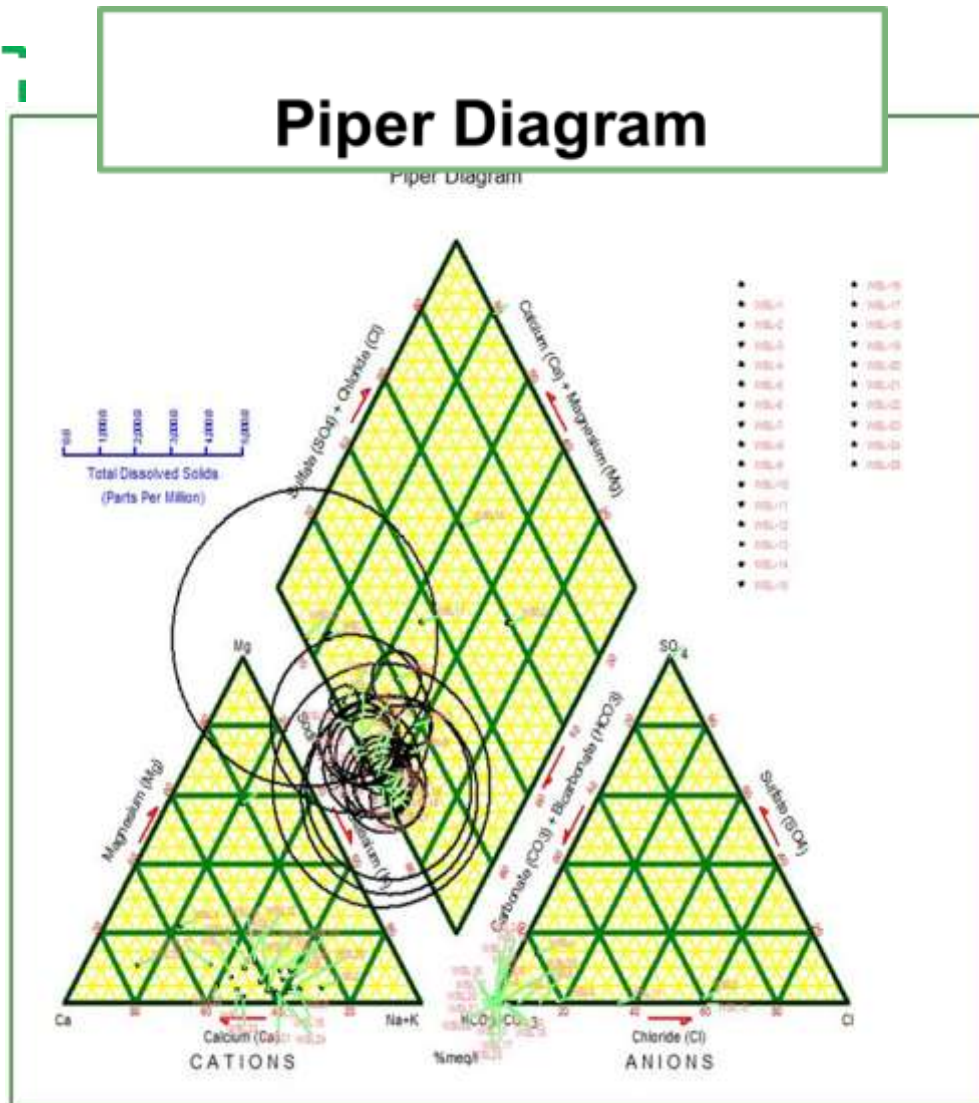
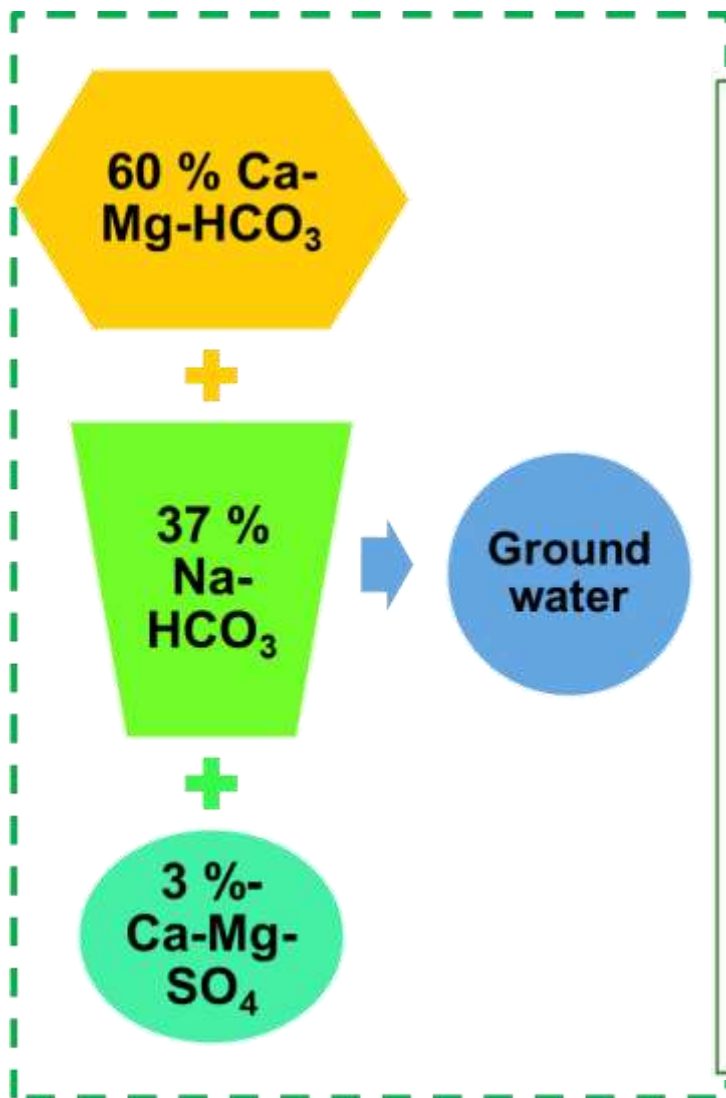


## GROUNDWATER POTENTIAL MAP





# RESULTS AND DISCUSSIONS cont'd



## CONCLUSION

- The determined hydraulic characteristics are useful tools for groundwater prospecting in the study area.
- The groundwater potential is classified into five zones: very low, low, moderate, high and very high potential zones, while the yield of the aquifers falls within low to moderate class.
- The water quality results show high levels of fluoride above the WHO limits of (0.5-1.5 mg/L)

## RECOMMENDATION

- **Fluoride concentrations of 3.47 mg/l** in some parts of the study area is a source of public health concern as the value is above the **WHO upper limits of 1.5 mg/l**. Hence it is necessary to treat both surface and groundwater to reduce the Fluoride concentrations to the acceptable limits (0.5 – 1.5) before use.
- Detailed hydrogeological methods should be applied in ground water prospecting to identify the few moderate yield aquifers for abstraction of water for sustainable rural supply.

*Thank You*