



Farmer Perceptions and Barriers to Solar-Powered Irrigation Adoption in Ewaso Ng'iro basin, Kenya

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Introduction

- Solar-powered irrigation systems offer a promising pathway to climate-resilient agriculture and enhancing food security in Kenya's arid and semi-arid lands



- Adoption rate in Kenya still very low (5%)
- The study examined farmer perceptions of solar-powered irrigation, perception adoption gap, and identifies the multi-dimensional barriers to adoption in **Ewaso Ng'iro basin (UENB), Kenya**

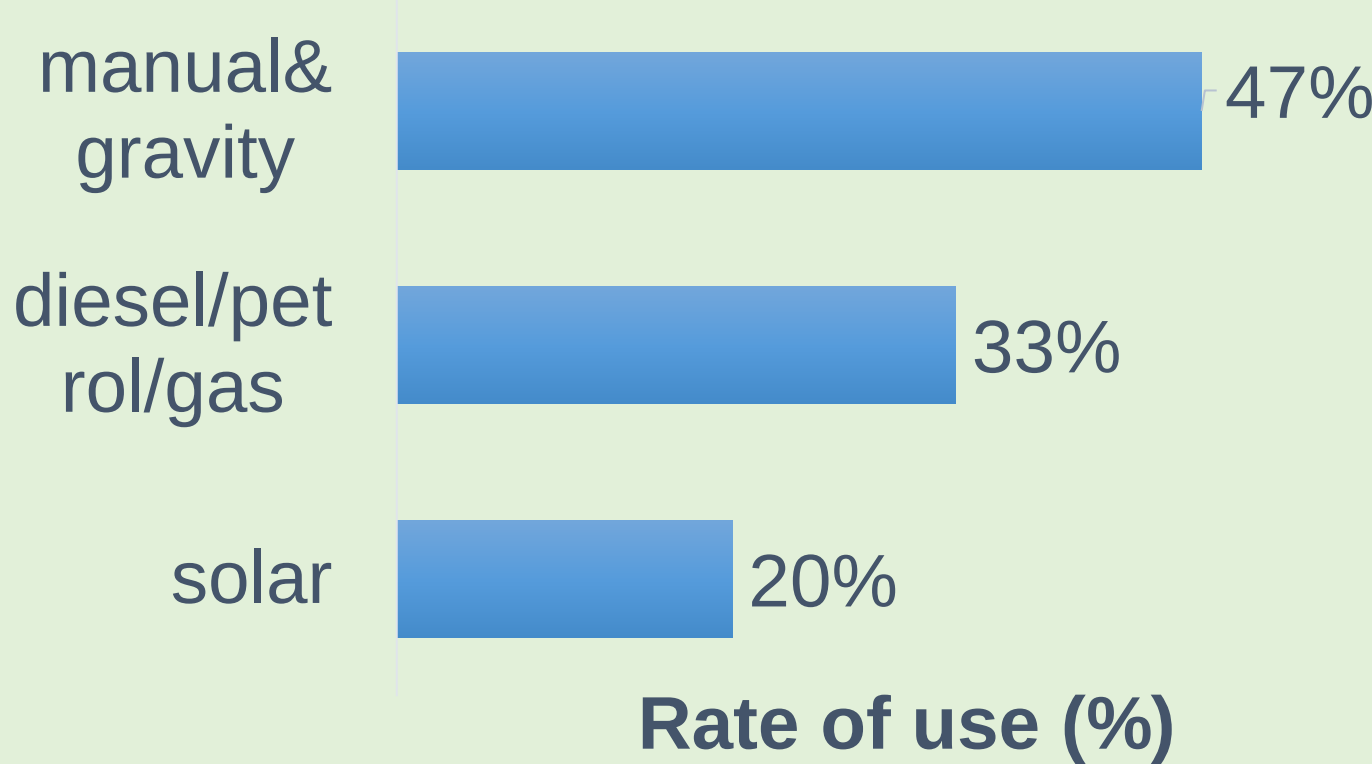
Materials and Methods

- Household survey data from 180 households in three counties; Laikipia, Isiolo and Meru
- Descriptive statistics and comparative analysis were used to analyze adoption dynamics across the three counties
- Barrier severity index was used to analyze adoption barriers (1=barrier, 0=not a barrier)



Results

Types of energy for irrigation n=180



- Manual watering and use of gravity are the most popular irrigation energy (47%)
- Diesel, petrol and gas popularity is 33%
- Solar energy is the least popular at 20%



Farmer perceptions

- 93.9% of farmers agree that solar irrigation saves money
- 96.1% recognize sufficient sunlight for effective operation
- Perceived affordability presents a major constraint, with 70.6 % of respondents agreeing that solar pumps are very expensive

Barrier analysis

- Financial barriers are the most severe e.g., high upfront costs and limited credit access
- Technical barriers: inadequate knowledge and limited maintenance services
- Institutional barriers: weak extension support and land tenure insecurity
- Awareness barriers: limited exposure to demonstration

Perception-adoption gap

- A significant perception-adoption gap exists (74.3%)
- The adoption is highest in Isiolo (32.7%) and lowest in Meru (6.9%).
- Meru exhibits the lowest SPI adoption rate and the highest perception-adoption gap suggesting possible unobserved constraints, or satisfaction with existing diesel-based systems.
- Isiolo has the highest adoption rate and lowest gap attributed to water scarcity pushing for innovative ways of irrigation

Barrier	Severity index (0-1)
Financial	0.74
Technical	0.47
Institutional	0.42
Awareness	0.41

County	Positive perception (%)	SPI adoption rate (%)	Gap (%)
Isiolo	94	32.7	61.3
Laikipia	94	22.2	71.8
Meru	94	6.9	87.1
Overall	94	19.7	74.3

Conclusion

- High perception-adoption gap (74.3%)
- Requires integrated and county-specific interventions - innovative financing models, strengthened technical support ecosystems, expanded demonstration and peer-learning opportunities, and integration of solar irrigation into agricultural extension services.

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