



# UTOONI DEVELOPMENT ORGANIZATION (UDO)

Kenya



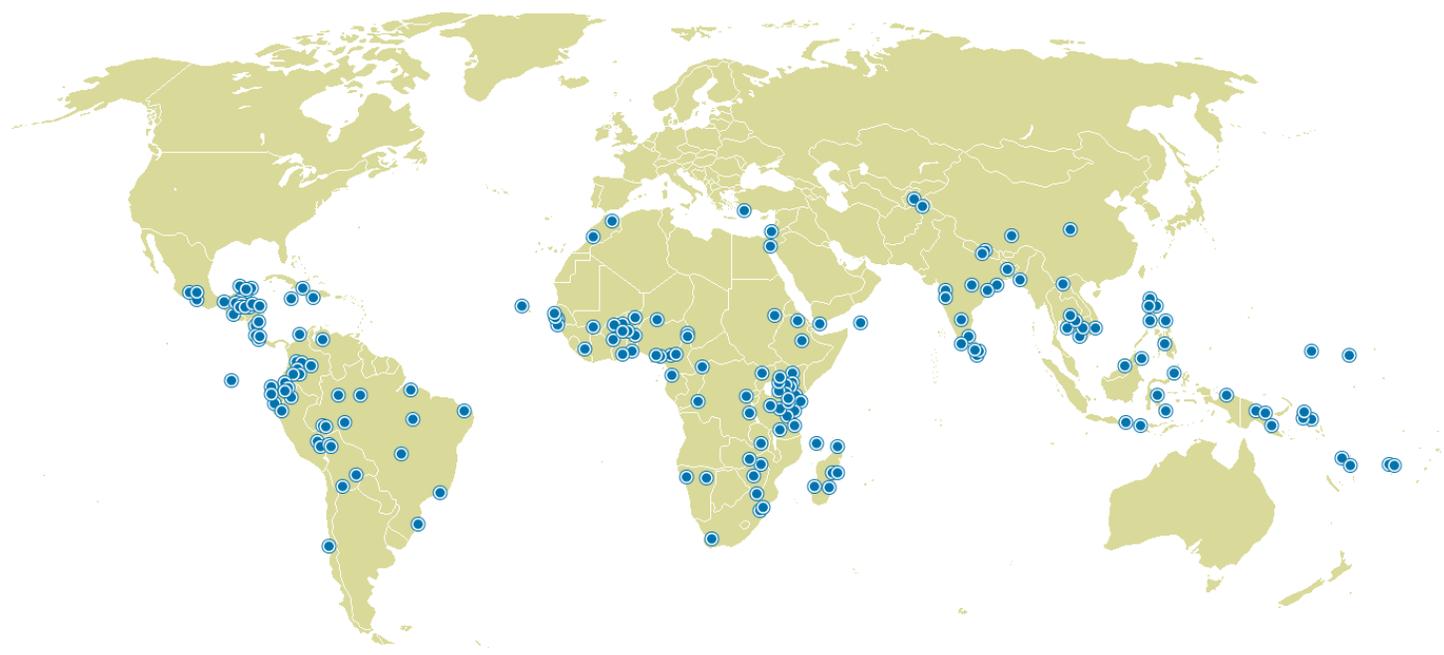
## Equator Initiative Case Studies

Local sustainable development solutions for people, nature, and resilient communities

# UNDP EQUATOR INITIATIVE CASE STUDY SERIES

Local and indigenous communities across the world are advancing innovative sustainable development solutions that work for people and for nature. Few publications or case studies tell the full story of how such initiatives evolve, the breadth of their impacts, or how they change over time. Fewer still have undertaken to tell these stories with community practitioners themselves guiding the narrative. The Equator Initiative aims to fill this gap.

UNDP's Equator Initiative, in partnership with ENDA Tiers Monde (ENDA), Open Society Initiative for Southern Africa (OSISA), United Nations Convention to Combat Desertification (UNCCD), and funded by the Global Environment Facility (GEF), identified examples of local ingenuity, innovation, and leadership in sustainable land management (SLM) in drylands in Sub-Saharan Africa. The following case study is one in a series that describes vetted and peer-reviewed best practices in SLM management, with the purpose of inspiring the policy dialogue needed to take local success to scale, to improve the global knowledge base on local environment and development solutions, and to serve as a model for replication.



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## PROJECT SUMMARY

Utooni Development Organization (UDO) is a Kenyan NGO dedicated to improving the lives of subsistence farmers living in environmentally degraded, drought-prone, arid and semi-arid lands. The organization takes a holistic approach to development that promotes water and food security and environmental restoration through the construction of sand dams and the introduction of drought resistant crops, soil conservation strategies and tree planting. Sand dams provide ample, clean water to communities for decades, resulting in increased agricultural yields, environmental restoration, improvements in community health and the creation of income opportunities.

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## KEY FACTS

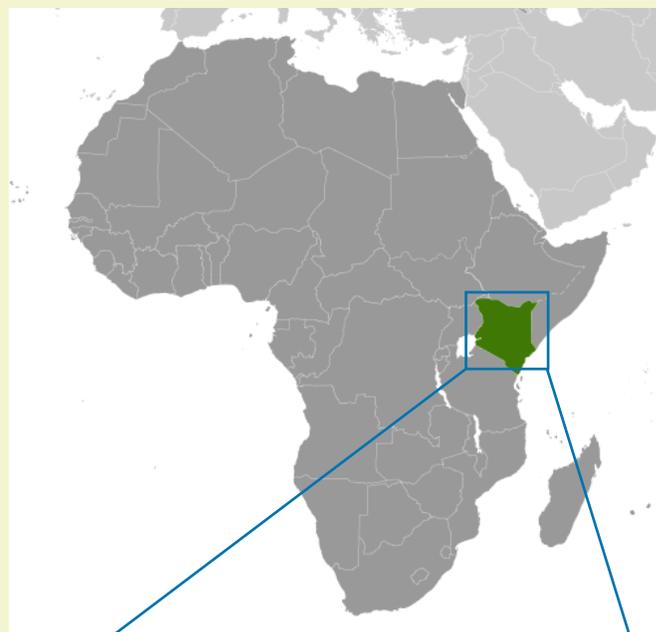
EQUATOR PRIZE WINNER: 2014

FOUNDED: 2002

LOCATION: Operating in Machakos, Makueni and Kajiado Counties, Kenya

BENEFICIARIES: 75 self-help groups, 22,200 individuals

AREA OF FOCUS: Biodiversity, drylands management, habitat restoration



# Background and Context



Utooni Development Organization works with government-recognized self-help groups in Machakos, Makueni and Kajiado Counties in south central Kenya. Machakos and Makueni Counties lie southeast of the capital Nairobi and are primarily inhabited by farmers of the Kamba ethnic group. Kajiado County is southwest of Nairobi in the Rift Valley bordering Tanzania and is home to the pastoralist Maasai people as well as to Amboseli National Park, one of the country's premier wildlife parks.

The three counties are characterized as arid and semi-arid lands, receiving an average of 600 millimeters of rain per year. The "short rains" occur from October to December while the "long rains" last from March to May, although there is great variation from year to year. In recent years the area has experienced chronic drought. The terrain is hilly, with an average elevation of 1400 meters above sea level. Residents of the three counties are dependent upon agriculture and livestock for their livelihoods. Drought, exacerbated by poor land management practices and climate change, has produced a domino effect of problems from food insecurity to chronic poverty and associated environmental and social problems.



Drylands cover 84 percent of Kenya and support nearly 10 million people, around a third of the country's total population. However, drylands receive little governmental support in the form of infrastructure and social services, and poverty rates are generally higher in these areas (Machakos and Makueni Counties, for example, have poverty rates near 60 percent). Although soils in the three counties where Utooni Development Organization works are rich, they are unproductive due to a lack of water. During recent droughts, communities in the area were forced to rely upon donor food aid. Yet as soon as aid disappeared, residents faced starvation. A local farmer, Mitto Andei, remarked of the situation: "We do not want relief. Give us water, and then we can grow our own food." Utooni Development Organization has addressed the region's woes in a stepwise manner, first focusing on the provision of water, then following up with training on sustainable farming and tree planting. These efforts have resulted in the transformation of arid and semi-arid lands into productive landscapes.



# Key Activities and Innovations



The Utooni Development Organization helps communities become self-sufficient and food-secure through a holistic, complementary set of strategies promoting water conservation, drought-resistant crops, tree planting and soil conservation.

## *Sand dam technology*

Arid and semi-arid lands are particularly vulnerable to climate change. In south central Kenya, rainfall has become more erratic, causing drought and the drying of wells and rivers. An initial strategy, the construction of borehole wells, provided some relief to communities, but they often failed due to maintenance issues (lack of training as well as spare parts) and low water tables. A simpler, easier to maintain solution was needed. Utooni Development Organization rediscovered an indigenous water retaining device that is thousands of years old: the sand dam.

Modern sand dams are reinforced concrete walls that are built across seasonal river beds to capture and store water. The structures range in height from one to five meters and span as far as 90 meters. When seasonal rains fall, most of the water in the seasonal river flows over the concrete barrier (about 97 percent), but enough water is trapped behind the dam, beneath sand, to provide an artificial aquifer for the community. Well-designed sand dams hold as much as 10 million liters of water, enough to supply a community of more than 1,000 through the dry months. The sand serves a multitude of functions: it holds the water in storage, it minimizes evaporation by the sun and it cools and filters the water. Communities access the water in the sand dam via a pipe at the base of the dam, through wells, by digging scoop holes or by pumps.

Sand dams are simple to build, low-cost, low-maintenance structures. Their construction uses local materials, such as rocks and sand, and local labor, augmented by a few external inputs including concrete, reinforcement bars and wire or lumber for concrete forms. Sand dam construction takes a matter of weeks to complete yet provides communities with potable water for decades. To date, Utooni

Development Organization has overseen the construction of more than 1,500 sand dams in south central Kenya.

In addition to sand dams, Utooni Development Organization has helped communities to achieve water security by constructing two pipelines, three rock catchment systems and more than 8,500 water tanks.

## *Drought resistant crops*

Maize is a staple crop in south central Kenya, but it is a heavy water-user and often fails to survive droughts, which are increasingly common in the region. Poor farming practices, such as not allowing corn fields to lie fallow after harvest, deplete soil nutrients. In an effort to boost local food security, Utooni Development Organization educates self-help groups about sustainable agriculture practices and the benefits of growing indigenous, drought-resistant crops. Com-



munities now realize greater annual harvests of crops from more drought-resistant species such as sorghum, millet, green grams, lablab, pigeon peas and cowpeas. Through training programs, self-help groups are taught how to practice intercropping to diversify output and improve pest resistance.

### *Tree planting*

Charcoal making and firewood collection are the biggest drivers of deforestation in Machakos, Makueni and Kajiado Counties. Utooni Development Organization works with local communities to create tree nurseries and reclaim degraded lands through tree planting, with the long-term goal of re-establishing forest cover and improving soils. Communities participate in selecting which species to propagate and plant, focusing on trees that yield good firewood, edible fruits, palatable fodder for livestock or medicinal barks, fruits and leaves for health care. Utooni Development Organization mentored self-help groups have established more than 75 tree nurseries and three protected forests, and carry out tree planting activities at local schools as well as within government forest reserves.

Such actions have substantially improved the local environment. To date, over one million trees have been planted in the three counties where Utooni Development Organization works.

### *Terracing*

Terracing is a land management technique that increases soil moisture while preventing erosion. Communities served by Utooni Development Organization have dug more than 1.8 million meters of terraces. Terracing prevents torrential downpours from carrying silt into riverbeds, which would endanger the efficacy of sand dams. Terraces hold water in soils even in the dry season, enabling farmers to obtain higher yields from their vegetable plots and orchards.

Together, sand dams, drought-resistant crops, tree planting and terracing work in concert as complementary, mutually-supporting land management strategies that help communities restore degraded lands. Each strategy supports a basic community need: sand dams supply water, drought-resistant crops provide food, tree planting yields firewood, fruit and medicine and terracing conserves soil.



*“Water harvested by the sand dam raises the water table both upstream and downstream of the sand dam. As the aquifer increases in size local wells have more water and springs return to the area.”*

*Kevin Muneene, CEO, UDO*

# Impacts



## BIODIVERSITY IMPACTS

Utooni Development Organization's land management strategies produce a range of environmental benefits. Sand dams raise the water table and permit irrigation, giving the rich native soils a chance to support trees and crops. As degraded lands heal and bloom, birds, insects and mammals return to vegetated areas, restoring important services and functions.

### *Greenways*

Sand dams raise the water table in areas near dams, as well as down river. The excess water recharges springs and encourages the growth of native vegetation along seasonal river courses. The resultant plant and tree cover holds soil in place, conserves soil moisture and adds nutrients to the soil. The shade and greenery provided by these human-created greenways attracts birds, insects and mammals, restoring important ecosystem functions such as pollination. Over time, these green microclimates become refuges in an arid landscape and provide humans and wild species with a buffer against climate change.

### *Sustainable land management*

In the past, many communities in the area were stuck in mutually reinforcing cycles of poverty and land degradation. Drought pressured farmers to put more land into agriculture, often using poor agricultural practices that increased erosion and decreased soil fertility. Failed crops in turn drove deforestation rates higher as community members turned to charcoal production as a means of livelihood.

Reliable water sources for irrigation, in the form of sand dams, provide communities with a means to break the cycle of poverty and poor land stewardship practices. Planting native, drought resistant crops rather than exotics such as maize improves yields and environmental resiliency. Through training from Utooni Development Organization and its partners, farmers learn how to implement no-

till farming, use green manures and nitrogen-fixing plants to build soil fertility and how to let fields lie fallow to recover after harvest. Communities are also taught how to consolidate livestock into holding camps to reduce grazing pressure on natural and planted vegetation. Consolidating animals around steady sources of water frees Maasai pastoralists from walking long distances in search of water and results in better animal health. Animal manure can also be more easily collected from enclosures and added to soils. States Kevin Kamuya, Utooni Development Organization's chief executive officer, "We have literally turned arid and semi-arid lands into some of the most productive farmland."



## SOCIOECONOMIC IMPACTS

With the assistance of Utooni Development Organization, many communities in Machakos, Makueni and Kajiado counties have moved from hand-to-mouth subsistence farming to self-sufficient farming that produces agricultural surpluses. The ability to grow excess food has in turn created jobs and business opportunities for community members, improving the economic fortunes of the community. Provisioning of reliable, potable water has also reduced the incidence of disease, increasing community well-being.

### *Creating local income opportunities*

In the years prior to the construction of sand dams, many communities lost large numbers of youth to emigration due to a lack of employment options. Sand dams enable farmers to irrigate small farm plots, orchards and greenhouses, some large enough that they require extra labor for tending and harvesting. These jobs represent the foundations of a nascent local economy. Small loan programs within communities have given farmers and women's groups the ability to earn supplemental income selling excess vegetables and fruits, such as mangos, avocados, guava, papaya and bananas. Greenways in proximity to sand dams have also attracted bees, allowing some communities to diversify income streams with the establishment of apiaries. The extra income earned from the sale of vegetables, fruits and honey has allowed parents to send their children to school as well as to buy necessary household goods. One self-help group member served by Utooni Development Organization, Josephine, is earning nearly 7,500 USD per year, or 6 times the national per capita income. Josephine has even created a retirement fund – a rarity in rural Kenya.

### *Improving community health*

Unclean water sources are a major health risk to humans and livestock in Africa. Sand dams reduce exposure to waterborne diseases by trapping water below ground, away from parasites and mosquitoes that serve as vectors for disease. The sand in the sand dams naturally filters water, decreasing exposure to bacteria, protozoa and parasites that cause diarrhea, hepatitis A and Schistosomiasis. Typhoid is a particularly serious waterborne disease. Prior to the construction of a sand dam in Makueni County, 15 people in one self-help group died from an outbreak of typhoid fever that was contracted from contaminated river water. Says Dorcas Nzioki of the Miamba self-help group: "We used to get diseases from drinking water from the rivers, but from when Utooni helped us to build the (water) tanks, that's in the past." Sand dams, water catchments and water tanks also provide more water for bathing and washing clothes, increasing community hygiene and resistance to disease.

Potable water and an abundance of fodder have made livestock healthier, increasing milk and meat production for communities. The move away from staples such as maize and beans to a more varied diet of drought-resistant crops and nutritious fruits from planted trees has also improved local health. UDO reports that rates of childhood malnutrition in one area served has dropped from 7 percent to 0 percent.



### *Strengthening local capacity*

By working with recognized self-help groups, UDO avoids a "top down" approach to development. Self-help groups are responsible for identifying problems, making decisions and asking for Utooni's assistance. Such an arrangement respects local leadership and reinforces community decision-making, fostering community independence, self-accountability and empowerment. It also builds upon the Kamba people's concept of *mwethya*, a traditional communitarian ethos of "work group" that directs individuals to subsume their personal goals for the good of the larger community. Additional training in agriculture, apiculture and fruit tree management builds internal community capacity, enabling self-help groups to "graduate" from UDO support and stand on their own as autonomous units.

### *Resilience*

By supplying year round sources of water and establishing local greenways, Utooni Development Organization's work has improved community resilience to drought and climate change. Sustainable land management practices have enhanced soil fertility while terracing protects soils from erosion by erratic downpours. Rates of deforestation and charcoal burning have decreased and forest cover, through tree planting efforts, has returned to many areas. Drought-resistant crops have provided more reliable and diverse food sources than maize, acting as a further buffer against future food insecurity.

## GENDER

In the communities where the Utooni Development Organization works, women and girls bear the prime responsibility for providing water to households. Females walk an average of 4 to 8 kilometers



per day in search of water, and often must queue for hours once they reach water sources. Utooni Development Organization estimates that women in the region spend, on average, 183 working days per year hauling water. Women and girls are therefore the major beneficiaries of sand dam construction. Unsurprisingly, women comprise more than 65 percent of all self-help groups serviced by Utooni Development Organization. Sand dams dramatically reduce the hours women spend searching for water, creating more time for gardening, house chores, and schooling. Self-help group member Lydia Wanguta's comments underscore the importance of sand dams to women's daily lives:

"Before the construction of the dam, we had lots of water problems. We used to travel for around 10 kilometers in search of water. It took a lot of time and we were not able to do other domestic chores. Our children were always late to go to school because even bathing water was very little.... We are now able to fetch water near our houses and we plant vegetables too. Our children are going to school now, and they are clean."

Three of Utooni's Board Members are females, as are six of its employees, two of whom are in senior management. Females in self-help groups served by Utooni Development Organization, now largely freed from the constraints of fetching water, are also able to find employment or start businesses with the help of village savings and loan groups. Susan Kasila, of the Kitandi Fruit Tree Growers self-help group, says her life has been transformed by Utooni Development Organization's work in her community: "My life has changed from a beggar to an independent woman."

## POLICY IMPACTS

Nationally, regionally and internationally, Utooni Development Organization is a leader in sand dam technology and in the management of arid and semi-arid lands. UDO provides technical support to sand dam projects within and outside of Kenya, hosts educational trainings for organizations interested in learning about their programs and delivers presentations at a variety of agricultural and ru-

ral development conferences and meetings. Utooni Development Organization is also a member of Pastoral Ecological Land Use Management (PELUM) Kenya, a network of organizations dedicated to sustainable land management. This organization provides UDO with a platform to network, share information and form partnerships. It also allows Utooni Development Organization access to the Africa-wide PELUM network, where it can promote sand dam construction and other land management strategies to help Africans living in arid and semi-arid lands.

At the local level, Utooni Development Organization's training and education programs build capacity within self-help groups, creating strong, self-sufficient communities that are able to advocate for their own rights with government officials. In discussions with local government officials, UDO supported self-help groups have successfully pushed for expanding tree planting programs and reducing charcoal burning. In Makueni County, such efforts impelled government officials to develop local policies to address deforestation.

Expanding urbanization in Nairobi has created demand for construction materials including sand. Nearly 80 percent of all sand used in construction activities in Nairobi is sourced from the three counties where Utooni Development Organization works. Sand harvesting for construction, estimated at 180 truckloads per day, threatens the seasonal river beds and sand dams upon which many communities rely for water. Through advocacy and lobbying, UDO has supported local communities in their struggle to curb predatory sand harvesting, particularly in areas close to sand dams. As a result, county governors have begun to implement laws and regulations for the extraction of sand, and sand harvesting in the vicinity of sand dams has become rare.



# Sustainability and Replication



## SUSTAINABILITY

Once provided with water through the construction of sand dams, the self-help groups served by Utooni Development Organization become largely self-sufficient and sustainable. Additional services, in the form of agricultural training or technical assistance with the maintenance of water pumps, may be required in the short term. Utooni Development Organization itself is less self-sufficient, as it has been reliant on donor grants for much of its operating budget over the past decade. In order to become more economically self-sufficient over the long term, UDO is currently investigating the possibility of creating farmer training centers or establishing consulting services.

## REPLICATION

Sand dams are a simple, relatively inexpensive (costing around 8,000 USD per dam), high-impact technology that can be adapted to a number of arid and semi-arid regions around the globe. Sand dams are in use across Africa (Angola, Burkina Faso, Ethiopia, Ghana, Mozambique, Namibia, Somalia, Sudan, Tanzania, Uganda and Zimbabwe) as well as in other regions of the world, including Brazil, India and Thailand. Leadership within two Kenyan NGOs currently promoting sand dam construction, the Sahelian Solutions Foundation (SASOL) and the Africa Sand Dam Foundation (ASDF), trace their inspiration and mentorship directly to Utooni Development Organization. Utooni Development Organization's additional strategies of promoting drought-resistant crops, tree planting and terracing also have wide application to arid and semi-arid lands across the globe.

## PARTNERS

Utooni Development Organization's work is funded by many organizations including church groups (e.g., the Mennonite Church and

Salvation Army), development NGOs (Excellent Development UK, Just a Drop and Sahakarini), educational institutions (James Madison University), government (the Japanese embassy) and the private sector (APA Insurance). UDO works in close cooperation with the Kenyan Water Resources Management Authority and the National Environmental Management Authority to ensure that sand dam construction meets environmental and water conservation standards. Partnerships with the Kenyan Ministry of Agriculture, the Kenyan Agricultural and Livestock Research Organization and the World Agroforestry Centre (ICRAF) provide self-help groups served by UDO access to technical advice and training on tree planting, grazing, livestock diseases and crop management.





*“UDO has managed to find creative solutions to environmental and socioeconomic challenges through the holistic approach to its projects achieving greater successes in sustainable land management practice.”*

*Kevin Muneene, CEO, UDO*

## FURTHER REFERENCE

- Utooni Development Organization [website](#)
- Give a dam [video](#)
- [UNDP video](#)
- Stern, J. H. & Stern, A. (2011) Water harvesting through sand dams.
- Simpson, L. (n.d.) [Mennonite Central Committee helps improve health and food security of Kenyan community through sand dams.](#)

## PROJECT PARTNERS

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