

Report on the Saline Agriculture and Halophyte Agro-ecologies Conference In Turkana County, Kenya (March, 2023)



Implemented by: Seawater Solutions, WFP, FAO, The Salt Doctors
With additional contributions by: Waterkiosk, Turkana County Government, Ministry of Agriculture
Supported by: the Saline Water & Food Systems Partnership (SW&SF) of the Netherlands Food partnership (NFP) and Netherlands Water Partnership (NWP)

Summary

In March 2023, a three-day workshop took place in Turkana County, Kenya. The workshop was implemented by Seawater Solutions and The Salt Doctors, in close collaboration with World Food Programme, FAO and the Turkana County Government, with support of the Saline Water & Food Systems Partnership (SW&SF) of the Netherlands Food Partnership (NFP) and Netherlands Water Partnership (NWP). The workshop brought together various stakeholders from (local) government, NGO's, United Nations organizations, knowledge institutes and the private sector and the challenges and opportunities of using the saline resources in Turkana County were discussed. The activities of the workshop focused on knowledge transfer, cooperative project design and future collaboration. As part of the practical activities, various water sources were sampled and analyzed. Although the observed salinity levels provide several options (salinity levels are in the range of 0.4 to 5.8 dS/m) the pH is clearly a concern as well (with values of 8.2 to 9.6 for several water sources). Saline agriculture is seen as a potential solution for food security at county level as well as at national level by the (local) government. A first outline for a strategy to move forward (short term and long term) was composed and a working group of 30 stakeholders was initiated by the Minister of Agriculture to explore the establishment of saline agriculture projects in Turkana and facilitate the development of public-private sector working relationships. New initiatives should focus on identifying the most suitable locations for implementation, developing tailor-made, cost-effective approaches for cultivation, and supporting policy formulation.

Background

Saline agriculture and degraded land rehabilitation is increasingly important in the East African countries of Kenya, Tanzania, and Mozambique. The companies The Salt Doctors and Seawater Solutions have engaged in saline agriculture training and support in this region for over 6 years, in partnership with RVO, NGOs and international organisations such as the United Nations World Food Programme (WFP) and the Food and Agriculture Organization of the United Nations (FAO). The SW&FS Partnership has now supported a 'Cluster Conference' and training seminar that brought together partners in the region. The conference was hosted by the World Food Programme sub-county office in Northern Kenya, where current saline agriculture projects are being launched. Partner organisations were invited to share their findings, learn more from project developers and researchers in the field, and benefit from on-the-ground training workshops delivered on existing saline agriculture projects. This Cluster Conference brought together organisations and stakeholders from the National Ministry of Agriculture, the local Ministry of Agriculture (as part of Turkana County), various representatives from the Turkana County Government, including the governor himself, WFP, FAO, UNHCR, Turkana University, and local NGOs. On average, 48 people per day attended the conference.

The context

Kakuma and Kalobeyi Sub-Counties remain economically, politically, and socially marginalised from the main markets, with poor infrastructure provision. The economy is principally reliant on pastoralism. 79.4% of the Turkana population live below the poverty line compared to a national average of 31.6%. With very few viable livelihoods alternatives to nomadic pastoralism and high food insecurity among the population Harsh climate change, in combination with political, environmental, and economic development challenges in Turkana, has had an impact on the Turkana people's ability to access food, water and health.

Unpredictable rainy seasons have placed increased pressure on water resources, resulting in less dry season grazing land, diminished livestock herds, and increased competition over grazing lands. Prolonged and more frequent droughts have exacerbated already difficult access to potable water, making every day a struggle for survival. Women and girls often walk extremely long distances to dig for water in dry riverbeds.

Given the climate challenges that the Turkana region is facing and the needs of the host and refugee community, in order to alleviate these issues and promote development, any future interventions must:

1. Address the growing freshwater scarcity
2. Stop the loss of biodiversity while meeting the growing food demand
3. Adapt to climate change

4. Increase opportunities and capacities to produce food under saline soil and water conditions

A multi-stakeholder conference was organized to include key representatives of stakeholders of the Kenyan National Government, County Government, Sub-county Government, Turkana University, National Irrigation Authority (NIA), Water Resource Authority (WARP), NGO's including WFP, FAO, UNHCR, and private sector partners including NARA, Salt Doctors, and Water Kiosk.

Activities

Day 1, Tuesday 21 March

Day 1 started with a meeting with the local representatives of the Ministry of Agriculture of the Turkana County Government. With 16 people, the programme for the next few days was discussed and finalized. It was decided that the overall outcome of the workshop should be:

- Good understanding of the local salinity challenges and potential solutions
- Bringing various stakeholders together and share knowledge and experiences
- Perform a practical training on salinity assessments
- First outline of a strategy for the way forward (short term and long term)



Image 1. Impression of the local office of the Ministry of Agriculture of the Turkana County Government in Lodwar.

Day 2-3-4, Wednesday 22-Friday 24 March

From Wednesday 22 March to Friday 24 March a three-day workshop/conference was organized at the World Food Programme (WFP) compound at the Kakuma office. On average, 48 people per day attended the conference, which was highly appreciated by the participants. Below, an overview of the programme is provided.

Day 2

Time	Session	Objective of the session	Facilitator
11am-11:30pm	Welcome session	Introduce delegates & agenda of events	Yanik Nyberg / Francis Ekiru
11:30am- 12pm	Diverse perspectives of Saline Agriculture in Kenya	Provide an overview of saline agriculture in Kenya and current obstacles	Dr. Moses Langat
12pm-1pm	Introduction to saline agriculture	Global case studies and experiences	Arjen De Vos
1pm-1:30pm	Introduction to halophyte agriculture	Global case studies and experiences	Yanik Nyberg
1:30pm-2:30	LUNCH		
2:30pm-3pm	Introduction to <u>Waterkiosk</u> & Boreal water infrastructure projects in Kenya	Technology overview and case studies of Kenya desalination operations	Samuel Kinyanjui
3pm-4pm	Saline agriculture opportunities in Kenya	Approaches and procedures specific to Kenya ASAL	Arjen De Vos
4pm-5pm	Halophyte agriculture opportunities in Kenya	Approaches and procedures specific to Kenya ASAL	Yanik Nyberg

Day 3

Time	Session	Objective of the session	Facilitator
10am-10:30pm	Arrival and day agenda overview	Introduce agenda of events	Yanik Nyberg / Arjen De Vos
11:30am- 11am	Technical overview of saline agriculture techniques and case studies	Provide insight into specific technical approaches and key site-specific considerations and risk mitigation for salinity.	Arjen De Vos
11am-12pm	Technical overview of halophyte agriculture techniques and case studies	Provide insight into specific technical approaches and key site-specific considerations and risk mitigation for salinity.	Yanik Nyberg
12pm-1:30pm	Lunch		
1:30pm-3:30	Kalobeyei technical workshop	Site tour at Kalobeyei Farm and technical workshop on site selection, species selection, measurement and risk evaluation for salinity.	
2:30pm-3pm	Introduction to Waterkiosk & Boreal water infrastructure projects in Kenya	Technology overview and case studies of Kenya desalination operations	Samuel Kinyanjui
3pm-4pm	Saline agriculture opportunities in Kenya	Approaches and procedures specific to Kenya ASAL	Arjen De Vos
4pm-5pm	Halophyte agriculture opportunities in Kenya	Approaches and procedures specific to Kenya ASAL	Yanik Nyberg

Day 4

Time	Session	Objective of the session	Facilitator
9am-10:30pm	Continuation of technical workshop on saline agriculture @ WFP compound	Continuation of technical workshop on saline agriculture: techniques, protocols, risk mitigation	Yanik Nyberg / Arjen De Vos
10:30am- 1pm	Technical workshop @ Kalobeyei site	Field activities training on field preparation, sowing, harvesting, and irrigation.	Arjen De Vos
1:30pm-2pm	Lunch and closing ceremony		Yanik Nyberg



Image 2. Impression of the conference at the WFP compound in Kakuma, Turkana County.

The activities during the conference / workshop were:

Knowledge transfer:

- Practical 'lessons-learned' from past projects
- Understanding systems and governance structures
- Exploring market analyses and supply chain modelling for successful farm-to-fork implementation
- Technical and operational design considerations for varied geographical applications
- 2-day field training
- Co-design of long-term knowledge transfer tools to be shared with the wider Partnership

Cooperative project design & future collaboration:

- Facilitating inter-organisational and inter-sectoral collaborations
- Co-designing multi-stakeholder projects & research collaborations
- Overview of UN organisational infrastructure and collaboration frameworks
- General relationship building between stakeholders & engagement with the wider SW&FS Partnership

During the second day, also a short meeting took place with WFP Country Director, Lauren Landis, and the UN resident coordinator Dr. Stephen Jackson. They have also expressed their interest and willing to work on saline

agriculture in the nearby future. This was also expressed by the governor of Turkana County during his speech on the last day of the conference. Some of his remarks were:

- Salinity remains a challenge for domestic use and livestock
- Encouraging partners to come together to implement innovation ideas and use of technology to solve the problems
- Working together under MOUs will allow Turkana to become a food basket form the country. There is plentiful supply of water underground, even if rains are poor. This should be used to serve municipalities and food production
- To become food secure, Governor target is to change the mindset that without rain Turkana cannot produce food – this is not the issue. We want to produce food and pasture even when no rain. By coming together in conference, we can get the best solutions
- This county will produce food in the next few years and even sell to neighbours
- Funding given must produce something for the county both host and refugee
- Must apply practical technologies and measures in food production. The president has requires 1M acres to be irrigated
- Want to support creating halophyte production, addressing the salinity issues



Image 3. Impression of the WFP compound where the conference took place (left) and an impression of the field visit to one of the refugee camps where water harvesting is greenhouse cultivation is taking place (middle and right).

As part of the practical training, also water samples were taken and analyzed (see table 1). Water samples were collected at the refugee camp (location Kalobeyei), at the WFP compound, the river in Lodwar and also Lake Turkana (day 4) was visited and sampled. The source of the water varied from water catchments (water pan), groundwater, brine from desalination units, and directly sampled from the river or the lake. Sampling techniques were shown, as well as different sensors to measure salinity (EC), pH and various individual salts/nutrients. In short, the optimal pH is in the range of 6-7 and values above are problematic. So, many water sources show extreme pH levels, which has limitations in its use. The salinity levels (EC) from 1.5 to 3 dS/m can be challenging from irrigation, everything above 3 dS/m needs careful management. Based on the results in table 1, it is clear that the elevated salinity levels are mostly caused by elevated sodium levels. The highest recorded values of 5.4-5.8 dS/m could be used for salt tolerant crop cultivation, but only with proper irrigation management. Still, the pH values are problematic and needs further attention.

Table 1. Analysis of various water sources in Turkana County that were sampled during the conference.

location	Water source	pH	EC (in dS/m)	Na	Ca	K	Nitrate
Kalobeyei	water pan	8.7	1.1	55	81	210	54
Kalobeyei	groundwater	7.8	5.4	1100	55	55	57
WFP compound	brine	6.9	3.2	570	190	69	73
WFP compound	waste-water	7.5	2.2	320	58	24	51
Lake Turkana	lake	9.6	5.8	1100	44	73	120
Lake Turkana	groundwater	9.4	5.7	1200	6	5	100
Lodwar	river	8.2	0.4	19	59	6	22



Image 4. Impression of the some soil salinity measurements (left), the nethouse at the refugee camp and lake Turkana (two pictures on the right).

The first outline for a strategy to move forward (short term and long term) were discussed and can be summarized as:

1. Facilitate the exchange of knowledge transfer of the practice of saline & halophyte agriculture.
2. Conduct field visits with in-situ testing methods of soil and water salinity.
3. Facilitate open discussions to explore the practicalities, cultural influences, and scientific knowledge, existing government policies with regards to saline and halophyte agriculture intervention.
4. Co-design a pilot site based on the findings and discussions.
5. Gather feedback and recommendation from the participants on the content of the conference and the plans set out.

Based on discussion between the delegates and presenters' reflections thus far are as follows:

- Push on community engagement and protection
- Regarding implementation of a project, clear coordination of processes from start to end of partner roles and responsibilities
- Managing risks, mindsets, misconceptions, and protecting the current ecosystem
- Sustainability of any intervention and scale potential
- Need for knowledge gap filling
- Policy direction and development of this agenda
- Long term focus and need for 360 degree solution thinking
- Implementation of a working group on saline and halophyte agriculture including specialists from all technical departments in government, NGO, and private sector actors.
- Need for further baseline testing of soil and water conditions across the county to inform suitable interventions are directed in the appropriate areas/regions.
- The concept of a conference with a field component alongside discussion sessions in the agenda was widely encouraged and all agreed that practical action can be developed in such a configuration.

Perspective of the Turkana County Government

Following a successful 3-day inter-sectoral conference on saline agro-ecologies in Turkana, a working group of 30 stakeholders was initiated by the Minister of Agriculture to explore the establishment of saline agriculture projects in Turkana and facilitate the development of public-private sector working relationships. A ministerial desk officer was nominated to facilitate communications. Rounding off the conference, His Excellency the Governor of Turkana

voiced his support for saline agriculture development and committed his government's resources and commitment to launching large-scale projects in Kerio.

1. Technical manual for saline agriculture viability assessment in Turkana
 - Profiling soil types in Turkana for accurate mapping of saline agriculture viability
 - Low-medium-high salinity profiling for identification of saline agriculture approaches

2. Turkana-level proposal for all interventions at scale
 - Long-term recommendations for scaling saline agriculture interventions
 - Supporting the County Government and National Government in policy formulation
 - Advising on approaches for small-holder farmers & commercial-scale viability

Media coverage

The event was reported by the website of the Turkana County Government:

<https://turkana.go.ke/2023/03/22/saline-agriculture-conference-kicks-off-in-kakuma/>, as well as by the Kenya News Agency: <https://www.kenyanews.go.ke/experts-to-exploit-saline-water-for-agricultural-production/>, the Star: <https://www.the-star.co.ke/counties/rift-valley/2023-03-27-turkana-to-exploit-groundwater-for-food-security/>, and the PanAfrica Agriculture also covered some of the activities: <https://panagrimedia.com/turkana-county-turning-salinity-into-their-advantage-to-maximize-crop-production-amid-drought/>. In addition, WFP has composed a video of the conference.

Next steps

Opportunities for the short-term focus mostly on the farming activities around the refugee camps where WFP and FAO are working on food security and economic perspective of the inhabitants of the camps. The ambition is to maximize the use of different water sources (rainwater harvesting, saline groundwater) to grow climate smart agriculture using water saving irrigation methods. This will allow farmers to maximize the use of the space and water for vegetable and fodder production. These activities focus on the greenhouse areas of the refugee camps. For the initial demonstration, The Salt Doctors propose to install an open-field hydroponic production system (low-tech, low-cost). The system itself will also be linked to the production of fodder and some tree species (agroforestry). In this way, the water will be used at several levels and the production itself will provide food for the refugee camp, and fodder will be produced as animal feed as well. The agroforestry set up will integrate the various production levels and can include the production of shrubs and trees that can provide additional resources to the farmers (food, mulch, compost, wood, fruits, nuts,..).

By demonstrating the various forms of agriculture which can be achieved in Kalobeyei, it will provide a roadmap for other regions to begin developing this practice at scale.