



# ROTARY FUNDED SAND DAMS

Kenya, 2014

# ABOUT EXCELLENT DEVELOPMENT

Excellent Development supports subsistence farmers and their families to gain access to clean water and grow more food to eat, store and sell. We support communities to build sand dams which provide clean water and the potential to invest time in sustainable agriculture.

In Kenya we work with our partner the Africa Sand Dam Foundation (ASDF) to build sand dams and implement food production activities with local communities.

We are proud to be working with Rotary to support communities in Kenya to transform their lives through local, reliable and cost-effective water supplies. Since 2010, Rotary have supported 18 communities in Kenya to develop water and food security.



## Patrons

Lord Joel Joffe CBE  
Sir Edward Clay

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# INTRODUCTION

Around 200 Rotary Clubs across 15 districts in RIBI came together in a major RIBI wide project to address the problem of drought and food shortage in rural drylands worldwide.

To date, their fundraising efforts have leveraged two Rotary Foundation Global Grants and one Matching Grant that have been used to support nine such communities in rural Kenya. The current of these grant funded projects is currently ongoing until May 2015.

In addition, funding provided directly by Rotary clubs has improved water access to for a further 11 communities, three of these during summer 2014.

This report details the construction of three sand dams in 2014 with the: **Kwa Mwatu Kyangwasi, Kyuasini Water Project**, and **Sindano Wa Wia Women's Self help Groups (SHGs)** in South Eastern, Kenya.

Rotary provided the following funding for these projects:

£29,798 in May 2014 to fund two of the dams

£14,104 in July 2014 to fund the third dam

**Total Rotary Funding = £43,902**

The principal objective for building these sand dams was to create year-round access to water for each of the SHGs and their wider communities.



Members of Kwa Mwatu Kyangwasi SHG

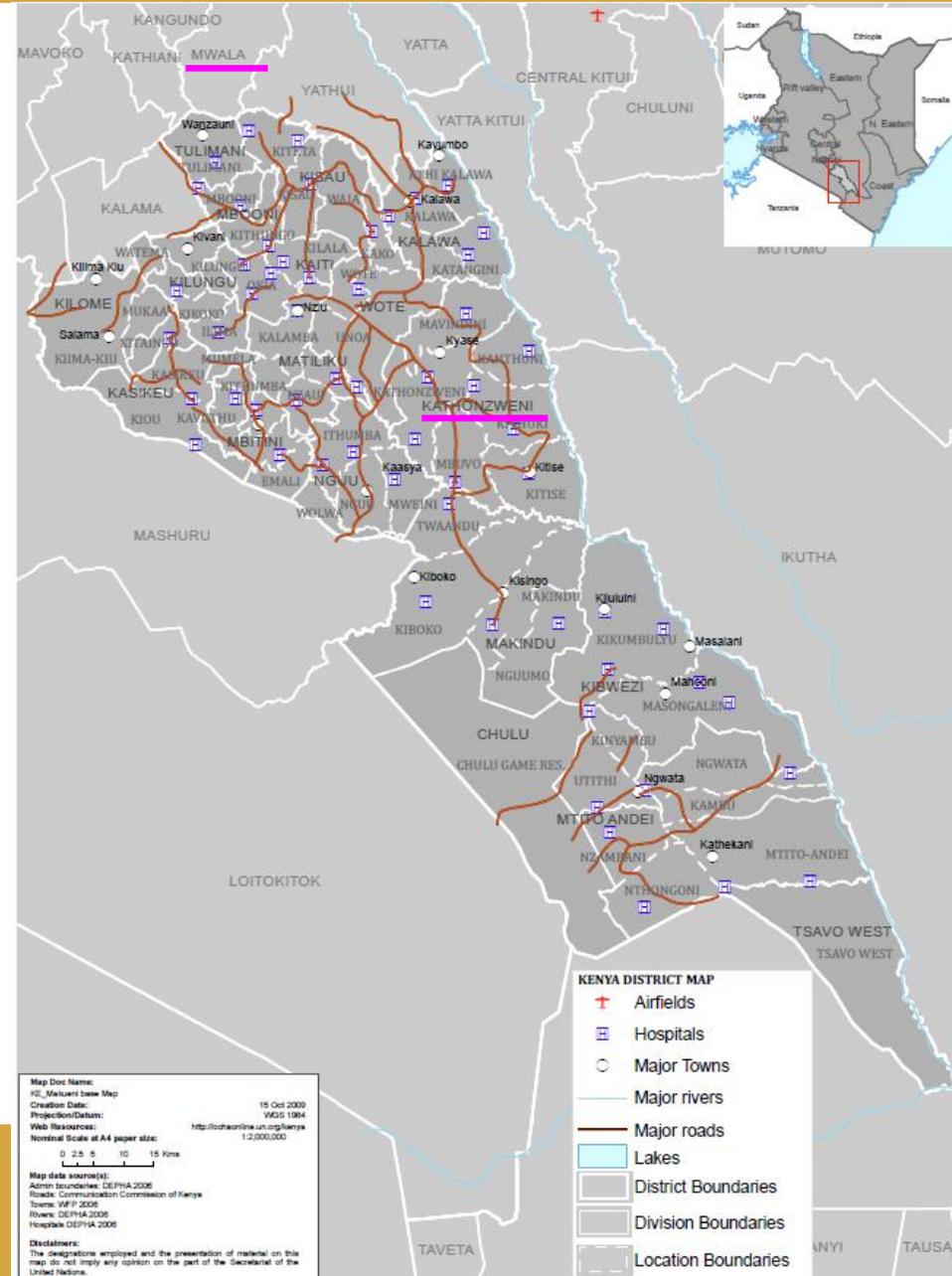
# CAUGHT IN A DRYLAND TRAP

Makueni County is a tough place to live. 95% of the population (more than 840,000 people) are rural farmers living below the national poverty line. Water shortage is a serious problem since they depend on rain-fed agriculture to survive.

Typically, nearest water points in Makueni County are a shocking 10km away. Despite annual rainfall similar to the UK, rains are concentrated into only one or two short flood periods. Most of the rain runs off bone dry land and disappears to the ocean, taking fertile soil with it. To make things worse, climate change is causing more unpredictable rains, longer droughts and heavier floods.

The burden of water collection traps people in a vicious circle of drudgery and poverty – especially women and children who spend on average six hours per day collecting water. During extended droughts, this can take up to 12 hours per day. Children, especially girls, often miss school to help their families collect water. This steals time away from more productive activities like farming and education.

Communities supported by this project are located in Kathonzweni district and just over the Makueni / Machakos county border in Mwala district.



# THE COMMUNITIES

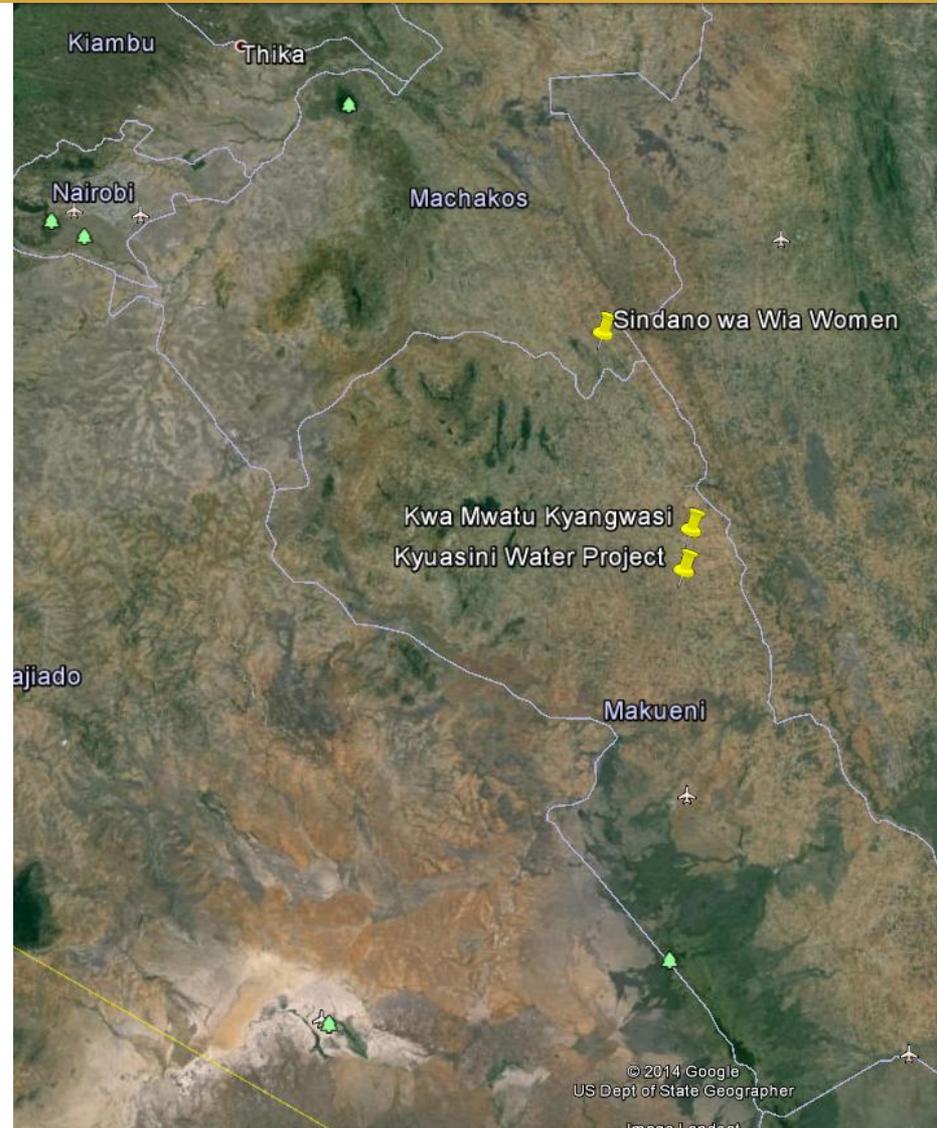
**Sindano Wa Wia SHG** consists of 36 members (33 of whom are women) from Muangeni Village (705 people). This group is based in Ngungi sub-location (2,551 people) in Mwala District.

**Kwa Mwatu Kyangwasi SHG** has on average 16 active members of the group who are based in the villages of Mwanyani, Kiaoni and Kiukuni. The combined village population is 590 people. Located in the Kanthuni sub-location (3,053 people) in Kathonzweni District.

**Kyuasini Water Project SHG** is made up of 21 active members from Kimundi Village (population 214). The group is based in a sub-location of the same name (3,082), also in Kathonzweni District.

The new sand dams directly benefit 73 active SHG members, their families and the people living in the villages where the new sand dams are built. A total of **1,509 people**.

In addition, the sand dams are intended to create a ripple effect of benefits for people living further away – typically the sub-location populations: **8,686 people**, either because they too will collect water from the dams, and/or because the dams reduce pressure on other overstretched water sources in the area, particularly during drought periods.



GPS locations of each of the three sand dams.

# WHAT ROTARY IS ACHIEVING FOR THE GROUPS

Before this project, the communities were collecting water from shallow wells, open rivers and pipelines, often located several kilometres from their homes. Communities often complain that these water sources quickly run dry because of the scarcity of other water points, and/or become dirty and unsafe from contamination by animals and other pollutants. Sand dams will change all of this.

The primary benefit of the sand dams is the provision of local, reliable water supplies. This reduces the distance the groups had been walking in search of water and saved them time and energy to work on their farms. SHG's now have a local water source within 30-90 minutes of their homes.

**Opportunity to improve food production:** Having a local, year-round water supply not only means people have more time to spend on farming but the water stored in the sand dams can be used to support farming activities such as tree planting and vegetable growing, and even provide new water points for people to take livestock. Thanks to Rotary's funding for these sand dams, Excellent Development is able to access co-funding from other donors, including the UK Government, to support these communities to implement a range of sustainable farming and food security activities and build further sand dams.

**Benefits to children:** The availability of water provides real benefits to children. Initially many children in the communities miss classes because they need to help their parents with water collection. With the new sand dams, parents will be able to fetch water from sources that are closer to their households enabling children to attend school more often.

Also, as a result of the closeness to water sources and the availability of fruits and vegetables from the food production activities that will follow this project, children will grow up in a better environment with healthier nutrition. This will improve their health as well as concentration at school.



Kwa Mwatu Kyangwasi SHG previously relied on the shallow well above. Unfortunately, shallow wells like this are prone to running dry. With a sand dam, the volume of water available in the channel, significantly increases, shallow wells like this are recharged and can be used for longer into the dry season. The tradition of collecting water from shallow wells and dry river beds, is of course a very good sign that the community will use their new sand dam because it does not require behavioural change.

# SITING AND DESIGNING THE DAMS

The first stage in the project was for the members of the SHGs to discuss with ASDF Field Officers their specific water needs and preferences for where to site their sand dams from a practical perspective. Input from female members is especially important for choosing suitable sites because the responsibility for collecting water typically falls to women and then to children.

ASDF then assessed these sites from a technical perspective to agree on the best site for each sand dam. During this process the SHGs also decided on the abstraction methods they preferred to use. Once all these details were agreed, ASDF drew up designs and bill of materials for each dam which became the blueprints for construction.

Next the groups were responsible for ensuring the necessary legal agreements were in place. This involved signing an agreement with landowners adjacent to each dam site to ensure permanent access to the dam. Once constructed, ASDF then helped the SHGs to register their dams with the Water Resource Management Authority (WRMA).

The site chosen by Sindano wa Wia SHG for their sand dam, pictured here on the right, utilised the bedrock protruding at the surface. By taking advantage of this rock, less cement and steel were required, and the community needed to collect less sand, stones and water.



# CONSTRUCTION PROCESS

In order to build their dams, the groups first needed to collect all of the local materials (sand, stones and water), and they needed to terrace the valley on either side of the site for the dam to prevent soil being washed into the dam during the rains. Once completed, ASDF's Dam Coordinator visited each site to check the quantity and quality of materials collected and ensure that the terracing has been completed satisfactorily. Only then were specialist materials ordered (cement and steel) for construction to begin.



(Above) A lady from Kwa Mwatu Kyangwasi SHG breaks stones to make sure there are enough quantities of small and large stones for the construction.

(Left) Members of Kyuasini Water Project SHG excavate the area where the wings of their dam will extend.

# HOW THE DAMS ARE BUILT

The construction work itself was all done by members of the SHGs, guided by craftsmen who are responsible for building the timber framework, and by ASDF's field staff and dam coordinators. The day after construction is completed, the timber shuttering is removed. Barbed wire used to reinforce the structure is trimmed and any holes or exposed rocks are plastered with mortar. Finally, in order for the dam to reach its maximum strength and to prevent shrinking and cracking, the dam is watered to 'cure the cement' for 4 weeks after construction. Keeping the dam hydrated in this way lets the cement and sand particles bond together.

Below: Timber shuttering provides the framework for Kyuasini Water project SHG's sand dam



Above: Kwa Mwatu Kyangwasi SHG mixing cement, Top: the same SHG filling in the trench dug for the wing walls.

# KWA MWATU KYANGWASI SHG SAND DAM & SHALLOW WELL



Thanks to the fundraising contribution from the Rotary Clubs of Littlehampton, Chichester Priory, Brighton & Hove Soiree, and the Rotary District 1250, the Kwa Mwatu Kyangwasi SHG were able to build their sand dam. The group chose to add a shallow well as an additional feature to aid water collection. Photos on this page show the sand dam during construction and the completed shallow well.



# SINDANO WA WIA SHG SAND DAM

Thanks to support from the Rotary Clubs of Billericay in District 1240, the Sindano wa Wia SHG were able to build their first sand dams in August 2014.

The photos on this page show the sand dam after completion and following the first rains.



# KYUASINI WATER PROJECT SHG SAND DAM



Kyuasini Water Project SHG's sand dam was enabled by funding contributed by the Rotary Clubs of Bretby, Sherwood Sunrisers, Worksop Dukeries, Belper & Duffield, Clay Cross, Derby, Swadlincote, Bakewell, Drone Valley, Hope Valley, Matlock, Kirkby in Ashfield, Sherwood Forest, and West Ashfield, from Rotary District 1220.

The contribution from these clubs was used to enable the Kyuasini Water Project SHG to build their sand dam in August 2014. The photos right show the construction process and above the completed sand dam.

# HOW THE SAND DAMS WILL WORK

## What is a sand dam?

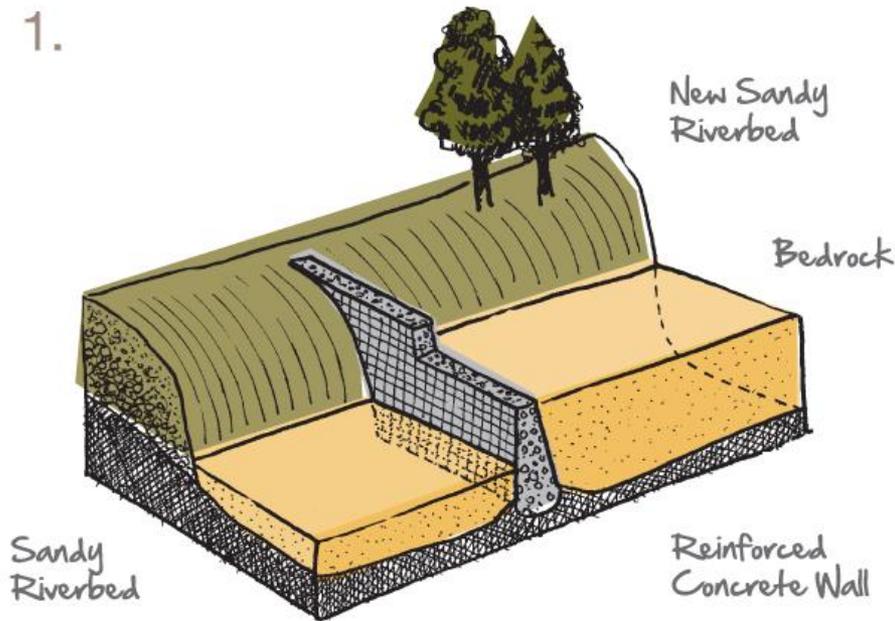
A sand dam is a reinforced concrete wall built across a seasonal sandy river. They are a simple, low cost and low maintenance technology that serves to retain rainwater and recharge groundwater.

They can store up to 20 million litres of water and are widely suited to dryland regions of the world.

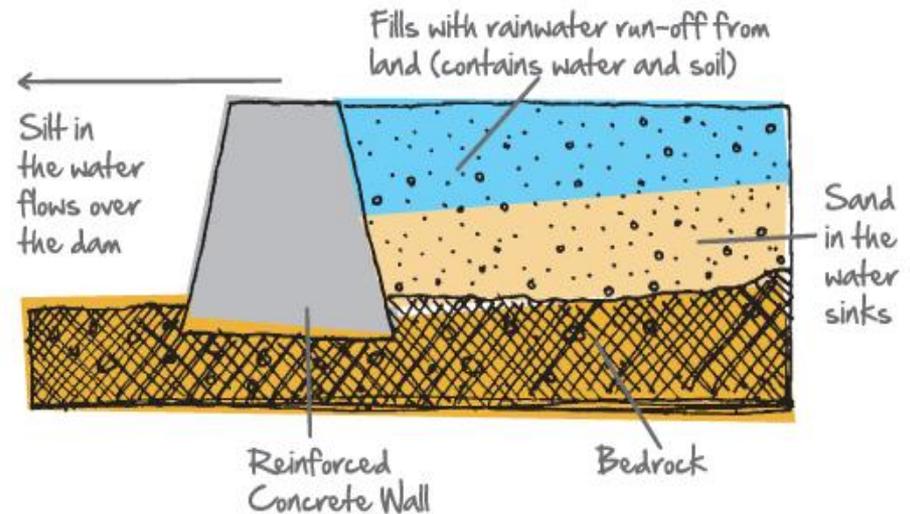
## How do sand dams work?

Seasonal rainfall fills the dam with water containing eroded soil. The soil is made up of silt and sand. The heavier sand sinks behind the dam, whilst the lighter silt washes downstream.

1.

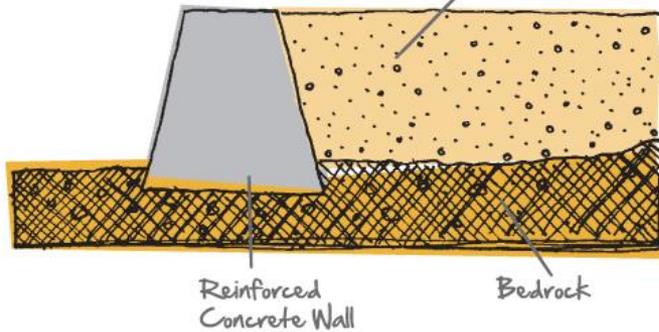


2. 1-3% of water flowing downstream is retained behind the wall



# HOW THE SAND DAMS WILL WORK

Dam fills with sand - but  
25-40% of the volume is water!



## Getting Water from Sand Dams

1. People use traditional scoop holes to collect water from any point along the dam.
2. Infiltration galleries leading to pipes or taps enable water to be abstracted through the dam wall.
3. Infiltration galleries can also be linked to sealed shallow wells with hand pumps.

Sand accumulates behind the dam until it is full to the spillway. 25-40% of this volume is actually water, trapped in the spaces between grains of sand.

Because the water is stored within the sand, it is protected from evaporation losses.



# HOW WE SPENT YOUR FUNDS

	BUDGET FOR 3 SAND DAMS	TOTAL EXPENDITURE	VARIANCE
<b>Project Mgt &amp; Fieldwork</b>	£ 7,854	£ 9,579	£(1,725)
<b>Finance &amp; Admin Costs</b>	£ 2,771	£ 2,771	£0
<b>Transport</b>	£ 1,852	£ 2,036	£(185)
<b>Sand Dams</b>	£ 26,710	£ 24,817	£1,893
Cement	£ 11,980	£ 9,743	£2,237
Steel & Barbed Wire	£ 2,180	£ 1,812	£368
Timber shuttering	£ 1,710	£ 1,795	£(85)
Tools	£ 448	£ 495	£(47)
Materials Transport	£ 1,962	£ 2,646	£(683)
Dam Permits	£ 523	£ 484	£39
Water Abstraction	£ 2,163	£ 1,181	£981
Skilled Labour	£ 5,744	£ 6,661	£(917)
<b>Local Labour and Materials</b>	£ 3,204	£ 3,204	£0
<b>Pioneering Sand Dams</b>	£ 4,710	£ 4,710	£0
<b>Total Project Cost</b>	£ 47,101	£ 47,117	£(17)
Communities' contribution		£ 3,204	
Rotary contribution 1		£ 29,798	
Rotary contribution 2		£ 14,104	
<b>Total Rotary Funding</b>		£ 43,902	
<b>TOTAL CONTRIBUTIONS</b>		£ 47,106	
Overspend		£(11)	

## Acknowledgements

Excellent Development is grateful to all of the Rotary Clubs and Districts who have contributed towards this work. We are also indebted to many individual Rotarians who have dedicated their time and support to helping promote Excellent's particular approach to sustainable development.

For the projects featured in this report, we would particularly like to acknowledge the involvement of:

**Rotary International District 1220** and the Rotary Clubs of: Bretby, Sherwood Sunrisers, Worksop Dukeries, Belper & Duffield, Clay Cross, Derby, Swadlincote, Bakewell, Drone Valley, Hope Valley, Matlock, Kirkby in Ashfield, Sherwood Forest, and West Ashfield.

**Rotary International District 1240** and the Rotary Club of Billericay.

**Rotary International District 1250** and the Rotary Clubs of Littlehampton, Chichester Priors and Brighton & Hove Soiree.

And, the Rotary Foundation.

THANK YOU FOR  
YOUR SUPPORT



Sindano wa Wia SHG (above) are already using their new sand dam to support a tree nursery