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**4<sup>th</sup> SADC  
GROUNDWATER CONFERENCE**  
THEME: Towards a Water Resilient SADC -  
Groundwater Systems Thinking.

10th - 12th of November 2021  
VIRTUAL CONFERENCE

[www.sadc-gmi.org](http://www.sadc-gmi.org)



# Investigating the sustainability of community-based management of solar piped water supply schemes in rural areas A case of Mt Darwin District, Zimbabwe.

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# Presentation outline

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- ☐ Background
- ☐ Objectives
- ☐ Study area
- ☐ Materials and methods
- ☐ Results
- ☐ Conclusions and recommendations



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## Background

- World over, of the 663 million people who were still lacking improved drinking water sources in 2015 ([WHO/UNICEF, 2015](#)).
- Access to water is a major challenge in Africa and Sub-Saharan Africa. ([WHO, 2012](#); [UNICEF, 2015](#); [Tadesse 2015](#)).
- Supply of water has been through electrical, fuel driven and hand pumps which had its disadvantages.
- Solar powered piped schemes have been increasingly adopted, in the region and in rural areas of Zimbabwe.



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# Background

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- Solar pumps is a new innovation adopted in the supplying of water at community level.
- Mt. Darwin is one of the areas where solar powered pumps have been adopted.
- Solar has a potential to benefit the local communities, water managers and the academia



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# Objectives

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## Main Objective

- To investigate the effectiveness of the community based-management on solar piped water supply schemes in Mt Darwin, Zimbabwe.

## Specific Objectives

- To assess the flow, pressure radiation and access of the solar powered water supply schemes in Mt Darwin District.
- To determine the local resources that enable communities in the management of solar powered piped water schemes.
- To explore community Participation and knowledge, attitudes and perceptions (KAP) of the solar powered piped water scheme in the Mt



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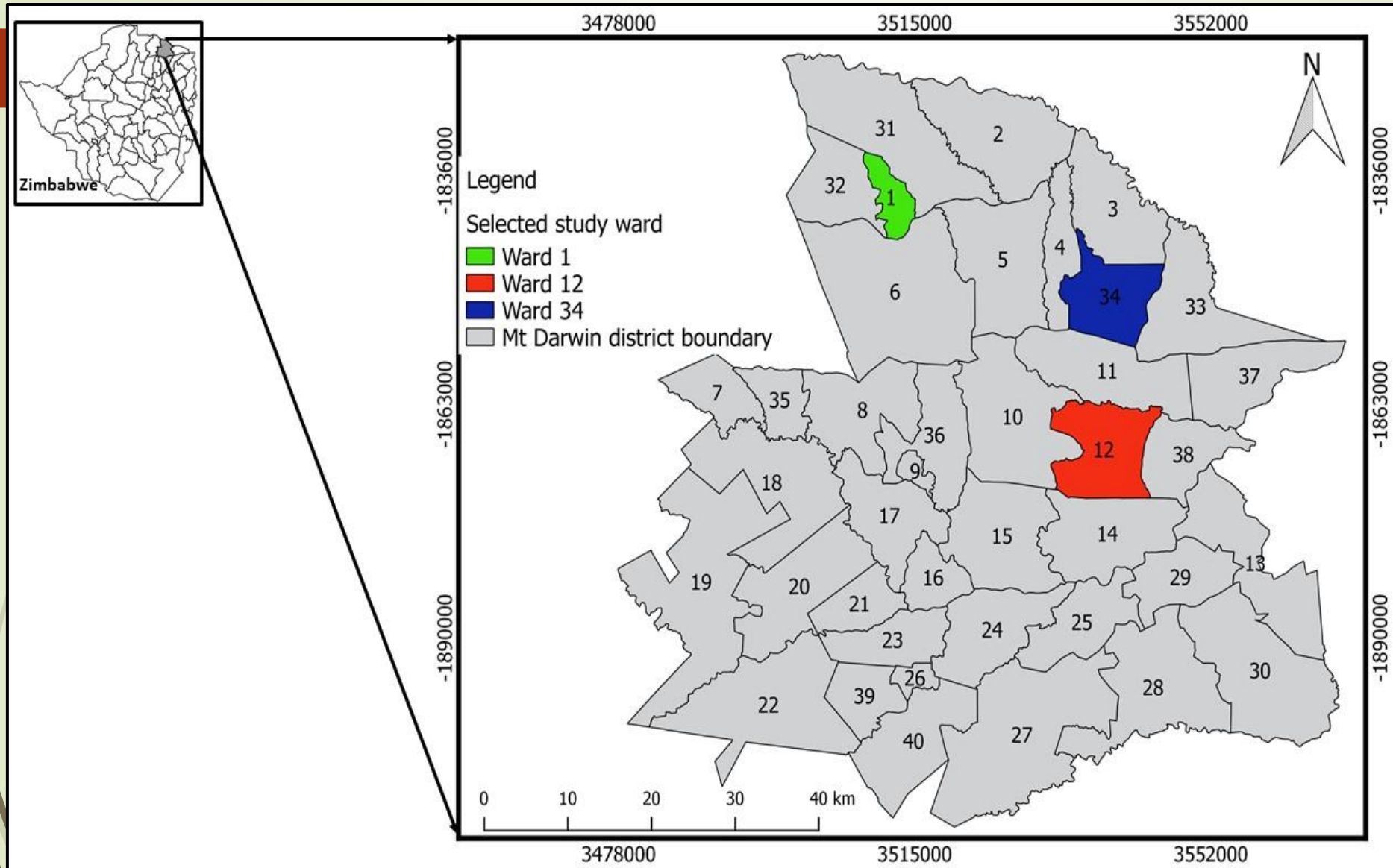
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# Map of study area



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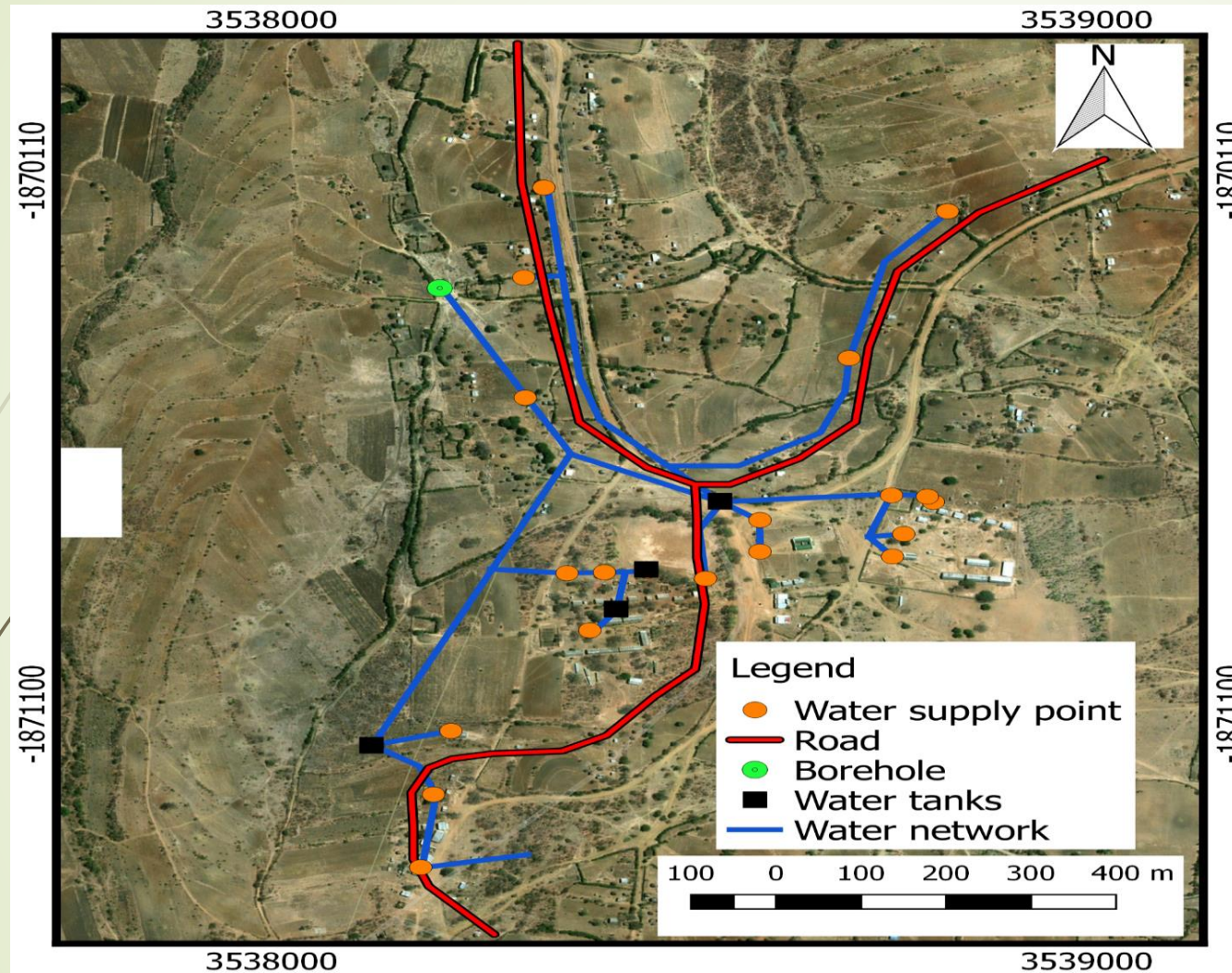
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# Water reticulation systems for Bveke community.

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- Borehole depth is 52m and pumping water level 47m . The Solar sizes  $12 \times 335 \text{ Watts} = 4\text{kw}$ , total power supplied. The network size is 4.8 km. The beneficiaries of the scheme are 298 households, 2 schools one shopping centre, and the clinic. 4 tanks with a total volume of 45000litres connected to 24 standpipes.



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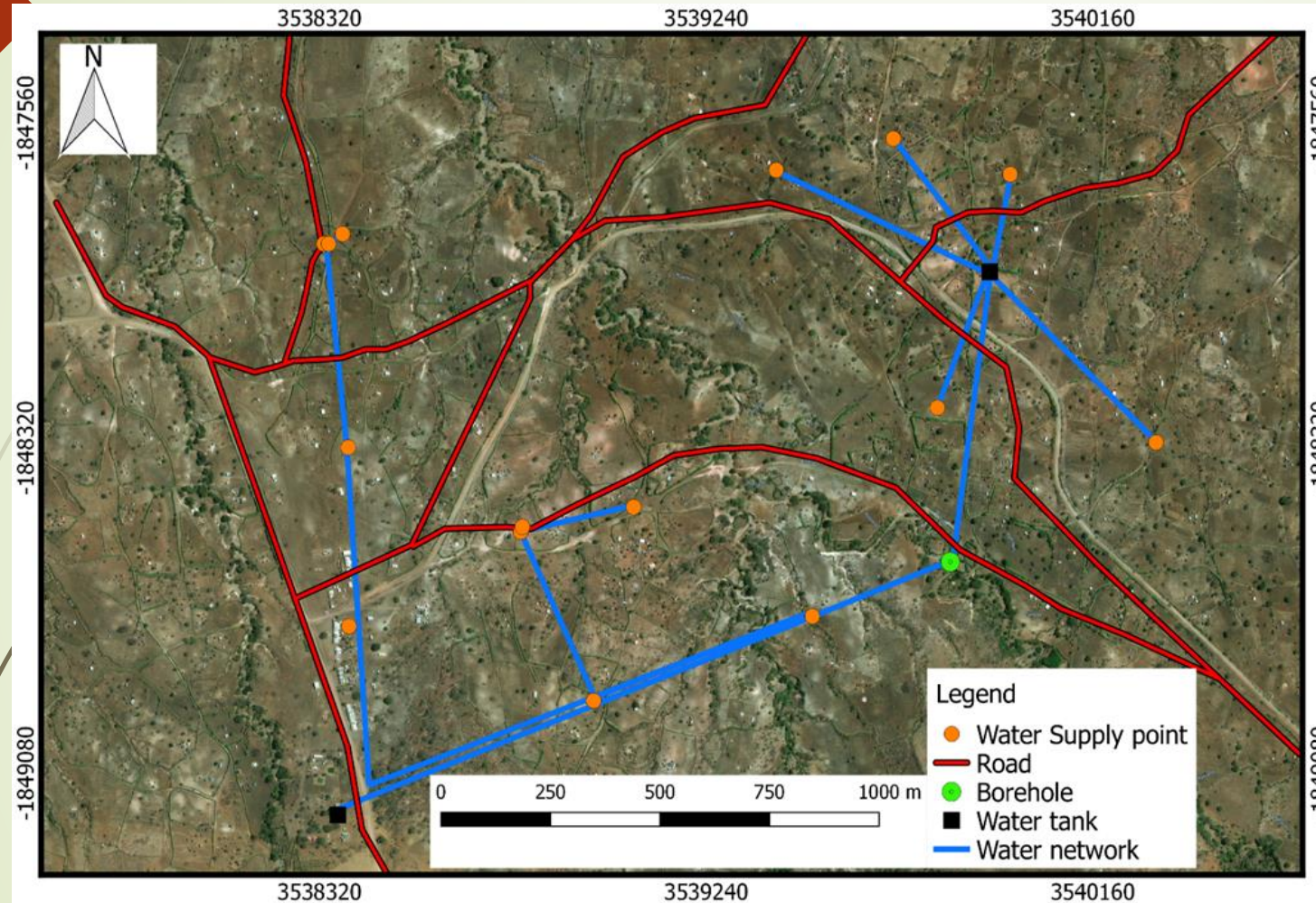
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# Water reticulation systems for Kamutsenzere community

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- borehole depth of 57 m . Solar sizes are  $12 \times 335 \text{ Watts} = 4020 \text{ Watts} / 4.02 \text{ KW}$ . The total network 8.5km. The beneficiaries are 320 households from 16 villages, one shopping centre, and the clinic. total volume of 35 000 litres



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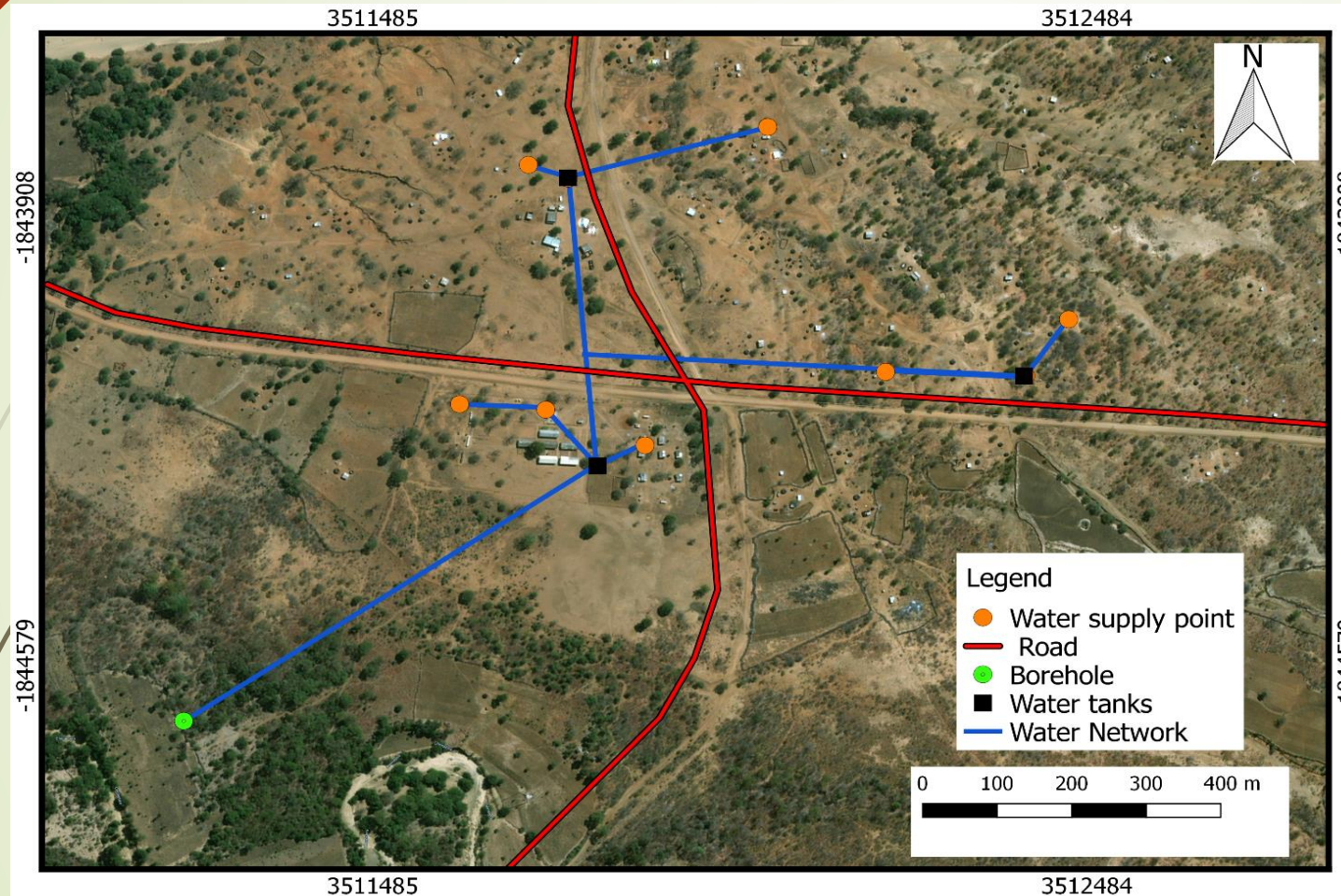
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# Water reticulation systems for Kaitano community

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- borehole depth is 23m. Total network length 3.7 km. The beneficiaries include 149 households from 5 villages' then one shopping center and a secondary school. 3 tanks with a total volume of 25 000litres.



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# Materials and methods

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- **Study design:** This study utilized an exploratory case study design.
- **Data collection methods:** Data collection was done through use of flow logger, pressure loggers, radiation software, questionnaires, interviews and FDGs
- **Data analysis:** Quantitative and Qualitative data analysis was done.
- Statistical analysis such as Pearson correlation was computed.



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# Installation and recording using Ultrasonic Flowmeter

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# Focus Group Discussions

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Woman doing FDGs at  
Kamutsenzere



Men doing FDGs at Kamutsenzere



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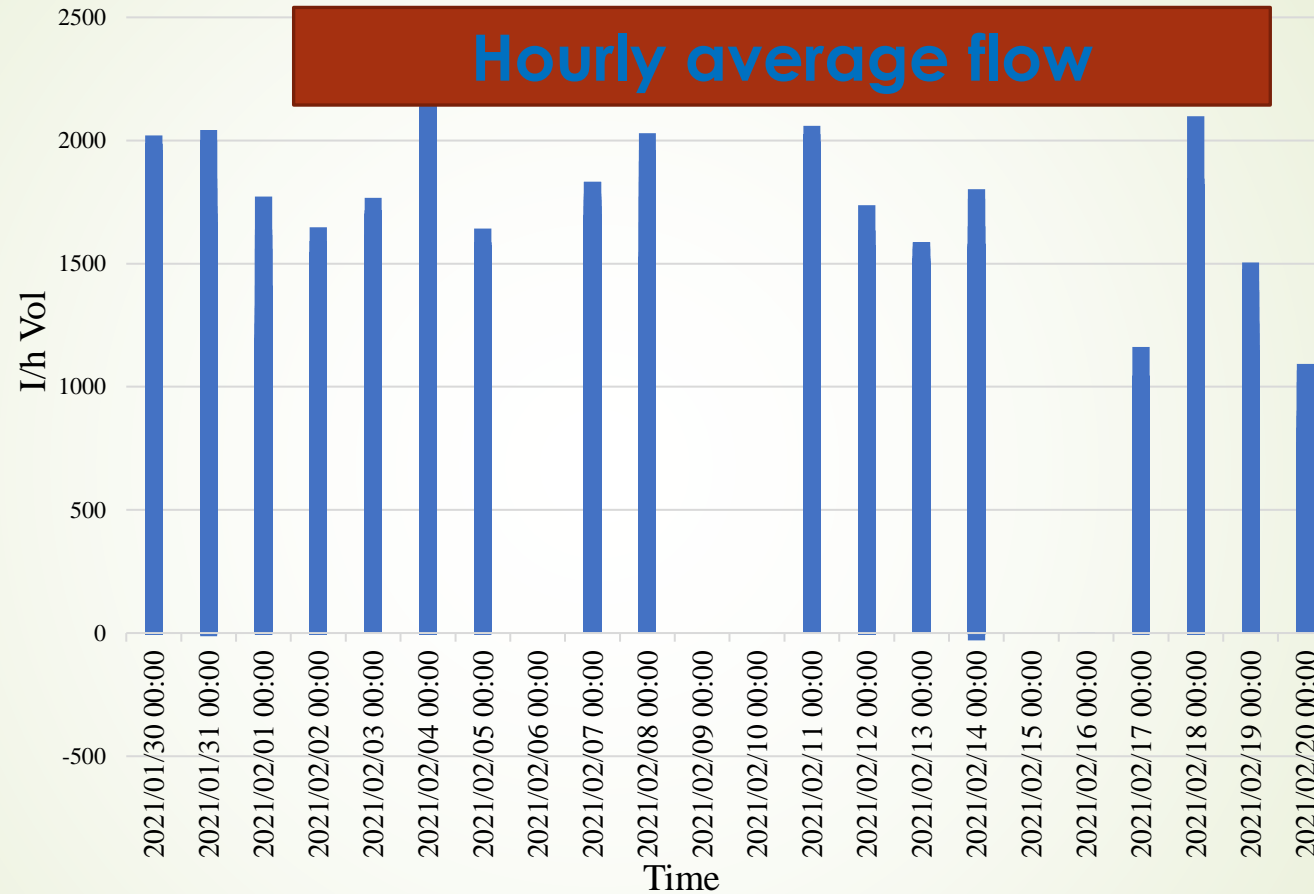
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# Results and discussion

## Average daily flow at Bveke



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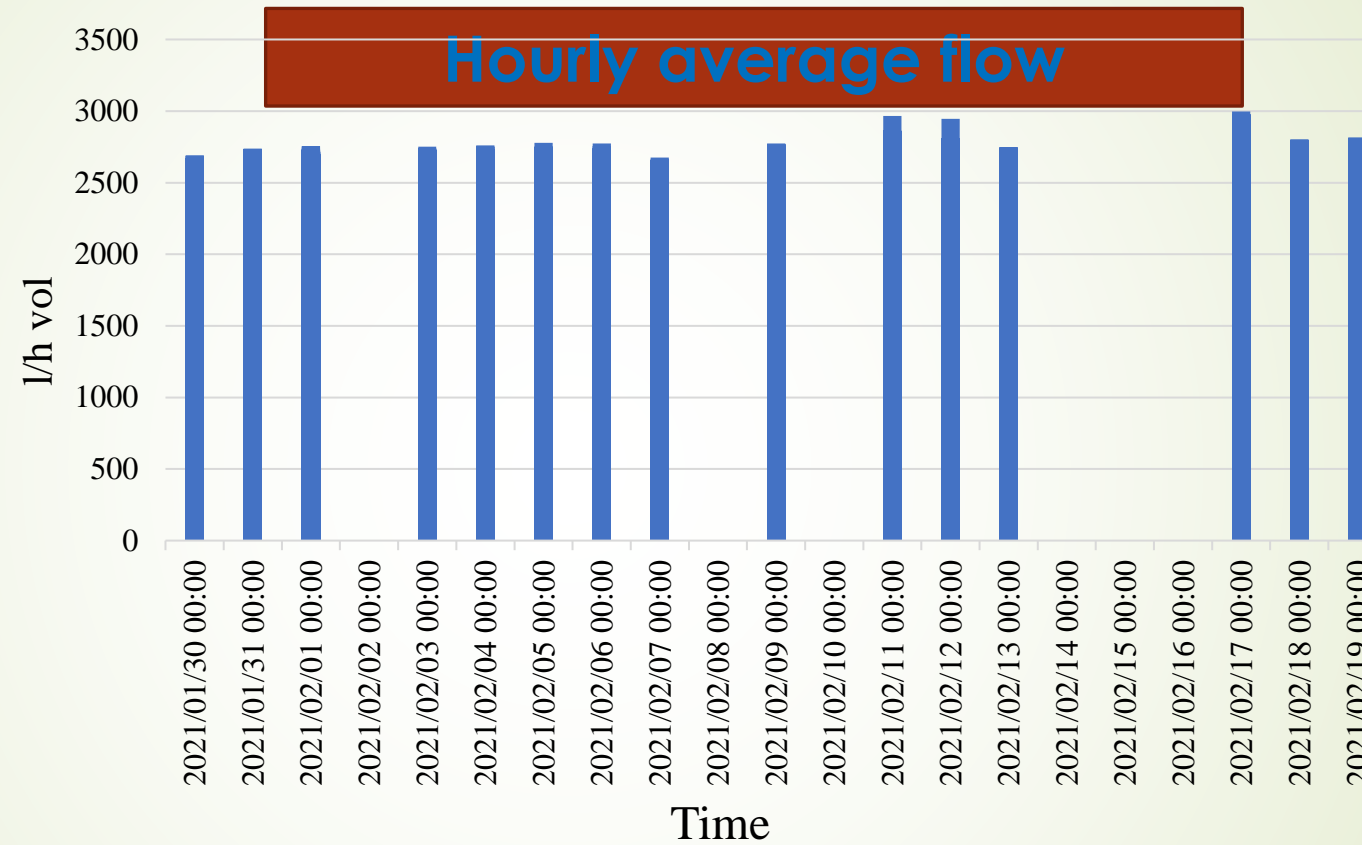


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# Average daily flow at Kaitano

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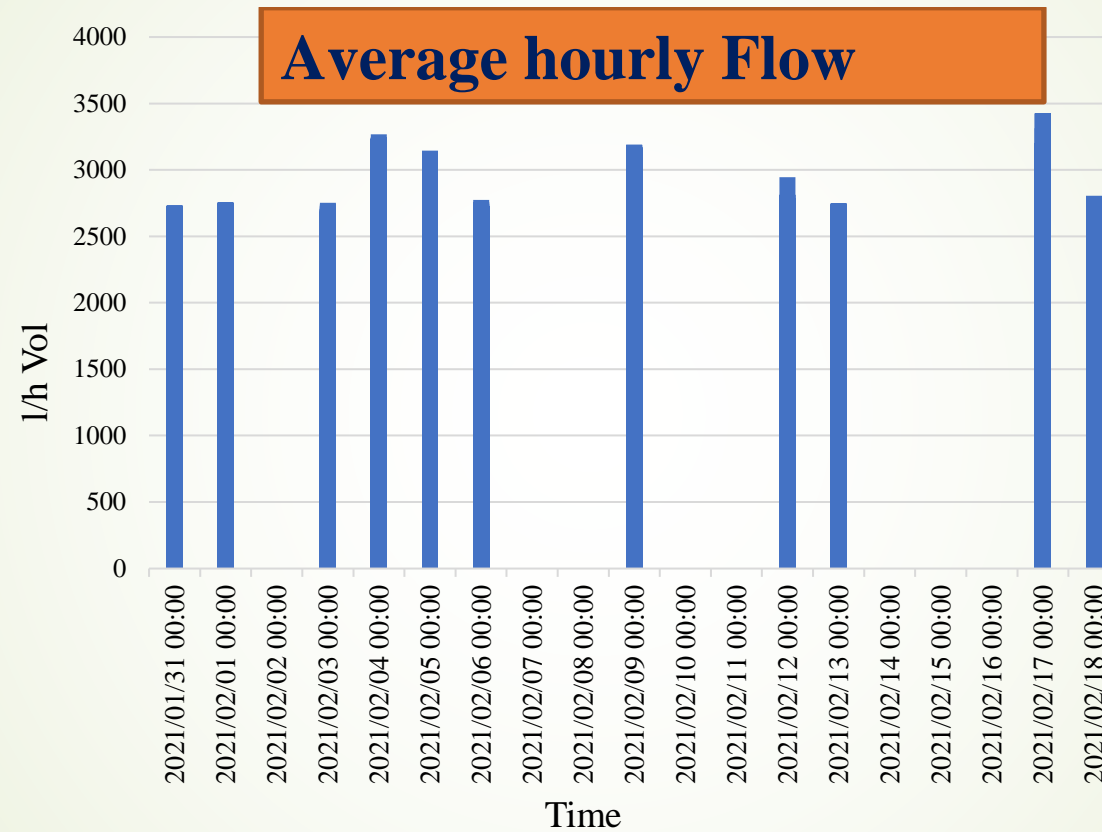
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# Average daily flow at Kamutsenzere

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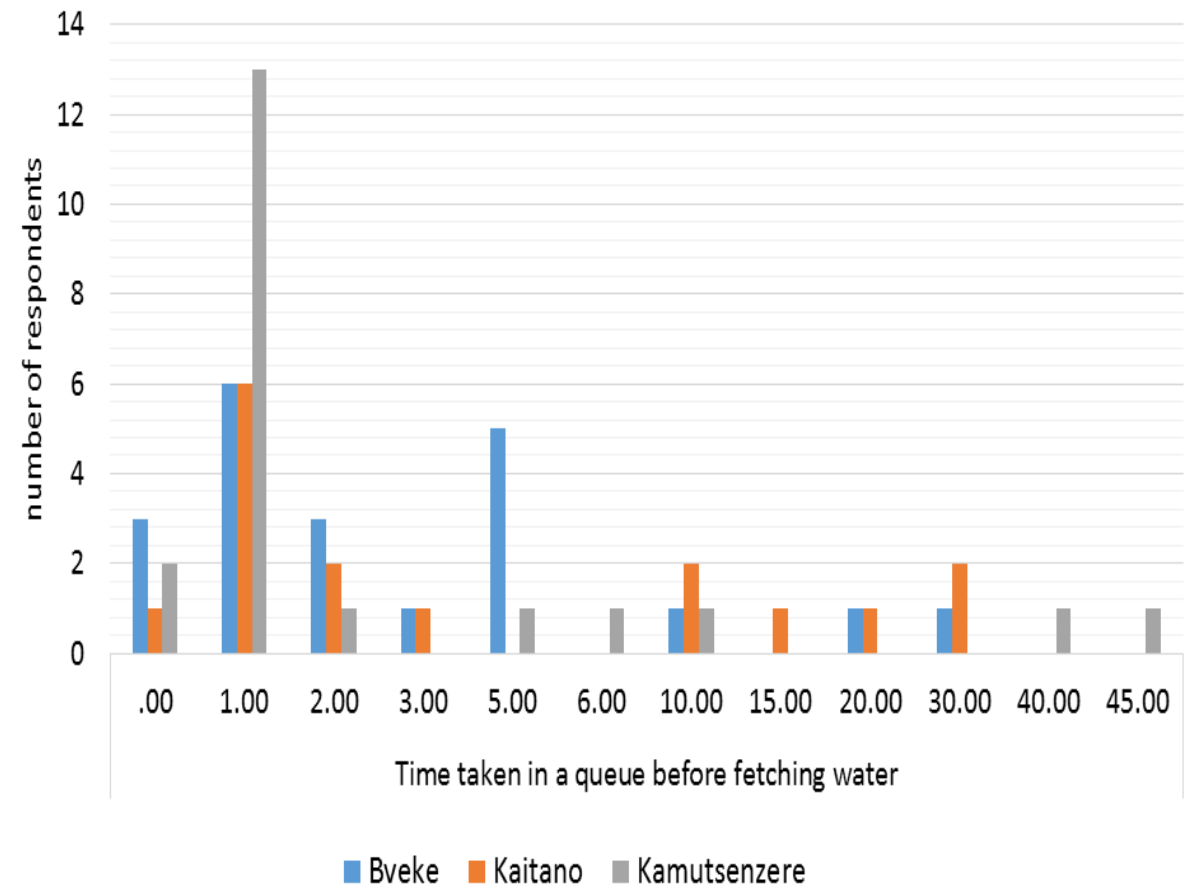
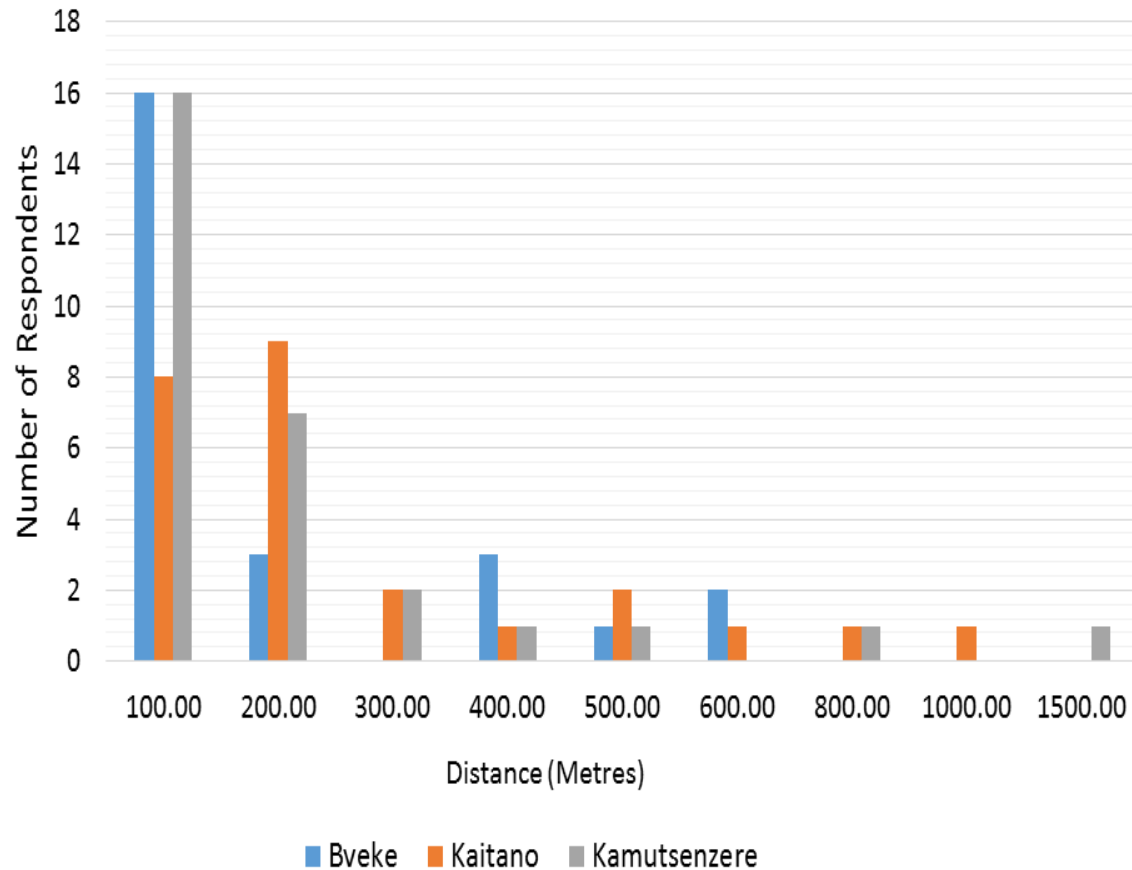


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# Distance and Time taken in queues

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# Capitals

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- **Human capital:** Defines the quality of people, management and capacity.
- **Financial capital:** Defines the financial status, contributions and expenditures.
- **Social capital:** Defines the involvement and participation of people in solar piped water supply scheme project.
- **Physical capital:** Defines the issues of maintenance and availability of spare parts.



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# Knowledge, Attitudes and Perceptions

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- **Knowledge:** The community is knowledgeable in understanding the importance of the use clean solar energy to the environment.
- **Attitudes:** Positive attitude.
- **Perceptions:** There are mixed perceptions since some of the people were of the opinion that they discharge pressure water, some said it depended on whether and some said they just operate optimally.



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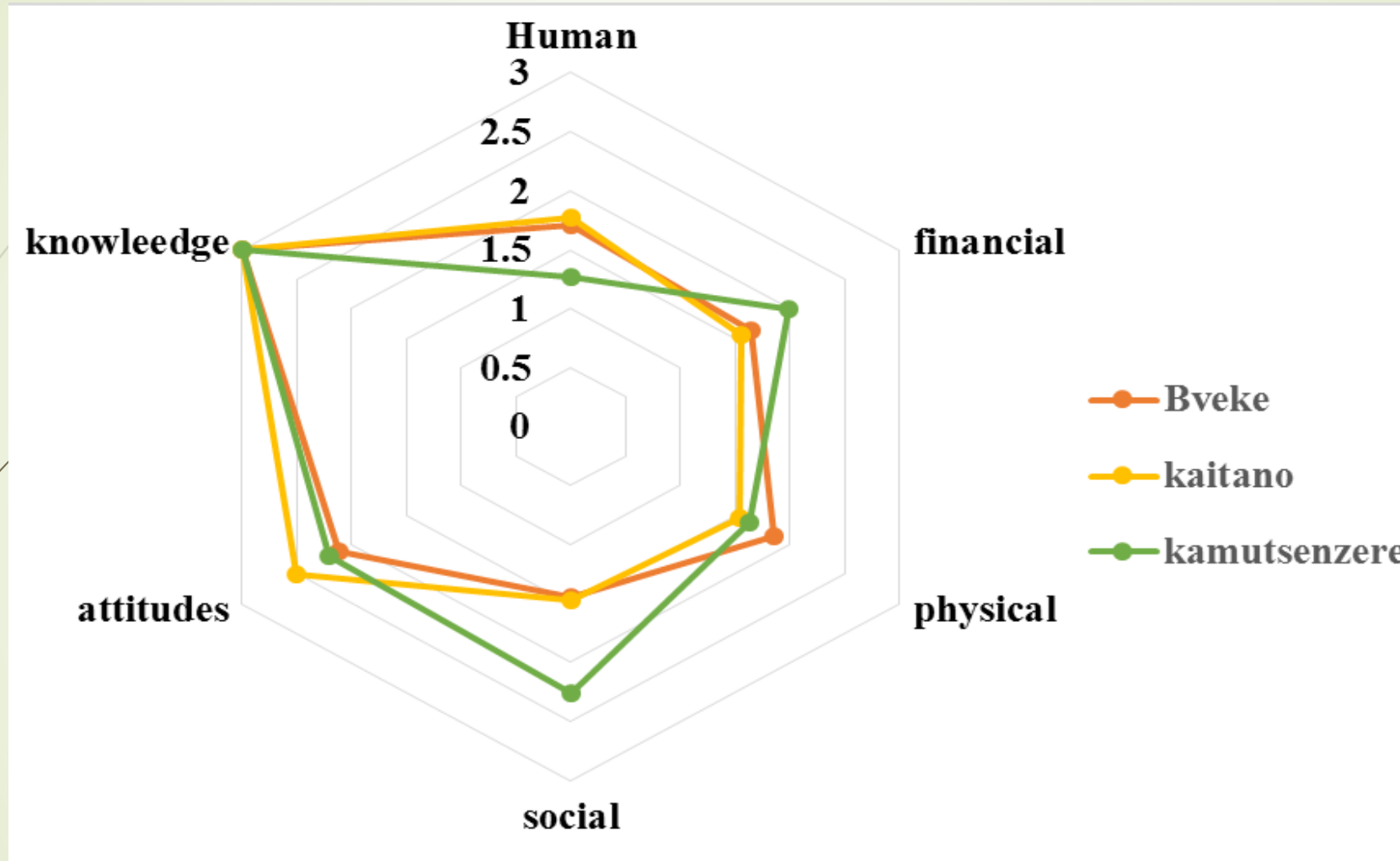
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# Aggregate performance by each scheme

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# Correlations

Variable	Correlation coefficient	Significant level (P- value)
Household population vs quantity fetched	0.465	0.000
Distance to the stand pipe vs frequency	0.644	0.000
Time taken to get to a stand pipe vs distance	0.644	0.000
Alternative water source to the stand pipe vs the scheme	0.164	0.146
Water adequate for the household requirements vs household population	0.543	0.007
Quantity of water fetched per day vs household population	0.465	0.000



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# Conclusions

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- It has been noted that the flows were not consistent to the expected especially for Bveke but the other two that were constructed later produced better results .
- The communities have reasonable capital to manage SPWSS though they could be variance in output but the output is inconsistent with standard.
- The research has reviewed the attitudes , knowledge, and perceptions and have been found to be more on the positive side hence ensuring sustainability.



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# Recommendations

- There is need for improvement on the issue technical capacity building and solar sensors should be fixed at the pumping station to control and regulate the power.
- There is need to make the committees accountable to the communities on their subscriptions and transparency should also prevail on monetary issues and village heads not to interfere with financial issues
- There is need for the RDC and the communities to integrate their efforts to ensure sustainability.



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# Thank you!!!!



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