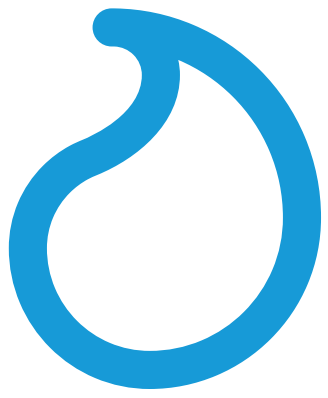




Just  
a Drop



**Impact of an integrated  
sand dam approach on  
water access and  
livelihoods**

## Background

In the drought-prone landscapes of Southeast Kenya, communities face escalating challenges in accessing clean water and securing food, often forcing women and girls to undertake perilous daily journeys of 6-12 hours to collect water. In response, Just a Drop, together with its Country Partner in Kenya, Africa Sand Dam Foundation (ASDF), and academic researchers from institutions across the UK and Europe, initiated an ambitious seed funding research project to explore the impacts of an integrated approach to water access, conservation, and use, with sand dams at its core.

When combined with integrated land-use planning, conservation practices, and community training, sand dam programmes have the potential to transform people's lives, improve food security, and restore natural environments. Previous studies have shown that sand dam programmes can store up to 40 million litres of clean water, deliver community-focused training, enhance biodiversity, and improve overall quality of life for surrounding communities.

The project aimed to generate comprehensive evidence to capture the benefits of sand dams on water access, livelihoods, and environmental outcomes. By highlighting the intersection of sustainability, community empowerment, and climate resilience, Just a Drop intends to use the evidence from the project to unlock new funding streams for WASH interventions and catalyse a paradigm shift in addressing water scarcity in arid regions.

## Sand Dams

Sand dams are simple, durable structures built across seasonal riverbeds in dry and semi-arid regions to capture and store water beneath the surface. Typically constructed from reinforced concrete or stone, a sand dam forms a low wall across a river channel. During the rainy season, fast-flowing water carries sand and silt downstream. When this water meets the dam, heavier sand particles settle and accumulate behind it, while lighter silt is washed away. Over time, this process creates a natural underground reservoir capable of storing significant volumes of water.

Unlike open surface reservoirs, sand dams store water in the spaces between sand grains. This form of underground storage greatly reduces losses from evaporation and limits contamination, making sand dams particularly effective in hot, dry climates. The stored water is protected from direct sunlight and from pollution caused by livestock or human activity and can be accessed throughout the dry season by installing hand pumps to draw water from the sand-filled riverbed.



The impact of a sand dam in Makueni County, Southeast Kenya





## Sand Dam Programmes

Sand dams are most effective when embedded within a wider, integrated approach to water and land management. By slowing the flow of water, they help reduce erosion and encourage groundwater recharge upstream and along riverbanks. Increased soil moisture supports vegetation growth, improves agricultural productivity, and contributes to the restoration of degraded landscapes. Trees and crops planted near sand dams often show higher survival rates and improved yields, strengthening local livelihoods and food security.

Central to the success of sand dams is the active involvement of communities in their construction, management, and maintenance.

Community-led approaches ensure that local knowledge is incorporated, and foster a strong sense of ownership, which is essential for long-term sustainability. Once established, sand dams can provide reliable access to clean water for decades, even in areas experiencing increasing climate variability. As a low-cost, climate-resilient solution, sand dams offer a powerful means of improving water security, restoring ecosystems, and enhancing wellbeing in water-stressed communities.

To ensure that communities can realise the wide range of benefits offered by sand dams, Just a Drop and ASDF also deliver a variety of activities as part of their sand dam programmes. These are targeted at Self Help Group (SHG) members, and include promoting food production through the planting of drought-tolerant crops, as well as providing training on natural resource management and riparian protection<sup>1</sup>. Additional capacity-building focuses on financial management, post-harvest handling, group dynamics and governance, and Voluntary Savings and Loan schemes.

Hygiene and sanitation are also addressed through training using the Participatory Hygiene and Sanitation Transformation (PHAST) methodology, with SHG members receiving additional instruction on soap-making to improve household hygiene while also creating potential income-generating opportunities.

<sup>1</sup>“Riparian” refers to the areas of land that are directly adjacent to rivers, streams, or other bodies of water.



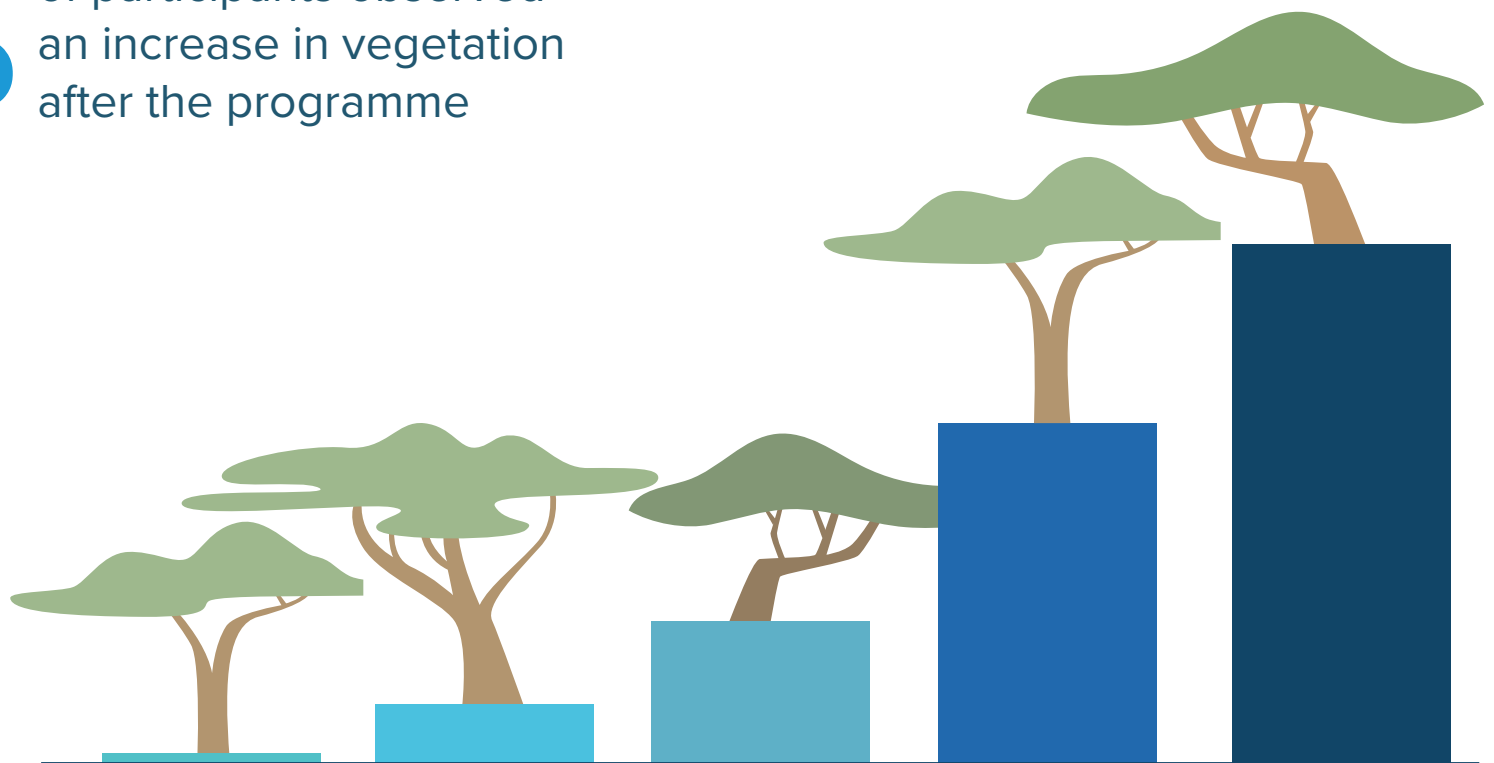


## Research Design and Methods

Just a Drop, in partnership with ASDF and academic researchers from institutions in the UK and Europe, designed a seed funding study to explore the multiple outcomes of an integrated sand dam approach.

Baseline data collected from sand dam programme target communities between 2018 and 2023 in Kitui, Makueni, and Machakos Counties of Kenya provided the foundation for this study. These sand dam programmes were delivered by Just a Drop and ASDF. Existing survey data from over 50 SHGs, covering more than 650 households, were analysed across nine key metric categories. A gap analysis identified areas requiring additional data, prompting a second round of field surveys targeting 280 households. These surveys captured further information on environmental, health, and livelihood impacts, while also providing a second data point to illustrate longitudinal changes from the baseline.

**94%** of participants observed an increase in vegetation after the programme



Data collection encompassed multiple sources, including individual households, focus group discussions, and key informant interviews, ensuring a holistic view of community experiences and outcomes. All collected data were compiled and analysed using the mWater data management platform, with results visualised through statistical graphics.



This comprehensive assessment also enabled the development of a localised model for evaluating WASH interventions that integrates Water, Energy, Food, and Environmental (WEFE) outcomes, providing robust evidence to guide both immediate programming and long-term investment in sand dam initiatives.

## The following section summarises the key findings and observations from this research:



# 88%

of people reported that water is now readily available all year round



A 38% decrease in health related expenditures

### Water access and sanitation

Participation in the programme led to a dramatic increase in household water use, with families accessing at least two and a half times more water per day, and in one location as much as four times more.

This increase meant that basic domestic needs were more consistently met, freeing up both time and water for productive activities such as crop cultivation and livestock rearing. As a result of improved infrastructure and access, 88% of participants now report that water is readily available throughout the year. Physical access also improved significantly: for 53% of households, the distance travelled to collect water was reduced to one kilometre or less, while the proportion of people travelling more than two kilometres fell sharply from 54% to just 6%. These gains translated into clear health and financial benefits, with two-thirds fewer people reporting illness from waterborne diseases, and more than one in three households stating that their medical expenses had dropped by at least half since joining the programme. Although open defecation rates were already low at the outset, the quality of sanitation improved over the course of the programme, with a 10% increase in the number of people now using covered pit latrines.



## Environment and agriculture

The sand dam programme has led to clear environmental improvements in the surrounding areas. An overwhelming **94%** of participants reported a noticeable increase in vegetation since the programme was completed, reflecting improved water availability and ecosystem recovery. These changes have also been felt at farm level, with **37%** of participating farmers observing improvements in soil quality. In addition, households reported a significant increase in tree planting, alongside a **40%** improvement in tree survival rates, suggesting that better water access is enabling more sustainable land management practices.

## Productivity and income

The study found clear evidence that participation in the programme strengthened household livelihoods. Farming activity increased among participating households, while reliance on casual labour as a primary source of income declined. These changes were reflected in household earnings: **50%** of participants moved out of the lowest income group, and the number of households in the two highest income brackets tripled.

Improved access to water played a critical role in these shifts. For **85%** of people involved in the programme, shorter distances to collect water significantly reduced the time spent on this daily task. This time-saving enabled households to devote more effort to productive activities at home and at work, attend school more regularly, and participate more actively in community life - contributing to more resilient and diversified livelihoods overall.





# Gender dynamics and wellbeing

Alongside improvements in water access and livelihoods, the programme also contributed to positive changes in gender roles and overall wellbeing. Time-savings generated by easier access to water had a particularly strong impact on women. With less time spent on water collection, women were able to engage in a wider range of activities beyond traditional household roles. Increased participation in community groups and local initiatives further strengthened their confidence, with more than one in five women reporting that they now felt able to take on roles traditionally dominated by men.



These practical and social changes translated into broader gains in wellbeing. Participants consistently described improvements to their quality of life and expressed confidence that these would last. By the end of the programme, nearly two-thirds of respondents - almost three times as many as at the start - reported feeling hopeful about the future, indicating a sustained sense of optimism and resilience.

## Looking to the Future

These results are extremely encouraging and highlight the wide range of potential benefits that can be achieved by integrating sand dams into a broader approach to water and land-use management. Because the intervention is relatively low cost and, when combined with strong community ownership, can be sustainably maintained over the long-term, this approach represents a highly attractive proposition for public and private funders seeking significant returns across health, poverty reduction, and wellbeing outcomes.

At the same time, it is clear that further research is needed to provide deeper insights and robust evidence on the effectiveness of this approach. To build on these findings, Just a Drop proposes the following actions:



- **Strengthen research partnerships:** Continue to collaborate with individuals and institutions across disciplines, including public health, water access, land-use and conservation, and gender equity.
- **Develop targeted research streams:** Design specific studies to explore in greater detail the range of outcomes highlighted by this research, providing robust evidence and further refining our theory of change.
- **Integrate data collection into project design:** Build monitoring and evaluation mechanisms into ongoing projects to capture data that supports future research and continuous learning.

With thanks to: Jonathan Garrard, Fiona Jeffery, Alice Murphy, Bella Mytton-Mills, Maria Niebla del Campo, Hadeel Hosney, Laurence Peinturier, Ha Phan, Africa Sand Dam Foundation.

The project was supported by the Department of Science, Innovation and Technology's International Science Partnerships Fund (ISPF) via the Royal Academy of Engineering under the Frontiers programme.