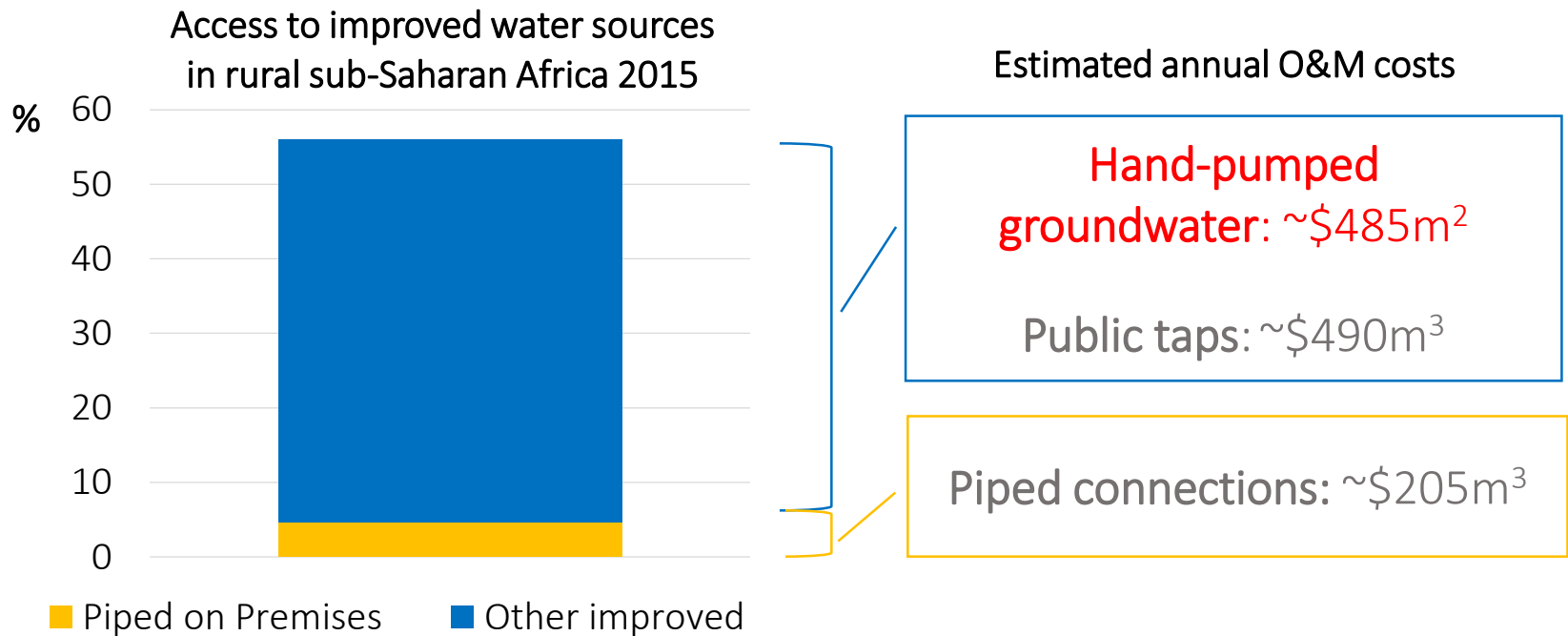


Multi-decadal financial assessment of groundwater services for low-income households in rural Kenya



IAH Congress, Dubrovnik
25th September 2017
Tim Foster, Rob Hope & Jacob Katuva (presenting)

~200m rural Africans depend on protected groundwater point sources, with O&M costs of ~\$500m p.a.

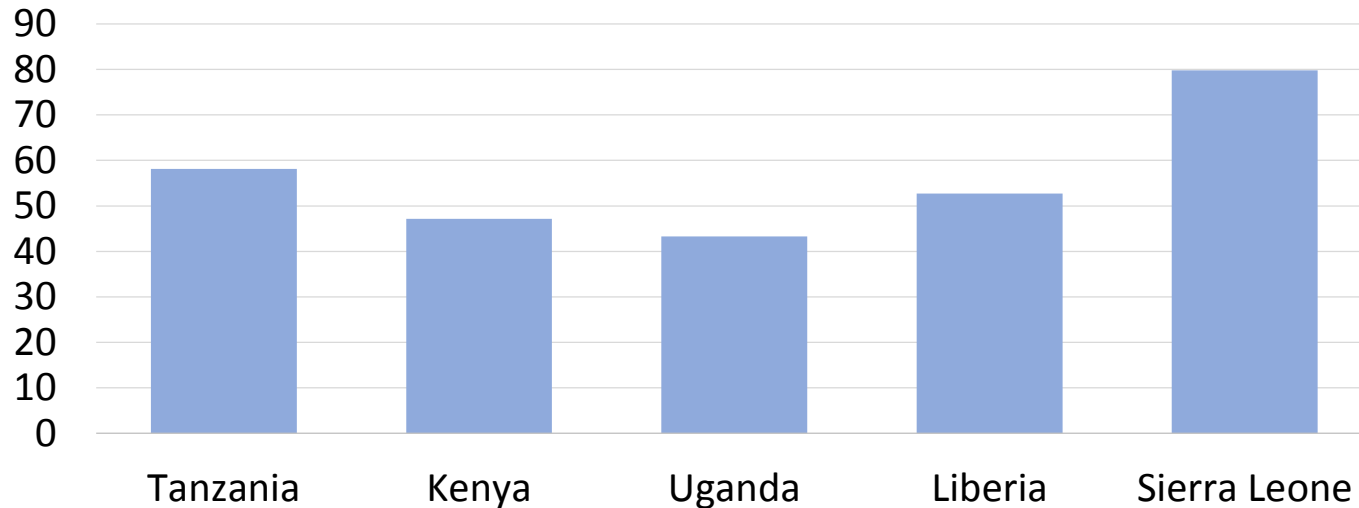


Community-based financing of O&M assumed in national policies and plans across Africa

Mismatch between policy and reality

Most communities struggle to pay for groundwater-fed services

% of handpumps without revenue collection system



Inadequate financing of O&M likely a key reason why 1 in 3 handpumps is non-functional

Evidence from water committee records in Kwale, Kenya

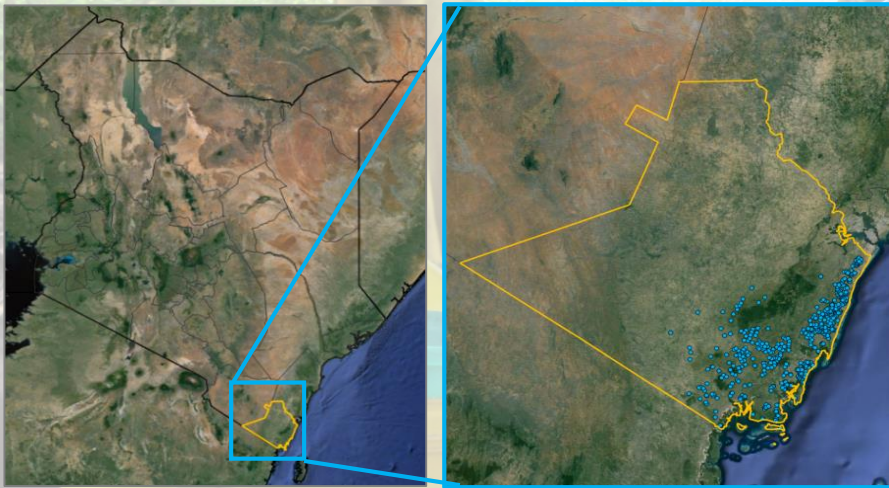


Research questions

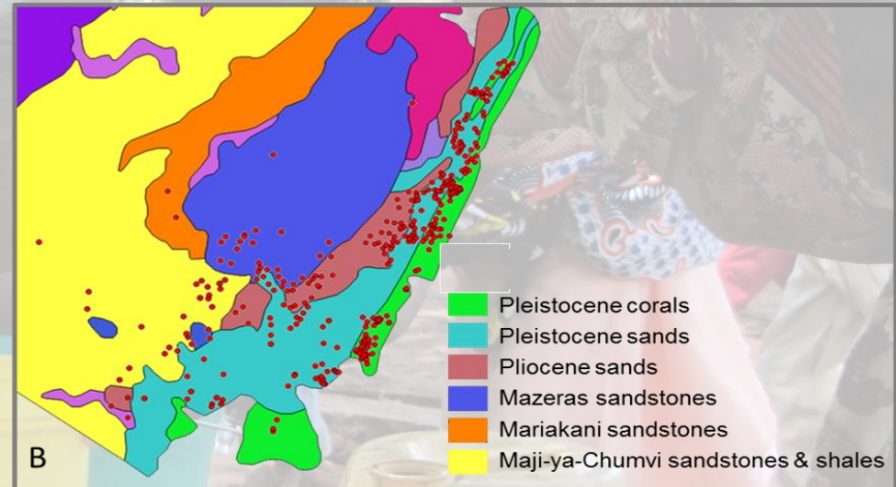
- What factors promote and hinder financial performance?
- How does financial performance impact operational performance?
- What impact does revenue collection have on groundwater use?

A heavy dependence on groundwater in Kwale

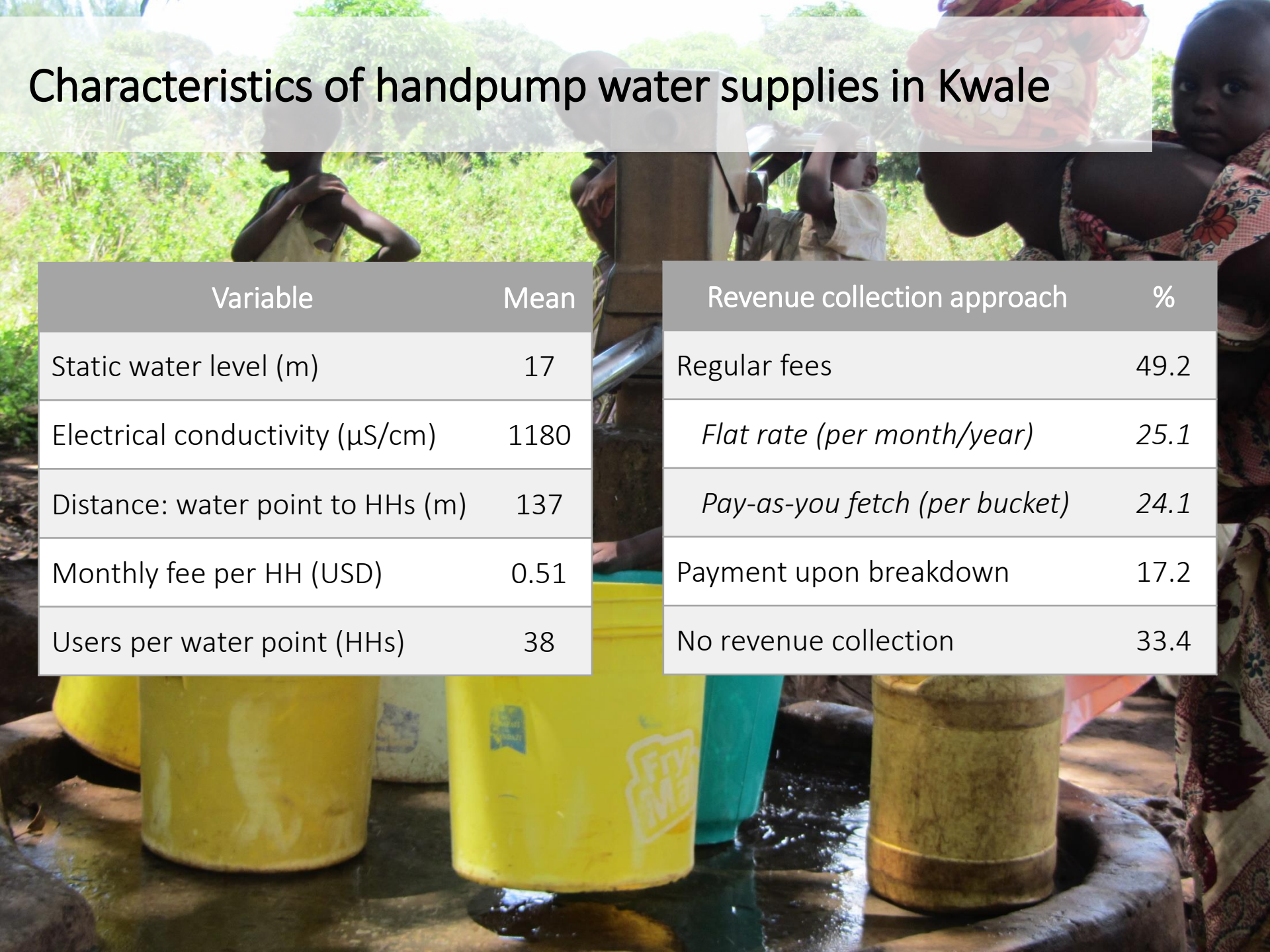
550+ Afridev handpumps installed 1983-95,
with 40% non-functional by 2013



Most handpumps underlain by Pleistocene
corals and Pliocene/Pleistocene sands



Characteristics of handpump water supplies in Kwale

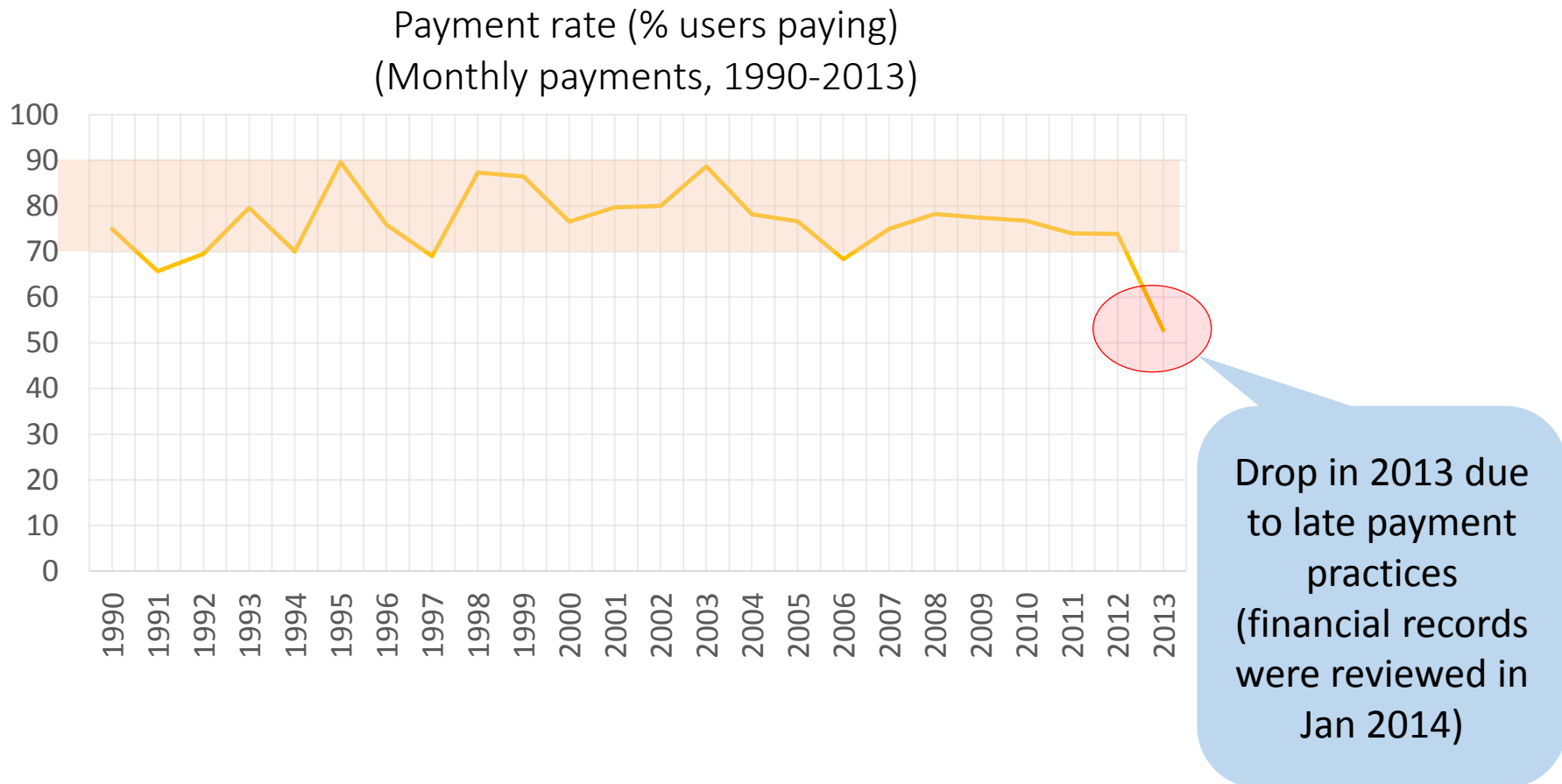


Variable	Mean	Revenue collection approach	%
Static water level (m)	17	Regular fees	49.2
Electrical conductivity ($\mu\text{S}/\text{cm}$)	1180	<i>Flat rate (per month/year)</i>	<i>25.1</i>
Distance: water point to HHs (m)	137	<i>Pay-as-you fetch (per bucket)</i>	<i>24.1</i>
Monthly fee per HH (USD)	0.51	Payment upon breakdown	17.2
Users per water point (HHs)	38	No revenue collection	33.4



- Financial records located at 100 communities
 - 270+ waterpoint years
 - 43,020 monthly contributions
 - Spanning 1987-2013
- Financial data integrated with data from large household survey (n=3,000+) & water point census

On average, each month around 1 in 4 households do not pay their water user fees



Payment rates predicted by water point location, water quality, rainfall season and productive uses

Geographic

- Distance: HHs to WP
- Distance: WP to WP
- Night lights

Environmental

- pH
- Elect. conductivity
- Taste
- Rainfall season
- Alternative sources

Operational

- Attendant
- Spare parts
- Lock
- Community mechanic
- System age

Institutional

- Participation

Financial

- Tariff
- Bank account

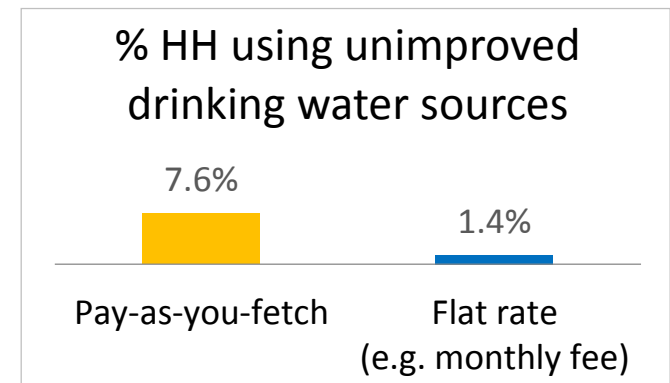
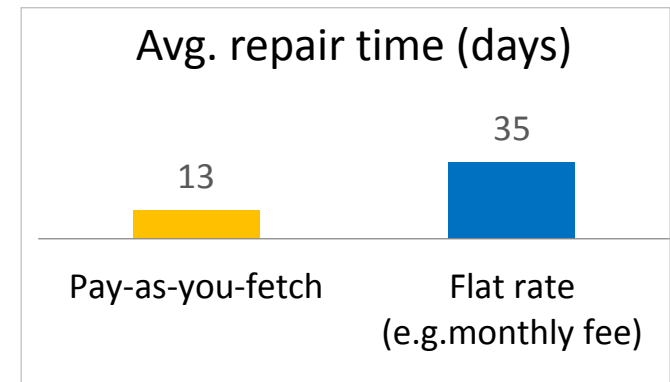
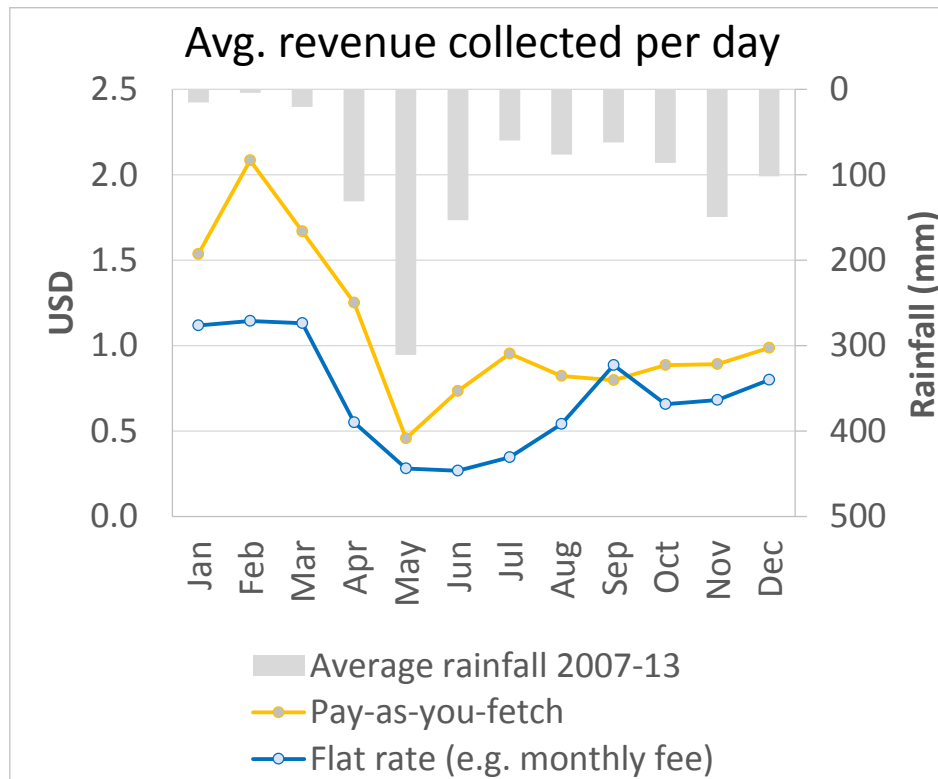
Socio-economic

- Productive uses
- Wealth
- Group size
- Ramadan
- Food security

Payment rates highest when:

- pump is located close to users
- pH is >6.5
- Water is palatable
- Rainfall is low
- Households use water for productive purposes

'Pay-as-you-fetch': associated with higher revenues and faster repair times, but also unimproved water use



Rainfall also has a major impact on revenue levels

Further details available in the following papers:

A multi-decadal and social-ecological systems analysis of community waterpoint payment behaviours in rural Kenya
Journal of Rural Studies

Evaluating waterpoint sustainability and access implications of revenue collection approaches in rural Kenya
Water Resources Research

A critical mass analysis of community-based financing of water services in rural Kenya
Water Resources & Rural Devt

Journal of Rural Studies 47 (2016) 65–80

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A multi-decadal and social-ecological systems analysis of community waterpoint payment behaviours in rural Kenya

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ARTICLE INFO

ABSTRACT

1. Introduction

Low levels of water supply sustainability pose a threat to development in rural areas of sub-Saharan Africa. Waterpoints that draw on groundwater – mainly wells and boreholes – are the most prevalent and rapidly expanding drinking water supply options across the continent (Banerjee and Moreira, 2011), accessed by more than 250 million rural inhabitants. Over the last three decades, community-managed handpumps have been the primary techno-institutional approach to rural waterpoint development (Fisher et al., 2007; Harvey and Reed, 2007). Handpumps and community management have long been considered ideal technologies: a low-cost and simple technology for lifting groundwater combined with an institutional model premised on the assumption that local users are willing and able to self-organize. However, with an estimated one in three handpumps non-functional at any one time (EVON, 2009), flaws in this techno-institutional coupling have become apparent. Communities often struggle to carry out operation and maintenance (O&M) responsibilities, and the resulting service disruptions likely force millions of households to revert to unsafe or fall-off water sources at any point in time, in an effort to expand safe water supplies to the 2.25 billion rural Africans who still rely on unimproved sources (WHO/UNICEF, 2015). Such water governments and development partners continue to spend hundreds of millions of dollars on an estimated 80,000 waterpoints. If such handpumps (Srinivasan and Koedee, 2006). Unfortunately, unless there is an improvement in the way O&M is carried out, this evidence suggests that investments will fail to generate the desired human development outcomes, and safe water access in rural sub-Saharan Africa will continue to lag behind the rest of the world.

One of the most critical collective action challenges of keeping rural waterpoints functional is the financing of O&M activities. Revenue

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AGU PUBLICATIONS

Water Resources Research

RESEARCH ARTICLE

10.1002/2015WR019304

Evaluating waterpoint sustainability and access implications of revenue collection approaches in rural Kenya

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ABSTRACT

Water policies in many sub-Saharan African countries stipulate that local communities are responsible for self-financing the waterpoint's operation and maintenance. In the absence of policy consensus or evidence on optimal payment models, rural communities adopt a diversity of approaches to revenue collection. This study empirically assesses waterpoint sustainability and access outcomes associated with different revenue collection approaches on the south coast of Kenya. The analysis draws on a unique data set comprising financial records spanning 27 years and 300 communities, operational performance indicators for 200 waterpoints, and water source choices for more than 2000 households. Results suggest communities collecting pay-as-you-charge fees on a volumetric basis generate higher levels of revenue and experience better operational performance than communities charging flat fees. In both cases, financial flows mirror seasonal rainfall peaks and troughs. These outcomes are tempered by evidence that households are more likely to opt for an unimproved drinking water source when a pay-as-you-charge system is in place. The findings illuminate a possible tension between financial sustainability and universal access. If the Sustainable Development Goal of 'safe water for all' is to become a reality, policymakers and practitioners will need to address this issue and ensure rural water services are both sustainable and inclusive.

1. Introduction

Community-based financing is widely recognized as a precondition for waterpoint sustainability in rural sub-Saharan Africa (Churruarín et al., 1982; Bricelj and de Frenay, 1988; Carter et al., 1996, 1999; Harvey, 2007). Community management has been the dominant rural water supply paradigm embraced by governments, donors, and nongovernment organizations (NGOs) for over three decades, and is premised upon the expectation that local water users are willing and able to self-organize and cover the cost of operation and maintenance (O&M) activities (Fisher et al., 1993; Harvey and Reed, 2005). A trough team and trailers play a role in subsurface water repair (see, e.g., Ministry of Water and Environment (MWE), 2013; Ministry of Local Government and Housing (MGLH), 2005; Jones, 2015), technician salaries and equipment (see, e.g., Hyatt, 2011), and spare part supply chains (Harvey, 2007). The bulk of funding to pay for O&M costs is expected to derive from tariffs paid by waterpoint users. Indeed, the principle of self-financing O&M is now formalized in policies and assumed in many financing plans across the continent (African Development Bank, 2010; Banerjee and Moreira, 2011; GLIAS, 2014). However, there is an absence of empirical evidence on policy consensus on the optimal revenue collection approach from financial, operational and safe drinking water access perspectives, and communities independently adopt a diverse range of strategies.

The arguments in support of community-based financing of rural water O&M are multifaceted and sit within a broader debate about user financing of basic social services (Andersson and Malmendal, 1996). Governments and donors have long been concerned if equipped to reliably finance recurrent water service costs (Bricelj and de Frenay, 1988; Churruarín et al., 1982). Additionally, the expectation of self-financing fits with the tendency of donors and NGOs to approach water supply interventions as one-off projects, the importance placed on local ownership of water supply systems, and a cultural idealization that rural communities will harmoniously cooperate and act collectively (Foster et al., 2014; Harvey and Reed, 2007). Bricelj and de Frenay (1988) also advance justifications based on principles of equity and efficiency as user contributions make more sense in a nondistributive utility framework, and liberal donor and government funds to

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FOSTER AND HOPE WATERPOINT SUSTAINABILITY AND USER IN-KENYA 1473

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A critical mass analysis of community-based financing of water services in rural Kenya

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ARTICLE INFO

ABSTRACT

1. Introduction

Indigenous financing of rural water supply operation and maintenance (O&M) poses a major thorn to the Sustainable Development Goal of safe drinking water for all in sub-Saharan Africa. The national water policies of many sub-Saharan African countries expect rural communities to bear the costs of operating and maintaining their water supply systems (Foster and Hope, 2016). However, evidence suggests a high proportion of communities struggle to raise the required funds (Foster and Hope, 2016). Even among communities that manage to get to place a system for collecting user fees, payment by households is not always universal (Carter et al., 2010; Foster and Hope, 2016). This situation has repercussions for the operational sustainability of rural water supplies. Studies suggest the failure to establish and maintain a system for collecting user fees increases the likelihood of a waterpoint falling into disrepair (Foster and Hope, 2017). Fisher et al. (2015), and lower levels of revenue have been linked with longer household durations (Foster and Hope, 2017). These recurrent service disruptions may in turn have significant ramifications for the health and well-being of water users (Foster et al., 2009).

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