



Multiple environmental shocks impacting livelihoods and food security in Nyangatom, the Lower Omo, Ethiopia

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Introduction

This briefing note presents preliminary results from the research project 'Shifting In/equality Dynamics in Ethiopia: from Research to Application' (SIDERA), which aims to understand the links between environmental change, poverty, and conflict in the Lower Omo. We are sharing our preliminary findings ahead of formal publication due to the urgent nature of the situation on the ground. A set of recommendations are proposed at the end of this briefing.

Methods

We conducted fieldwork in July-August 2018¹ in the Nyangatom woreda of South Omo zone, Ethiopia. Fifteen focus groups were conducted, including senior male and female members of three agro-pastoralist communities in Nyangatom woreda, that represented a spectrum of livelihoods from arable agriculture to pastoralism. Hosted in July 2018, each focus group was asked to describe the main natural resources they depended on, how these had changed over time, and their adaptations to these changes. These were supplemented by field observations, key informant interviews, and further focus group discussions on the topics of livelihood change and wealth and poverty dynamics in August 2018. This briefing note also incorporates some preliminary results from a household survey conducted at the beginning of 2019 in these same three communities.

Results

Environmental shocks and pressures

Crop harvests over the last four years in Nyangatom have been severely impacted by changing environmental conditions:

- There has been no flood-retreat river bank cultivation due to changes in the Omo River flood regime from 2015 onwards when the filling of the Gibe III

¹All dates in this brief are in Gregorian calendar.

Key findings

- Communities in the Nyangatom woreda, South Omo, Ethiopia, have experienced a range of environmental shocks over the past four years including drought, changes in the Omo River flood-regime and crop pest infestations which have curtailed crop harvests.
- As a result, communities are showing signs of reduced food availability and access, and implementation of a range of coping strategies.
- In the short-term, continued provision of food aid is needed to alleviate food insecurity, including through the existing Productive Safety Net Program (PSNP).
- In the long-term, communities should be supported in adapting their livelihoods to cope with changing environmental conditions.

dam reservoir began². See SIDERA Briefing Note #2 for further details on flood-retreat cultivation. The dam, which was inaugurated in December 2016, has resulted in the loss of the annual Omo River flood.

- Changes in the river flood regime have also led to the disconnection of river-fed lakes which communities utilise for crop cultivation. These are now only filled by rainfall and hence their productivity has reduced.
- Low rainfall from 2015-2017 resulted in meagre harvests from rainfed agriculture. In 2017 in particular there was insufficient rainfall, leading to failed rainfed crops.

²Avery & Tebbs. Lake Turkana, major Omo River developments, associated hydrological cycle change and consequent lake physical and ecological change. *J. Great Lakes Res.* 44, 1164-1182 (2018).

The Omo-Turkana Research Network is an international consortium of social and environmental scientists researching the impacts of hydrological, agricultural, and social change on the people and ecosystems surrounding the Lower Omo Valley and Lake Turkana. OTuRN affiliates collaborated on the research project SIDERA: Shifting In/equality Dynamics in Ethiopia: from Research to Application.

Figure 1. Pest destroying crops in Nyangatom woreda was suspected to be the invasive fall armyworm.



- Despite good rains in 2018, harvests from rain-fed cultivation were lost due to pest infestations, specifically locusts and suspected fall armyworm (*Spodoptera frugiperda*) (Figure 1).

Communities identified population pressure around settlements as an issue impacting resource availability, leading to reduced fodder, wild foods, firewood and building materials close to settlements, and meaning that people have had to travel further to source these items. Pastoralists are also extending their range to find sufficient grazing for their animals.

As a result of these multiple environmental shocks, communities are experiencing food insecurity. This is despite local communities already receiving some support in the form of PSNP and food aid. The risk of increasing food insecurity remains severe over the coming months, particularly if the rains should fail this spring.

Coping strategies

Nyangatom communities along the river are already implementing a range of food-based and non-food based coping strategies, expanded on in SIDERA Briefing Note #3 and including:

- Increased reliance on rain-fed cultivation around ponds and lakes
- Increased dependence on wild foods
- Increased dependence on fishing
- Requesting government provision of food aid for households not enrolled in PSNP
- Reducing dietary diversity and reducing the number of meals per day
- Selling firewood and building materials
- Selling livestock to buy grain
- Migrating for wage-labour at the construction site of the Kuraz V Sugar Factory

Some of these coping strategies are failing – for example, fish are reportedly less plentiful than they were before the end of the river floods; wild foods are scarce due to the lack of rain, changes in the river, and human population pressure.

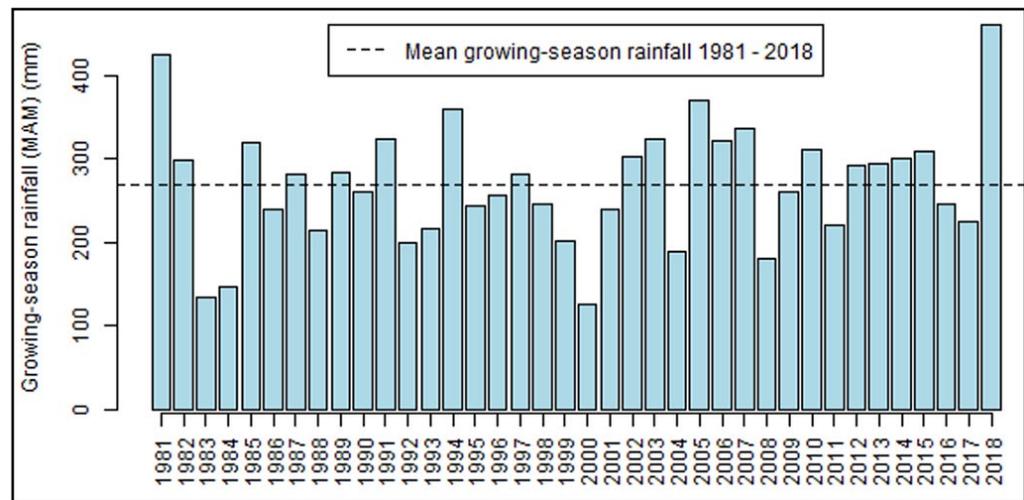
Government support

Communities also reported positive changes related to infrastructure developments in the region. These include the bridge over the Omo River at Kangaten, road building, and mobile phone coverage, which have assisted in providing access to new sources of information and markets for selling livestock and other goods and for buying food/maize. The separation of Nyangatom from the Kuraz woreda has also had benefits including additional civil servants, and with them a market for food and other consumables in Kangaten, which is easier for Nyangatom communities to access than Omorate.

While communities have been provided with several diesel-powered pumps for irrigation, only one pump was operational at the time of our field visit; this was being used to irrigate grass for fodder rather than for crop cultivation. The government has promised more pumps, though such provisions have, in the past, suffered from problems of inadequate maintenance, lack of fuel and reported theft of parts. The water department in Kangaten (interviewed in July 2018) reported that there are 23 pumps in the woreda (not all well suited to agriculture) of which only 13 are operational. Maintenance of pumps is a problem: repairs depend on experienced engineers travelling from out of the region; spare parts are hard to come by; and funds for repairs are lacking. According to the South Omo zone Agriculture and Livestock Bureau, of the 6,280 households receiving agricultural extension support in Nyangatom, only 1,543 (25%) currently have access to irrigation.

The veterinary services department administers a staged vaccination program for livestock throughout the year and monitors the situation closely, despite the difficulties associated with accessing remote dry season pastures and the challenge of frequent and unrestricted movement of animals across the open border with South Sudan. Even with this program, communities reported recurrent outbreaks of disease including an outbreak of what is believed to be foot and mouth disease. Respondents in a household survey reported that cattle herds in particular have declined significantly in recent years as a result of disease.

Figure 2. Annual growing-season rainfall (March-April-May) in Nyangatom woreda, South Omo zone, Ethiopia, based on CHRIPS satellite rainfall product.



Targets for livestock exports and the promotion of the livestock trade are priorities for the municipal authorities in Kangaten, who are currently planning the provision of a market place in Kangaten (once the town is moved to its new planned location). The single greatest obstacle to achieving their export targets is reported to be the poor state of infrastructure - mainly roads. This will improve with the completion of the Turmi-Kangaten road.

Conflict

During our visit in July 2018, people reported that this was a time of relative peace between Nyangatom and neighbouring agro-pastoral groups the Hamar and Mursi, but that there was ongoing conflict with the Turkana in Kibish. Conflict findings are expanded on in SIDERA Briefing Note #4.

The suspension of conflict with the Mursi may be due to the Mursi moving from the Omo River - which serves as their border with Nyangatom territory - given the inability to practice flood-retreat cultivation. Peace with the Hamar had been aided by government peace-building initiatives; however, this peace was short-lived and reciprocal small-scale raiding resumed later in 2018. This has resulted in heightened tension and hostility between the two communities.

The conflict in Kibish with the Turkana (in Kenya) means that Nyangatom communities cannot cultivate along the Kibish River as they have done in the past. There have been several outbreaks of hostilities along the border which have resulted in fatalities and a loss of cattle. A particularly violent outbreak took place in January 2019 when the Kenyan army allegedly provided back up for Turkana raiders.

Implications for Livelihoods and Food Security

The Lower Omo has long been regarded as a food insecure region due to frequent droughts. However, flood-retreat agriculture along the Omo was the primary and most reliable source of food, particularly

during periods of low rainfall. Preliminary results from a SIDERA household survey suggest that up to 85% of the total annual sorghum crop, the main agricultural staple in the area, came from this source. This livelihood option is no longer available due to changes in the river flood-regime caused by the Gibe III dam. Although, as described above, a wide variety of coping strategies are being utilised by communities, their effectiveness has been hindered by various environmental challenges, as discussed below.

Rain-fed agriculture

Increased dependence on unreliable rain-fed agriculture in response to the loss of Omo River floods has made communities more vulnerable to drought. Satellite rainfall estimates show high growing-season (March-May) rainfall in 2018 and lower values from 2016 - 2017 (Figure 2), which agrees with the rainfall patterns reported by local communities. The satellite data also show the high variability in rainfall between years.

Before the end of the Omo flood, local people did not practice rainfed agriculture unless the Omo river-bank harvest was poor. They were reluctant to invest time and resources in rainfed cultivation because it was very unreliable, and they usually had a good supply of grain from the flood-retreat cultivation. The loss of flood-retreat cultivation by the river has made communities more dependent on unpredictable rainfall to grow their crops. The timing of rain is also important and highly variable from year-to-year and between regions. Depending on when people start cultivation, if the rains come too early or too late people can lose their whole harvest.

Crop pests

The 2018 locust infestation caused widespread damage, both in Nyangatom but also in other parts of Ethiopia and in Kenya³. Locust swarms occur when

³<https://www.businessdailyafrica.com/news/counties/250-000-starvation-in-Turkana-as-locusts-destroy-crops--pasture/4003142-4883964-mxbk3dz/index.html>

drought is followed by a period of rapid vegetation growth. The conditions that trigger locust swarms may become more common in future as rainfall is predicted to become increasingly variable with climate change⁴. Another pest damaging crops in Nyangatom (Figure 1) was suspected to be the invasive fall armyworm, although future investigations are needed to confirm this. The fall armyworm is a non-native species which causes significant damage to crops if unmanaged and has now spread across most of Sub-Saharan Africa⁵.

Fishing

Whilst households now rely on fish more, fish were reported to be more difficult to catch. We hypothesise that this is primarily due to the loss of the Omo floods, which previously triggered fish migrations⁶ and replenished the river-fed lakes, and possibly in part due to overfishing given increased demand. Large reductions in the productivity of flood-plain fisheries are frequently observed following dam construction in many river basins around the world.⁷

In-depth interviews with elders revealed that there was a key 'shoulder' period (pre-Gibe III) when fishing in the lakes with harpoons could be a particularly important food source for everyone in the community. This was in the interval between the consumption of grain from the rain-fed harvest, and the ripening of the new flood-retreat harvest. The river itself was an extremely productive fishery and a small number of families specialised in fishing with hooks or with traditional boats and nets throughout the year⁸. Today, although more people are attempting to fish due to the loss of other livelihoods, the productivity is reported to be greatly reduced.

Environmental degradation

Many of the strategies employed to adapt to reduced harvest are potentially contributing to environmental degradation. The collection of firewood and building materials and the clearing of land for expansion of rain-fed cultivation around ponds is likely to lead to deforestation and land degradation. However, migrant workers in Kangaten and commercial farms are increasing the demand for wood products, including charcoal, leading to the perpetuation of this degradation cycle.

⁴ <https://phys.org/news/2017-09-locustsnew-climate.html>

⁵ <http://www.fao.org/fall-armyworm/en/>

⁶ Gownaris, N. J. et al. Fisheries and water level fluctuations in the world's largest desert lake. *Ecohydrology*, 10 (1), 1-16 (2017).

⁷ Richter, B. D. et al. Lost in Development's Shadow: The Downstream Human Consequences of Dams. *Water Altern.* 3, 14-42 (2010). Oka

⁸ This is informed by the small proportion of respondents to the household survey who reported fishing in 2012-2013.

Selling animals

Without flood-retreat agriculture, communities that previously used both arable agriculture and pastoralism have increased their reliance on pastoralism. Livestock are a key element of Nyangatom culture and food security, and mobile pastoralism is a successful adaptation in dryland ecosystems⁹. Animal products (blood and milk) are an important component of everyday diets; however, these foodstuffs become even more important in times of food insecurity, and our focus group participants reported increased reliance on these products, particularly milk for children.

Selling animals is an indicator of relatively serious food insecurity, indicating other food-based coping strategies are insufficient, and one that households in all our study sites reported in order to buy grain. However, communities with fewer animals have fewer assets to sell and thus must rely on a wider range of strategies for coping with the failed harvests.

Conflict

There is a close relationship between conflict and food insecurity: in times of conflict range is restricted, limiting livelihood options. Recent conflict with the Hamar has resulted in a loss of pasture and cultivable land on the east bank of the Omo river and has interrupted transportation links with the rest of the zone. Similarly, conflict with the Turkana is preventing Nyangatom from growing crops in productive plots along the Kibish River. Hence, successful peace-building activities will potentially contribute to improved food security in the region, both through enabling improved utilization of available resources and facilitating exports of livestock.

Recommendations

The following recommendations were initially constructed by the SIDERA team following our time in the field and data analysis. The initial list was presented at our dissemination events in Ethiopia in April 2019 where it was revised by a range of stakeholders representing the communities, the woreda, the zone, and national governmental and non-governmental organisations.

In the short term, food aid for households not enrolled in PSNP (and potentially additional support for those in PSNP) will be needed to bridge the gap in demand for grain until there are good harvests.

In the long-term, government, with support from NGOs, should help communities by:

- **Securing reliable food production from multiple types of cultivation**, including:

⁹ Behnke, R. H., & Kerven, C. Counting the costs: replacing pastoralism with irrigated agriculture in the Awash Valley, north-eastern Ethiopia. London: IIED. (2013).

- » Providing wider and more consistent access to efficient forms of irrigation (i.e. hydroflume), including the provision of functioning pumps that are well suited to local conditions, a supply of spare parts, and a steady supply of fuel through local fuel stations. Consideration should also be given to using solar or wind power, particularly if the district remains disconnected from the Ethiopian grid, or grid electricity if the district becomes integrated into the grid. However, although the amount of water abstracted by community irrigation schemes will likely be small in comparison with commercial farms, an environmental impact assessment should be carried out to assess the impact on downstream ecosystems and river users in Ethiopia and Kenya.
- » Providing ongoing comprehensive on-site training in pump operation and maintenance to key individuals within the community and paying community members to maintain the pumps so expertise from the zone would only be required to deal with serious breakdowns.
- » Better extension support from zone and woreda levels. For example, stationing more agronomists and entomologists at zonal and woreda levels to provide support and advice to communities in crop pest management; working with biodiversity research centres to reintroduce indigenous species; working with animal scientists to improve breeds and expand vaccination programs.
- **Providing support for pastoralists**, including ongoing delivery of veterinary services; provision of fodder in times of drought; support and advice in grazing management; setting up a cooperative for marketing of livestock; establishing a physical market place in Kantagen; and ensuring Kuraz 5 canals are accessible for animals to drink from. However, these latter activities have not always benefited pastoralist communities equally, with richer households more able to take advantage¹⁰, so this should be accompanied by consultation and research to ensure equitable distribution of benefits, particularly as households with smaller herds already have fewer assets to rely on when harvests fail. It is important to maintain diverse livelihood options to ensure resilience, as, in the short-term, livestock will form an important part of people's portfolio of livelihoods. Any policy that aims to reduce livestock numbers and move people towards cultivation is unlikely to guarantee food security unless other reliable cultivation options can

¹⁰Catley, A., & Cullis, A. Money to burn? Comparing the costs and benefits of drought responses in pastoralist areas of Ethiopia. *Journal of Humanitarian Assistance*, 24. (2012). <https://sites.tufts.edu/jha/archives/1548>

first be secured. However, future development plans should also recognise that environmental degradation within the region is reducing fodder availability. Social and environmental drivers mean that fodder availability is likely to continue to decrease and thus limit the number of livestock the region can support.

- **Tackling deforestation and environmental degradation** through an emphasis on indigenous tree planting, soil and water conservation activities, and *Prosopis juliflora* removal for people enrolled in PSNP (particularly incorporating female-headed households) and controls on charcoal production in the region. Additionally, there should be a focus on changing the energy consumption behaviours of the main consumers of charcoal, the residents and business owners in Kangaten town. Alternatives to fuel wood and charcoal, such as solar cookers, should be promoted, as well as more efficient charcoal production methods. Alternative income generating activities are also needed to discourage people from selling charcoal and other wood products.
- Continued **peace-building** activities, since reducing conflict will also have benefits for food security.
- Supporting communities in **accessing newly created jobs** in the region, including providing training in any new skills required and creating quotas of jobs for local people. There was demand from communities for improved access to **education, training and livelihood opportunities** for women and girls, for example via cooperatives.
- **Benefit sharing**, so that benefits from government run agriculture projects benefit local communities first, i.e. through access to irrigated land or the resulting food outputs, adequately-compensated job opportunities, access to by-products for animal feed, and by making fodder production a precondition of private leases.
- **Controlled release of flood waters** from the Gibe III dam. The dam has the hydraulic capacity to release a controlled flood¹¹ which could be used to support recession agriculture at least until local people are able to transform away from their traditional livelihoods.

¹¹Avery & Tebbs. Lake Turkana, major Omo River developments, associated hydrological cycle change and consequent lake physical and ecological change. *J. Great Lakes Res.* 44, 1164–1182 (2018).

During the focus groups in July 2018, in addition to the interventions related directly to changing environmental conditions, communities also identified the following as priorities:

- Safe and reliable sources of drinking water
- Investment in schools, mobile health centres and mobile veterinary services

It should be noted that there are various programs in the area that dovetail with these recommendations – *Prosopis juliflora* clearing, fodder production, agricultural cooperatives, livestock markets, and diversified breeds – often run through international groups such as the Regional Pastoralists Livelihoods Resilience Project. Integration and scaling up of these programs would be beneficial.

Conclusion

It is hoped that the preliminary findings presented here will provide valuable information for decision-makers on the current situation faced by Nyangatom communities, and will inform strategies for ensuring equitable and sustainable development of the region. Communities should be consulted closely before any new projects are implemented to ensure their success. A more in-depth analysis of the results will be presented in future publications.

For further details

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