RIGSS: Field Summary
Maiduguri and Borno State

We gratefully acknowledge the support of:

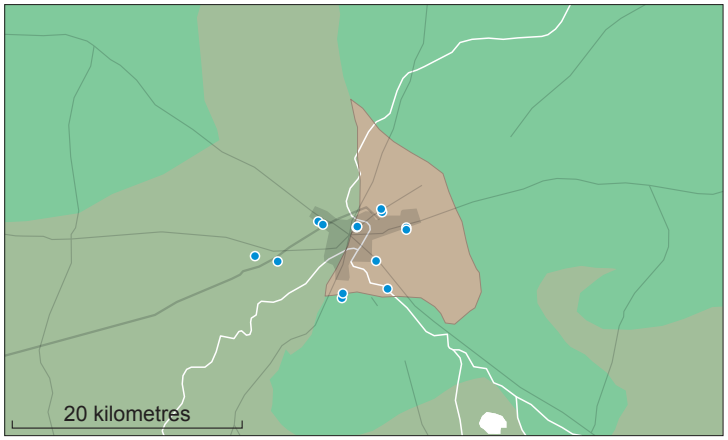
- RUWASA Maiduguri, Borno State
- Manual drillers association
- Unimaid Radio and Peace FM

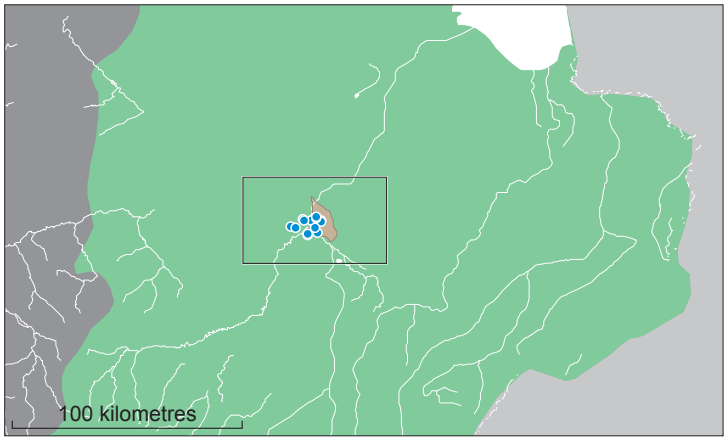
INTRODUCTION

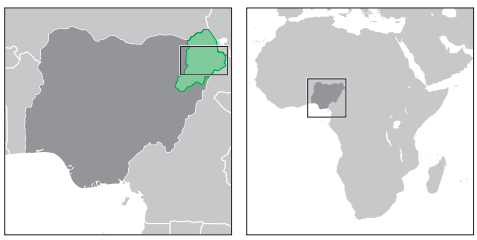
Water security is one of the most pressing risks facing the world. In rapidly growing urban areas, evidence suggests that increasing numbers of households are choosing to install private boreholes to meet their domestic water needs. The RIGSS project used an innovative interdisciplinary approach to understand the environmental, social, behavioural and institutional reasons for this trend, and its potential implications for individual and community resilience.

STUDY AREA

The study was carried out in the city of Maiduguri, which sits across two Local Government Areas (LGA): Maiduguri and neighbouring Konduga, in Borno State, north eastern Nigeria.







Borno State, Nigeria | Nigeria

METHODOLOGY

The Maiduguri field study involved two main activities:

- **Detailed water point surveys** of 14 groundwater sources, including vulnerability and water quality assessments, plus additional water quality sampling at a further 14 sources
- **Qualitative interviews** and focus groups to capture the perceptions of community and household water users

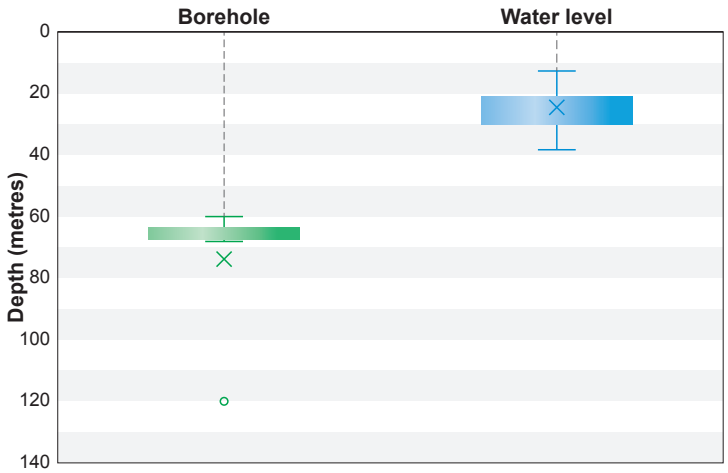
The following **groundwater sources** were examined in Maiduguri:

- 21 motorised boreholes, nine of which were sampled after storage in a tank
- 7 hand pump boreholes

At the 14 sources subjected to a detailed water point survey, ten were privately owned (all motorized boreholes) and four were developed by NGOs for IDP camps (2 motorised boreholes and 2 hand pump boreholes).

The following data were collected:

- Specific electric conductance (SEC), nitrate and E. Coli concentrations (at all 28 sources)
- Vulnerability scores (at 14 sources: 12 motorised and 2 hand pump boreholes)
- Groundwater levels (at 6 sources: 5 motorised and 1 hand pump borehole)
- Source depths (at 6 sources: 4 motorised and 2 hand pump boreholes)



Known or measured source and water level depth

Source depth and/or water level data was only known or measured for nine of the water points surveyed. The majority of sources were 60–70m deep, therefore exploiting the middle (artesian) sand aquifer of the Upper Zone of the Chad Formation.

PRIMARY SOURCES OF WATER

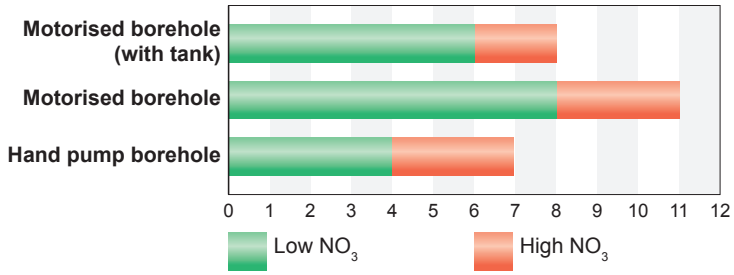
Across the Maiduguri study area, water for domestic use is primarily sourced from **private boreholes**. The majority of privately drilled boreholes also supply water to neighbouring households, either as a piped supply to individual houses or through a community tap. **Bottled/sachet water** is sometimes used for drinking, and **public (piped) water supply** is available in some parts of the city. Boreholes are also the primary source of water for groups in the IDP camps

It is estimated that the public water supply only extends to 30–40% of the population of Maiduguri, resulting in more than 2000 private boreholes being drilled into the upper aquifer. This situation is exacerbated by a significant influx of people into the region due to the insurgency. It is estimated that each IDP camp has around 10-15 boreholes, all exploiting the upper aquifer.

WATER QUALITY

Specific Electrical Conductance (SEC) gives a measure of the dissolved material in groundwater and can be elevated by natural or anthropogenic processes. **Nitrate** in groundwater is often derived from municipal or domestic waste. **E. Coli** is a coliform bacteria indicative of faecal contamination in groundwater.

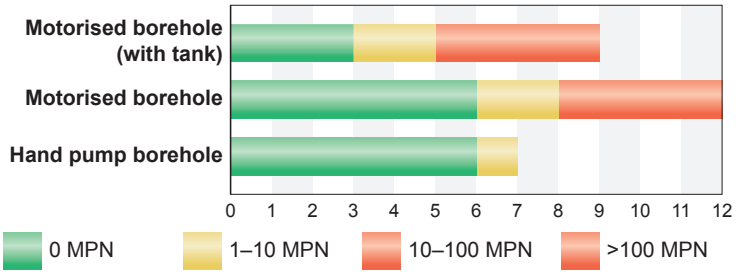
Sampling of groundwater sources in Maiduguri shows that 30% of sources have unsafe levels of nitrate (>50 mg/l according to the World Health Organisation Drinking Water Guidelines), which is generally correlated with elevated SEC.



Source risk as indicated by nitrate concentrations and World Health Organisation Guidelines for Drinking Water Quality (low NO_3: <50mg/l; high NO_3: >50mg/l)

According to the World Health Organization Drinking Water Guidelines for E. Coli, the water quality analysis shows that:

- 15 sources were considered safe (9 motorized and 6 hand pump boreholes)
- 5 sources were considered intermediate risk (4 motorized and 1 hand pump borehole)
- 8 sources were considered high or very high risk (all motorized boreholes)



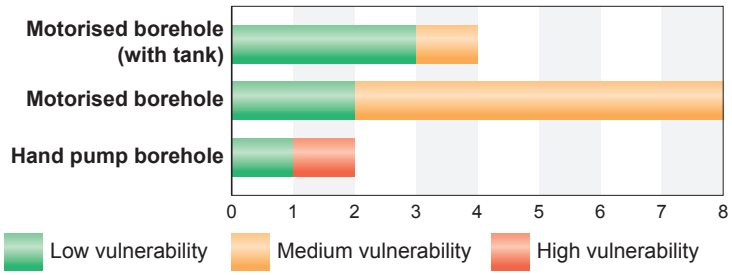
Source risk as indicated by the E. Coli MPN method and World Health Organisation Guidelines for Drinking Water Quality (low risk: 0 MPN; intermediate risk: 1–10 MPN; high risk: 10–100 MPN; very high risk: >100 MPN)

There are broad spatial trends in groundwater quality with elevated SEC, nitrate and E. Coli generally observed in older, more densely populated areas, and lower concentrations located in more recently-settled areas with lower population density.

VULNERABILITY OF SOURCES

Vulnerability assessments give a score between zero (low vulnerability) and seven (high vulnerability). The factors considered include: pollution sources within 10m of the water point, poor drainage causing ponding within 2m, insufficient concrete apron and lack of covers/fencing.

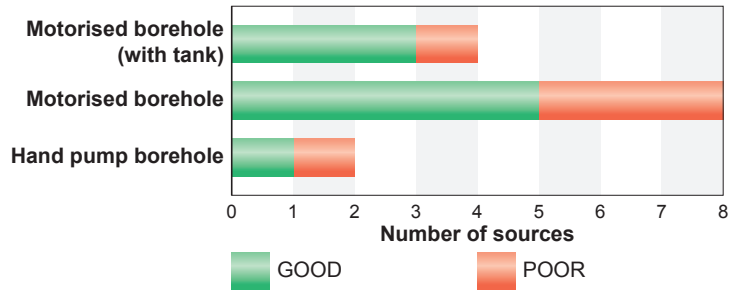
The majority of sources in Maiduguri were classed as **low to medium vulnerability**, with one highly vulnerable hand pump borehole located in an IDP camp.



Number of sources classed as low, medium and high vulnerability

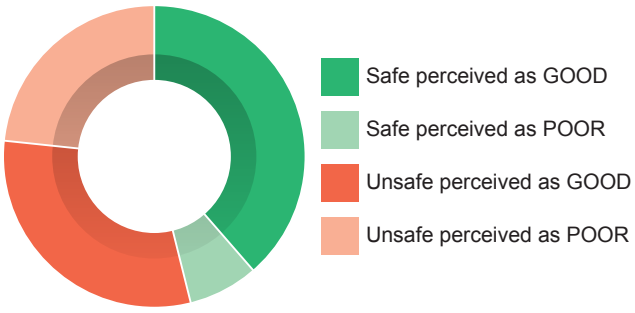
USER PERCEPTIONS

Water point users at 14 of the groundwater sources were asked whether they perceived the quality of water from the source as good or poor. 50% of hand pump boreholes, 63% of motorised boreholes, and 75% of motorised boreholes with tanks are perceived as good quality.



User perceptions of groundwater sources

However, people's perceptions of water quality from a source do not necessarily reflect the safety of water for drinking. Of the nine sources perceived as good quality, four (almost 50%) are classed as unsafe for drinking, according to the measured levels of E. Coli.



Comparing user perceptions and measured water quality for E. Coli

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