Furrows in the Desert

Agricultural development project

north Turkana, Kenya

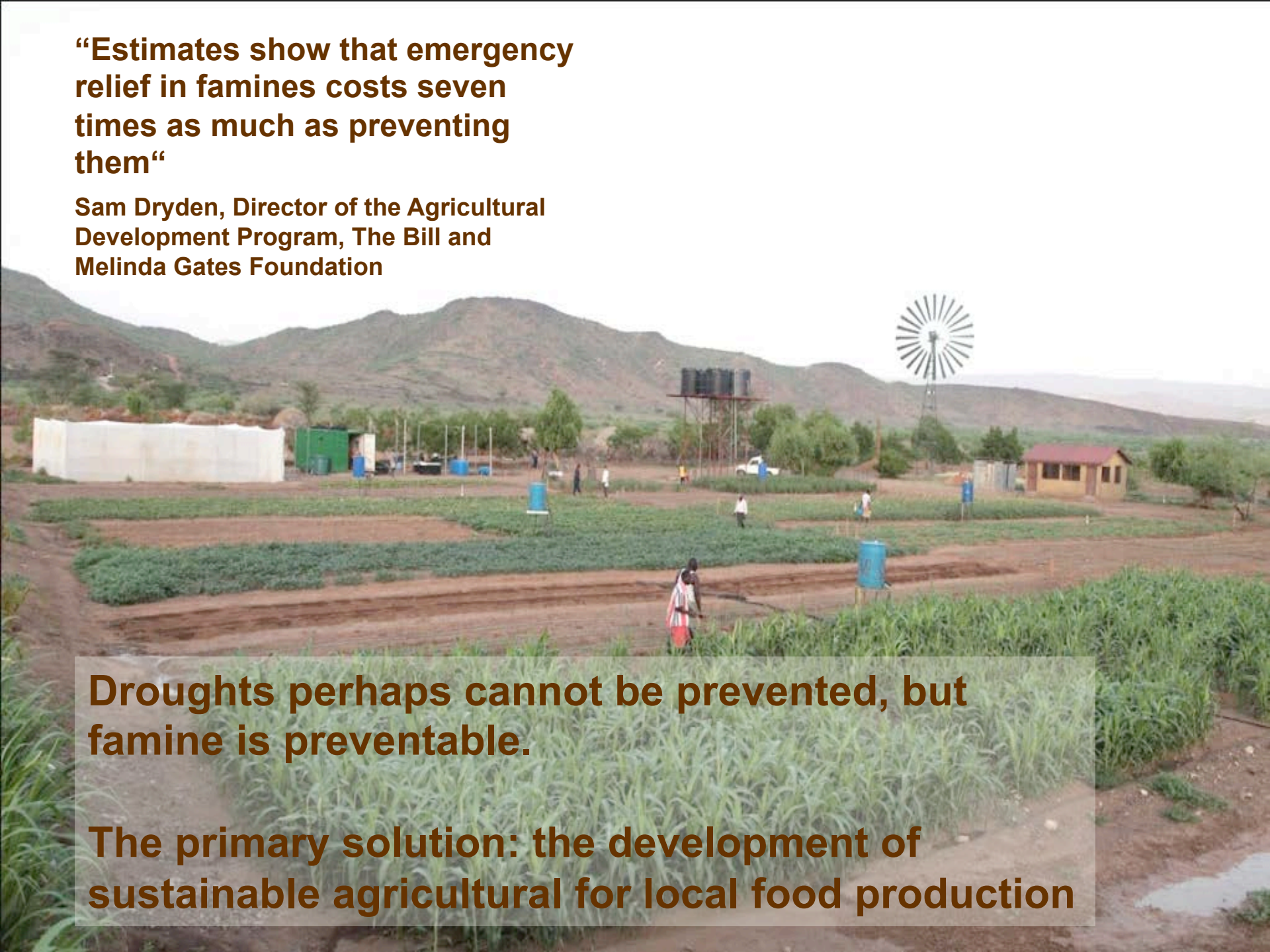
Brit Olam – International Volunteering and Development, Israel
Arava Center for Sustainable Development (ACSD), Israel
The Missionary Community Of Saint Paul the Apostle (MCSPA), Kenya, Spain

In this presentation:

- Why Turkana?
  - Increasing **survival stress** with environmental and geo-political changes resulting in an increasing **dependency on aid food** - the current trend in East Africa
  - Increasing numbers of "**population in transition**" from traditional life
  - Diversification: A need to **develop alternatives**. Local initiative to develop agriculture towards food security and livelihood
- Why Furrows In the Desert (FID)
  - Our development concept
  - Project goals and objectives
  - Innovation and sustainability
  - Water infrastructure
  - Central training, research and demonstration farm
  - Building capacity through training
  - Establishing new farms with our graduates
- Partnering organisations
- How to be part of a change

“Estimates show that emergency relief in famines costs seven times as much as preventing them“

Sam Dryden, Director of the Agricultural Development Program, The Bill and Melinda Gates Foundation



Droughts perhaps cannot be prevented, but famine is preventable.

The primary solution: the development of sustainable agricultural for local food production

Turkana is a semi arid region in Northwestern Kenya, on the border with Ethiopia, South Sudan and Uganda.

It is the largest yet least developed district in the country. Most of its inhabitants are children and youth.

Area of Turkana:	77,000 km^2
Area targeted:	20,000 km^2
Population:	850,000 (Turkana, estimate)
	40,000 (North Turkana, estimate)
Temperature:	20-40^{0}C
Precipitation:	100-400mm/y (low-elevated land)
(non drought year)	2 short rainy seasons
	Typically flash floods lost in runoff
Evaporation:	7-12mm/day
Water quality:	Poor: underground & Lake Turkana: Ph 8-9, EC: 2.5-3.5 dS/m
	Good: surface runoff: PH: 7.8, EC: 0.9 dS/m (Natoo rockdam)
Soil quality:	Poor: 40% sand, 30% silt, 30% clay as Montmorillonite, PH 9
	Good: floating seedbeds: 2:1 ratio dry river sand:compost

Turkana People, a Nilotic Tribe of semi-nomadic pastoralists, still live, for the most part, according to their ancestors' ancient tradition and are known for their resilience and adaptation to harsh desert conditions.

Traditionally the Turkana way of life evolves around their livestock for nutritional and cultural needs

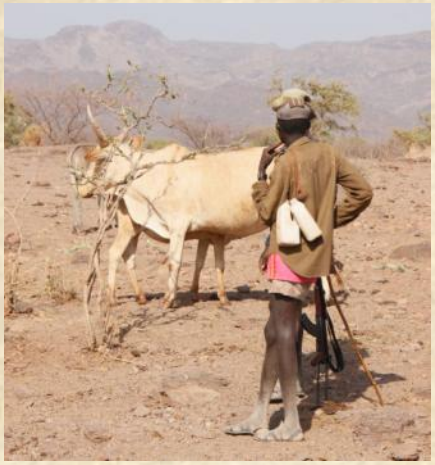
They grow camels, goats, zebu and donkeys

For food they relay on their animals for milk meet and blood. Occasionally they would gather wild fruits, hunt wild animals and gather honey. Often they would trade with neighbouring tribes for maize, beans and very limited verity of vegetables and grains.

Traditionally, if a family lost their livestock it would arm itself and raid a neighbouring tribe to restock.

The Turkana share the same origin and language with the Karamojong tribe of Uganda, and the Toposa and Nyangatom tribes of South Sudan.

The main adversaries of the Turkana People over grassing territory and water resources in north Turkana are the Daasanach (Merille) People of Ethiopia who speak a Cushitic language and share a similar way of life



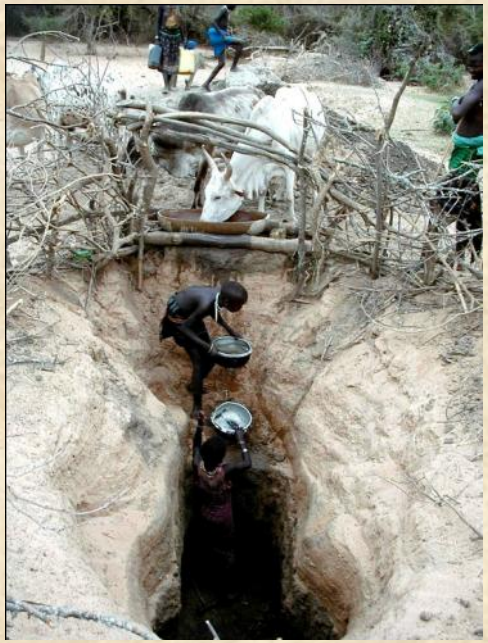
In the last decades increasing numbers of Turkana and other pastoral communities in East Africa can no longer live off their livestock the way their ancestors used to. Frequent droughts and geopolitical changes have led to diminution of local pastures.

As a result there are increasing accounts of starvation, malnutrition (mainly among children), disease outbreaks, deaths of livestock, dependency on aid food distributed by international NGO's, migration to urban centers, and tribal conflicts.

In a drought year, without the flow of runoff water in dry creeks, the shallow aquifers (1-10m) under the dry creeks, are dry

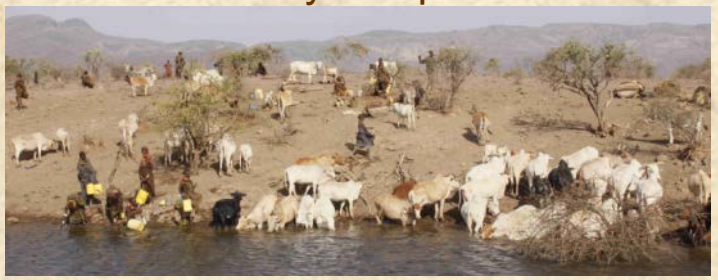
In a drought year, without the infiltration of rain water through geological structures at and around the north-south trending mountain ridges, the deeper aquifers (40-300m) are not charged, resulting in the drying up of drilled wells

In drought years the limited rock dams and clay pans built by NGOs and local construction teams are the only source of fresh water to sustain the people and livestock. At times, they become a place to fight over rather than sustain life.



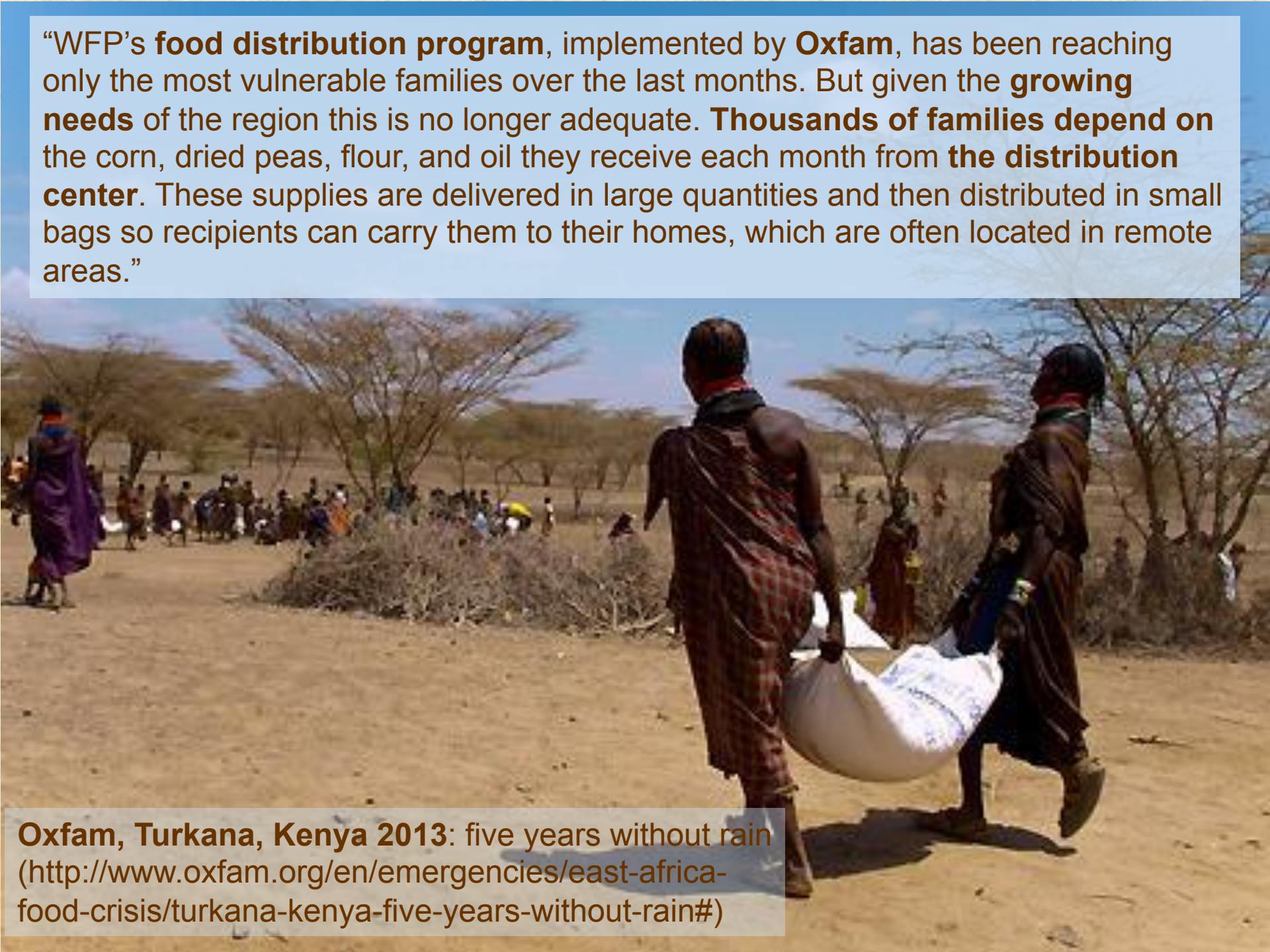
Shallow wells are dug into dry-creek loose sediments. Very low yields and poor safety setup

Left: a well drilled by MCSPA to serve a local community and a nutritional center



Right: women collecting water while the men attend to the livestock at the MCSPA-built Liwan rock dam

“WFP’s **food distribution program**, implemented by **Oxfam**, has been reaching only the most vulnerable families over the last months. But given the **growing needs** of the region this is no longer adequate. **Thousands of families depend on** the corn, dried peas, flour, and oil they receive each month from **the distribution center**. These supplies are delivered in large quantities and then distributed in small bags so recipients can carry them to their homes, which are often located in remote areas.”



Oxfam, Turkana, Kenya 2013: five years without rain (http://www.oxfam.org/en/emergencies/east-africa-food-crisis/turkana-kenya-five-years-without-rain#)

A family that can no longer sustain the traditional way of life is “in transition”.

Without a viable alternative they may raid other tribes for restocking of livestock or collapse into complete dependency on aid food

Diversification for the Turkana People is to have an **alternative way of life** that can be a mean to self subsistence and provide the family with food security

In the past decade commercial fishing on Lake Turkana became such a viable alternative way of life to many who were forced to settle and abandon the nomadic life.

We believe that the development of **sustainable agricultural** is the next form of diversification available to the Turkana that are “in transition”

Turkana Children at one of the MCSPA mother and child nutritional centers

Temporary camp inside the protecting fence of the MCSPA mission in Todonyang to families “in transition” who lost their herds to drought and raids

Food insecurity is worst in the northern part of Turkana, which is **devoid of any agricultural infrastructure** for food production except for pastoralism.

Providing food and clean water at MCSPA nutritional centers and schools

Former attempts by aid organizations to establish an agricultural infrastructure in the area **have not produced satisfactory results** owing to:

- the harsh environmental conditions
- The lack of know-how in developing agriculture in arid land
- the difficulty to bring expert agronomists and skilled manpower to the area on a long term basis
- The deep cultural gap between the herders way of life and farming way of life
- The lack of transportation infrastructure and markets

Furrows In the Desert (FID)

A possible solution is offered by the Israeli expertise in Desert agriculture. The conditions in the Arava Desert in Israel are similar to those in Turkana, and rainfall is even lower. Nevertheless agriculture is thriving there thanks to appropriate agricultural expertise and infrastructure

By the end of 2010 **MCSPA**, an international humanitarian NGO working in Turkana has contacted the Israeli **Brit Olam** association, requesting assistance in forming collaboration with Israeli centers of agricultural expertise.

The dialogue has resulted in **Furrows in the Desert**: A community-participatory joint program of the **Arava Center for Sustainable Development** (ACSD, Israel), **MCSPA** (Kenya), **Brit Olam** (Israel), and local semi-nomadic communities of north Turkana.

ACSD is a partnership of three research and academic institutions, The Arava Institute for Environmental Studies, the Southern Arava Agricultural Research & Development Center, and the Dead-Sea & Arava Science Center. Located in the Israel's Southern Arava region it specializes in water resource management, sustainable agriculture and renewable energy, with emphasis on arid land ecosystems.

Furrows in the Desert- Goals

- To introduce agriculture in Turkana as a means for:
  - food production towards food security in the area
  - income generating activities for the local population through the marketing of agricultural products
- To contribute to the local community resilience through achieving self subsistence as a foundation for new empowerment initiatives in the fields of health, education and further diversification

Furrows In the Desert – Objectives:

- To Demonstrate and train in 2 types of agriculture:
  - subsistence agriculture supporting humans and animals
  - market oriented agriculture
- To operate on both family scale and community (clusters) scale
- To support the development of agricultural based marketing activities
- To assure the sustainability of the project in the hands of local management
- To secure water resources and establish central water distribution systems for the development of farming clusters
- To encourage an intercultural dialogue between Israeli volunteers, local missionaries and the people of Turkana

Innovation & Sustainability

Furrows in the Desert is a **long term program** combining the continuous activity of MCSPA in north Turkana with Israeli expertise in the field of arid-land agriculture

The commitment is for a 2 years pilot stage followed by a 3 years implementation stage and a supervised follow-up for another 5 years

Achievements to date and targets to end of 2016:

1. **Establishing a training farm** next to MCSPA missionary center in Lobur demonstrating 4 types of agricultural models. **Completed July 2013**
2. **Training local Turkana** men and women from different parts of North Turkana, for 5-6 months program, through 2-3 cycles of plants growing. **Graduation of 2nd course** on 22nd December 2013
3. **We have established a professional team** in Turkana, responsible for running the courses and providing ongoing guidance at the graduates' individual farms:
   - Farm manager: long-term committed Israeli agronomist living on-site
   - Israeli trainers: alternating teams of Israeli volunteers with agricultural background on a continuous basis and for a long term stay of 4 to12 months
   - Local Turkana: selected graduates that are found suitable and are willing to stay at the training farm and become trainers and project leaders

Innovation & Sustainability

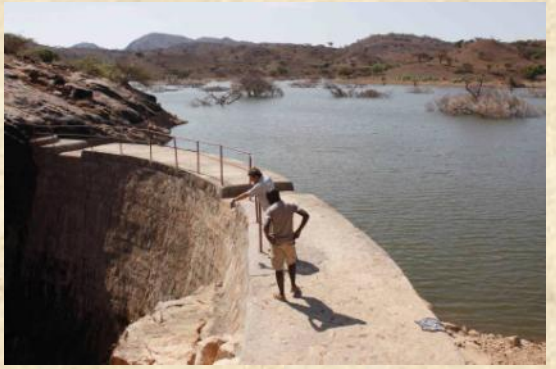
4. **Establishing new farms** by the program graduates (**completed** 13 in 2013, over 350 by end of 2016):
   - The trainees commit to establish their own farms and train 2 other local workers each at the successful completion of their training
   - FID supports the graduates with an income for 1 year and a full Farmer's Kit on loan that they can keep providing they fulfill their commitments to the project
   - The trainees are selected from locations where water for agriculture can be secured.
   - Regular visits to the new farms by FID professional farmers to provide guidance and further education as needed
   - Access to agricultural inputs by way of credit in kind. Currently available at the training farm to avoid supply delays. To be commercialized by locals based on demand
5. **Supporting commercial development** (by end of 2016):
   - Developing a credit system to allow farmers access to agricultural inputs
   - Facilitating access to local marketing avenues
   - Handing over the central training and demonstration farm to local management run by local trainers in agriculture
   - Facilitate local farming agreements to form farming clusters with a capacity to maintain a centralized water distribution system

Water infrastructure installed by MCSPA available to FID for development of agriculture

- The construction of **107 rock dams** by trained teams of Turkana people
- The construction of **92 earth pans** and dams using own bulldozers
- Drilled over **165 boreholes**, most are equipped with a hand pump, some with a solar pump and 30 with Kijito wind pumps

Catchment of runoff water and drilling for underground water are conducted in accordance with geo-morphological and hydrological parameters

All **projects are community participatory based** from identifying the locations where water is needed to the establishment of **water committees** responsible to the ongoing maintenance of the infrastructure



Central Training, Research and Demonstration Farm

Google, June 2013


Four days trip across Kenya with a full container, July 2012

Endorsement of FID by the Kenyan government and the Israeli ambassador to Kenya, August 2012

Building the trainees living and learning facilities (back), installing the central water distribution system between the 2 boreholes, 20m^3 water tanks tower, and the 70m^3 cement tank, constructing the nursery and tree nursery net-houses and tables, converting the container to a storage room and installing a 15m long shade-net. September 2012

FID- Building Capacity Through Training

Training Curriculum

Compost preparation; Land preparation; Crop planning; Nursery; Irrigation – Drip irrigation; Plant protection; Weed control; Crop management; Post harvest

FID- Building Capacity Through Training

Examples of **yields and income generated from surplus**, FID training farm

	5-15.4.13	16-26.4.13	27.4-6.5	7.5-18.5	19-31.5.13	1-9.6.13	10-23.6.13
Melon	32.1 kg (1.5 kg per piece)	133.2 kg income*: 7280 Ksh	126.3 kg income: 3490 Ksh	157.1 kg income: 1590 Ksh	279.1 kg income: 3890 Ksh	111.8 kg income: 1050 Ksh	75 kg income: 1530 Ksh
Okra	55.8 kg	66.8 kg	81.2 kg	81.2 kg income: 50Ksh	75.4 kg	12.9 kg	7.7 kg
Onion	7.1 kg						
Cow pea		1.9 kg	28.5 kg	income: 1100 Ksh			

10-28.9.13	Papaya	Swisschard	Kale	Greengram	Eggplant	Okra
harvested	111 kg	1300 leaves	2300 leaves	11.5 kg		76.8 kg
Surplus income	7330 Ksh	2455 Ksh	3980 Ksh	1150 Ksh	340 Ksh	2400 Ksh

500m^2 family drip irrigation plots. From right to left: okra, maize, watermelons, swisschard, and melons

Training Turkana graduates to be trainers at the farm

FID- Building Capacity Through Training

Successful **graduation** of 15 trainees in March 2013.

Fully operating farm with a large insect proof nursery, a tree nursery, a commercial insect proof ne-thouse, 10 gravity-fed drip-irrigated open fields, a central water distribution system, 3 Limans, 1 earth pan, 2 large compost pits, a storage facility for agricultural inputs, and attached living and studying facilities for the trainees

Certificate OF

Irrigated Desert Agriculture

This is to certify that

Ms. /Mr. _____

Has successfully completed a 6 month intensive residential training

In the framework of

Furrows in the Desert

The course took place in Lobur Mission – Turkana, Kenya

From 1st October 2012 till 31st March 2013

Course contents included:

1. Compost preparation
2. Land preparation
3. Crop planning – Market based
4. Nursery
5. Irrigation
6. Plant protection monitoring system
7. Weed control
8. Crop management
9. Post harvest
10. Record keeping

Dr. Elli Groner	Fr. Albert Salvans	Dr. Mike Naftali
Academic Director *Arava Institute for Environmental Studies*	President *Missionary Community of Saint Paul the Apostle*	Chairman *Brit Olam - International Volunteering & Development*

Products are consumed locally. Surplus is sold to the missions and at the Lokitaung and Kaikor markets

FID- Establishing New Farms with our Graduates

Few examples from FID graduates' farms

location	Graduate	Types of crops seeded/ planted
Kaikor	Kennedy	Onion (nursery) cowpea (direct seedling)
Lokitaung	Joseph	Kale, okra, swisschard
Lokitaung	Peter	Onion, okra, swisschard
Kokuselei:	Nicodemas	
Naricotome (mission):	Peter	Tomatoes (in field nursery), okra (in plot), coconut peat for seedling
Kokuro	Paulina	Okra, cowpea, Squash, Melon, Kale
Lobur	Wanjala	Tomatoes, kale & green pepper (in the nursery). melon & swisschard (direct seeding in the plot)


Kaikor


Paulina in Kokuro


Todonyang


Wanjala in Lobur


Emanuel in Nariokotome

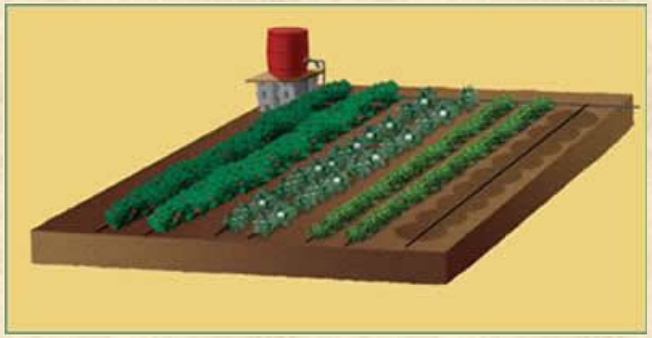
Peter & Joseph, Lokitaung


Introducing farming


in school

Practicing 4 Agricultural Models

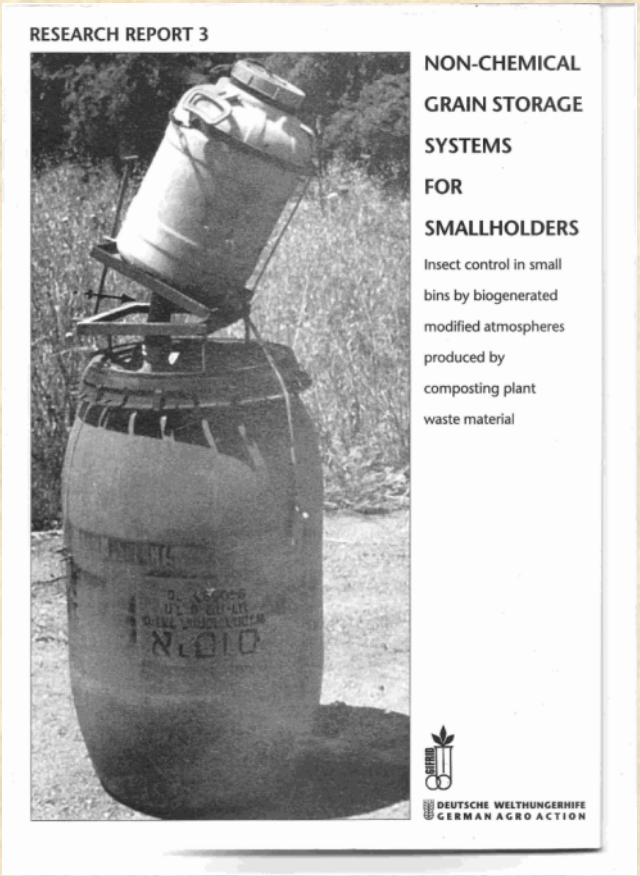
Four types of agricultural models are practiced for training, demonstration and research:



1. Subsistence to commercial agricultural plots

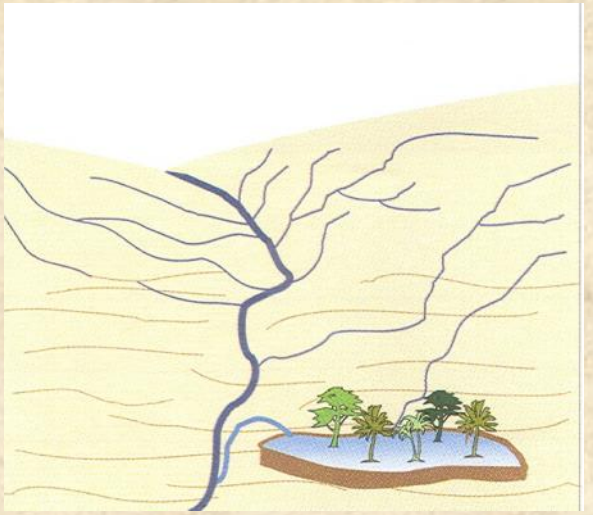
- Family scale to a community cluster scale of several plots sharing a central water infrastructure
- Growing in open field with or without a net-house over a growing area of 500-750m^2 per farming unit
- Gravity fed Family Drip irrigation Systems (FDS)
- Crop selection according to:
  - nutritional value
  - suitability to the local climate, soil and water properties
  - water availability
  - marketing potential (transportability properties and economical parameters)

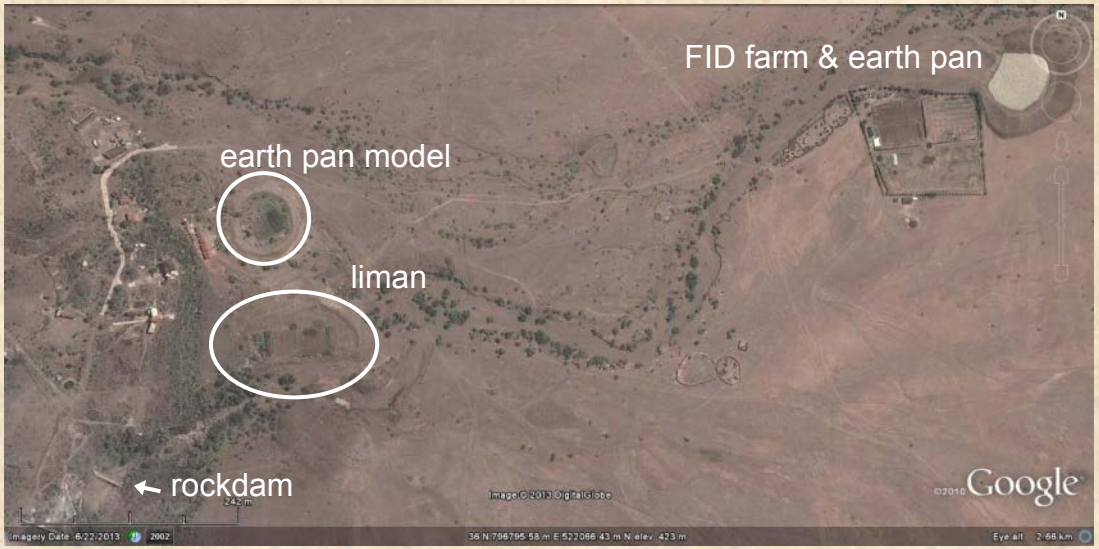
- Plant growing plan:
  - 4 crops a year out of 5 plant groups in 2 cycles
  - Legume: soy beans, peanuts, chickpeas, green gram, cowpeas
  - Solanaceae: tomatoes, eggplant, chilli
  - Cucurbitaceae: water melons, melons
  - Allium: anion, garlic
  - Others: sorghum, corn, okra, spinach, kale, beetroot
  - Selected verities of fruit trees
- Seed and product protection
  - Using the double container system for keeping seeds for next season planting or for sale when prices are high when a product is out of season
  - Produce low level processed products:
    - ❖sealed clay pots for later consumption such as cooked okra or chickpeas in tomato juice covered by a thin layer of oil
    - ❖Dry products such as tomatoes and chilli



2. Liman – diversion of flood runoff

- Cultivation of crops based on catchments of runoff water along the banks of dry riverbeds. Plots are irrigated by seasonal floods diverted by canals and retained by low earth dikes.
- To be used for:
  - Fodder: animal feed to bridge through drought years
  - Fruit trees: such as pomegranates, almonds, and olives adapted to arid conditions
- This agricultural method requires relatively small investment in infrastructure and maintenance and is suitable for implementation along many of the dry rivers cutting through the plains of North Turkana.





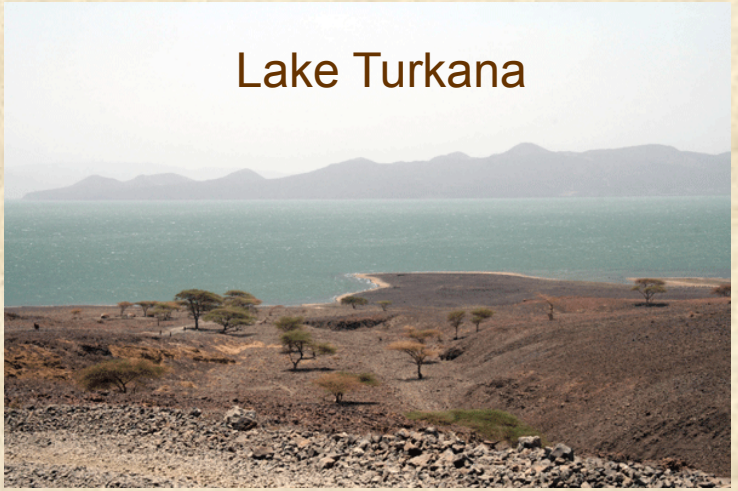
3. Earth Pan System

- While full with water the earth pan will support adjacent plots growing short-duration crops.
- When the water in the earth pan will reside, rain-fed crop types will be planted inside the earth pan, utilizing the water absorbed by the soil.
- Production of vegetables, fruit and grain (Sorghum, millet etc.) is expected to be supported for a duration of 9 month.

FID earth pan: maize & watermelon

4. Central Farm for dates and fodder on a commercial scale (to be developed out of FID)

- Utilizing the alkali water of Lake Turkana for this water intensive model
- Dates will be intercropped by annual crops in order to provide income from the first year onward.
- The propagation of offshoots from the third year after planting will support future date plantations and demonstrate another potential source of income in addition to the dates.
- Date crops are expected from the fifth year.
- Other saline/alkaline-water resisting crops will be intercropped such as pomegranates or sapota with fodder like sudan grass



Dates and Pomegranates grown at the Arava R&D Agricultural Center, Arava Desert, Israel

Arava Center for Sustainable Development (ACSD)

The Arava Center for Sustainable Development (ACSD) is part of the Arava Institute for environmental Studies (AIES), Kibbutz Ketura, Israel.

ACSD is a partnership of three research and academic institutions located in the Southern Arava region of Israel's Negev desert. Individually, these institutions are conducting critical research in water resources management, sustainable agriculture and renewable energy, with emphasis on arid land ecosystems.

ACSD was established to facilitate the dissemination of these expertise to developing communities facing environmental and technological challenges.

Field study, Turkana 2011

MCSPA visiting AIES Israel 2012

Vision

To support community-driven development programs locally and worldwide, aiming at poverty reduction, gender empowerment and improvement of life quality by collaborating with local and international partners to design and implement technology-based sustainable development projects.

Activities

- Generating development projects and appropriate technology transfer to developing communities
- Conducting short-term adaptive training programs in developing countries and in the Arava region
- Disseminating knowledge acquired through applied research with partner institutions as well as lessons learned from experience in the field.

The Missionary Community of Saint Paul the Apostle) MCSPA)

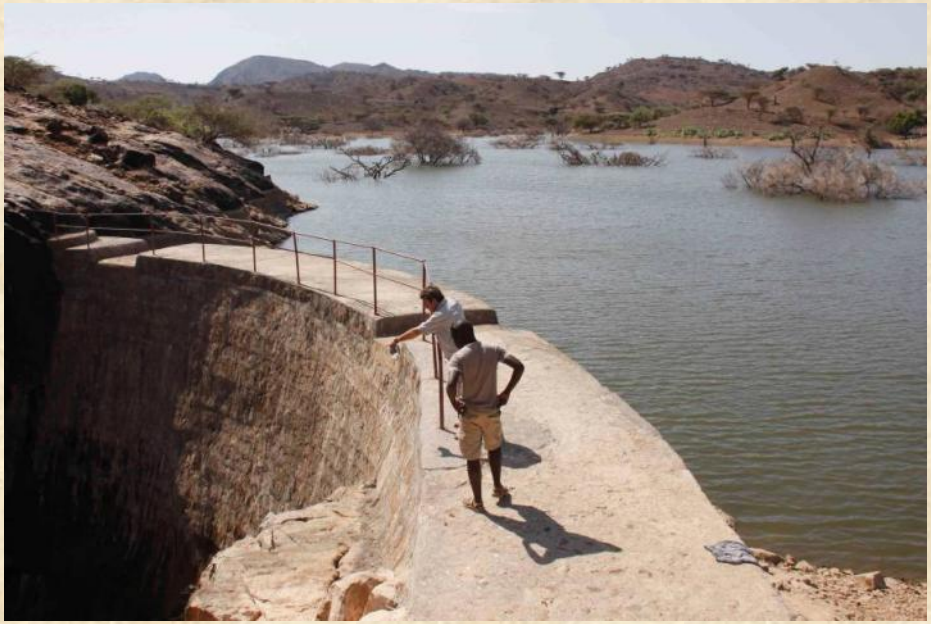
A public association of Christian faithful of the Catholic Church, made up of priests an lay people from different parts of the world. It operates in north-east Turkana and in south Ethiopia since 1986.

Among its various activities MSCPA strives to develop, together with the local Turkana population, new sources of water supply, and solutions towards food security and health care in the area.

Over 25 years of activities in the field of community development MCSPA established a significant water infrastructure including:

- The construction of107 rock dams by trained teams of Turkana people
- The construction of 92 earth pans and dams using own bulldozers
- Drilled over 165 boreholes, most are equipped with a hand pump, some with a solar pump and 30 with Kijito windpumps

Water infrastructure installed by MCSPA in Turkana



Around some of its water projects, the MCSPA has established nutritional centers which provide daily meals and primary education for children.

Some of the missionary centers in the area also operate clinics and dispensaries providing basic medical services for the local population.

Brit Olam
International Volunteering and Development

An Israeli volunteer organization established in 2005. Its activities include community-based projects designed to reduce poverty, hardship and vulnerability in developing communities.

Brit Olam projects draw on Israeli experience In various fields of technology, science and community development, and are done in collaboration with local and international developmental organizations.

Fields of Activity:

- Dispatching volunteers from Israel and the Jewish Diaspora to international development missions
- Developing projects in the fields of education, health and community empowerment in developing countries
- Aid delegations to areas afflicted by natural or man-made disasters
- Aid and development programs for the refugee and asylum seeker community in Israel.

Medical programs in Uganda and work with refugee communities in Israel

Centers for education, and arts and crafts in Uganda and Israel

Furrows in the Desert: Israeli Advisory Committee

Itshak Abt, the Founder and former Director of The Centre for International Agricultural Development Cooperation **(**CINADCO) of Israeli Ministry of Agriculture
Zion Shemer, Director of the The Ramat Negev Desert Agro-Research Center
Prof. Dov Pasternak, agronomist, expert in desert agriculture
Prof. Roni Fridman, Dean of the Faculty of agriculture, Hebrew University
Dr. Mike Naftali, chairman of Brit Olam
Uzi Israeli, board member, Brit Olam
Michael Froilich, The International Institute of Leadership
Moti Harari, FID chief agronomist, Arava R&D Agricultural Center, ACSD
Amit Eliyahu, FID projects developer and hydrologist, AIES, ACSD
Dr. Clive Lipchin, Director of the center for Trans Boundary Water Management, Arava Institute for Environmental Studies (AIES), ACSD
Elisha Zurgil, agricultural instructor, Israeli Ministry of Agriculture
Haim Sharvit, water purification expert. Owner of Puretech irrigation company
Dr. Aharon Zohar, former field manager of an agricultural project of Israeli Ministry of Foreign affairs and World Bank in Kenya
Natan Lanir, farm manager of Hakfar Hayarok agricultural boarding School
Dr. Nurit Hashimshoni-Yaffe, Department of African Studies, Tel-Aviv Jaffa Academic college
Uri Ben-Elli, Senior Toutor in Agriculture, CINADCO
Michael Pascal, fisheries expert, ROTARY Israel
Milett Biberman Furrows in the Desert project coordinator, Brit Olam

How to be part of a change

In December 2013 FID will successfully complete the 2 years pilot phase and will **commence a 3 years implementation phase**.

With a fully operating training, demonstration and research farm, a highly experienced team on the ground, and about 28 outstation farms established by our graduates in various parts of north Turkana, we'll be in the right position to take on trainees on a bi-annual basis and **grow the project to be a pivotal force** in the agricultural development of North Turkana.

To accomplish that we still put much efforts in raising the appropriate funding as we **haven't secured yet the required funds** in accordance with our budgeted program

The 3 partnering organisations are non-governmental and not for profit organisations. Hence, **most of the funds raised are spent on the ground** in North Turkana

The following organisations and institutional bodies support FID:

- Emalaikat Foundation (Spain)
- New Ways Charity (UK)
- DKA Austria on behalf of the Catholic Children Movement of Austria
- ROTARY International through an initiative of ROTARY Israel
- Government of Kenya through the office of the Prime Minister
- Israeli Foreign Office through MASHAV and the Israeli ambassador to Kenya

How to be part of a change

Here is what we need for the next 3 years ($US):

- **Infrastructure**: **1.6M**. Includes 360 farmers kits ($1,250/unit), 360 net-houses ($1,000/unit), 30 solar water pumping units ($2,000/unit), a tractor, a second vehicle, a second trainees living facilities
- **Operational and maintenance** costs: **400K**
- **Team** of experienced Israeli volunteering farmers, local trained Turkana employees, and supporting visiting experts: **621K**
- **Supporting our trainees and graduates** through their studies and establishment of own farms: **503K**
- **Admin** costs (10%) **and contingencies** (5%, allowing for unexpected costs): **468K**
- **Total** of: **$3.594M**

You can be part of a change that brings food security to the Turkana people

Be part of a project that builds capacity in agricultural practices in East Africa

Be part of bringing a sustainable improvement of empowerment and wellbeing to vulnerable communities in transition

Be part of a change – Volunteer with us or make a donation

For a better tomorrow in Turkana

Donate now, be part of a change

For donations or information on how to volunteer with FID contact:

Amit Eliyahu (AIES): amit.eliyahu@arava.org

Elli Groner (AIES): elli.groner@arava.org

Milett Biberman (BO): milett@britolam.org

Albert Salvans: albert.salvans@mcspa.org

In the current course participate 5 women and 10 men, all Turkana people. This group photo was taken in Kokuro at the farm of Paulina, an FID graduate