Food and Agriculture Organization of the United Nations

CGIAR RESEARCH PROGRAM ON Water, Land and Ecosystems

LED BY: IWMI International Water Management Institute

RUAF

ASSESSING FOOD SYSTEM RISKS IN TIMES OF CLIMATE CHANGE AND COVID-19

City region food system of

Tamale, Ghana

Introduction

The city of Tamale

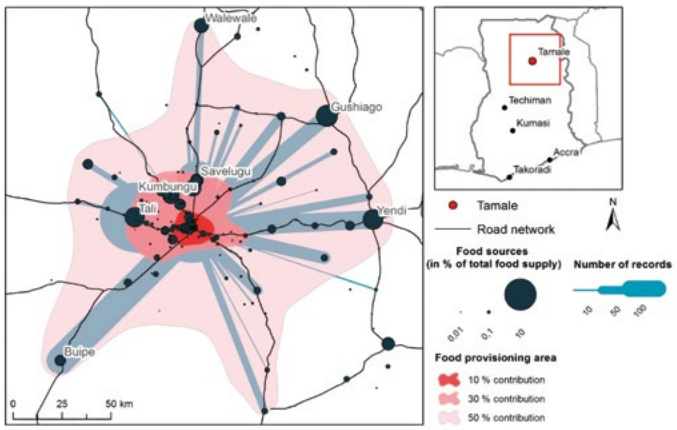
- Tamale's population is ca. 670 000 (2021). It is the political, economic and financial capital of the Northern region, and an important trade hub.
- The Tamale city region contributing to about 50 percent food supply occupies ca. 53 000 km^2.
- Agriculture, hunting, and forestry are the main economic activities in the Northern region.
- Climate is relatively dry, with a single rainy season from May to October.

The city region food system (CRFS) of Tamale

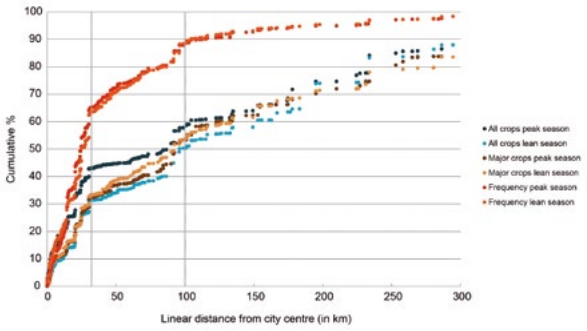
A quantitative approach to assess flows of largely unprocessed food items that dominate consumption patterns was used to define the boundaries of the Tamale City Region. More than 50 crops and animal products (live animals, meat) were included, including slightly processed items such as smoked fish and processed rice (husked, milled) and groundnuts (unshelled). The boundary has been defined based on the following criteria:

- Food products originating from within approx. 100 km of the city.
- Relevance of food sources from urban and peri-urban areas, and nearby rural hinterland.

↓ **Figure 1 Tamale food region supplying the city with up to 50 percent of food needs** (Karg *et al.*, 2016)



↓ **Cumulative food supply of Tamale with increasing distance from the city in different seasons** (Karg *et al.*, 2016)



- Three to five highest-ranking food groups in terms of household expenditure.
- Percentage contribution of food sources to total food supply, and number of records at customs department as a proxy for the number of vehicles entering the city.
- Food provisioning areas and their percentage contribution to the urban food supply.

The city region as defined using the above criteria is shown in Figure 1 with 50 percent of the food supply as suggested boundary for the city region (Figure 2).

Main food commodities

Tamale and other cities in the city region rely heavily on their hinterland for the provision of food (Karg *et al.* 2019). Subsistence farmers grow cereals such as maize, millet and sorghum, legumes (groundnut, bean, cowpea, pigeon pea, lately soya bean) and a variety of vegetables (hot pepper, tomato, onion, garden egg and dark green leafy vegetables, with significant amount coming from urban agriculture, see Box 1). The Northern region produces 40 percent of the rice consumed in Ghana.

Northern Ghana is also suitable for livestock-keeping, as a source of income as well as for subsistence, and can be a risk-reduction strategy for producers. Tamale's livestock sector is dominated by ruminant and poultry enterprises (94 percent of farmers own poultry) (Bellwood-Howard *et al.*, 2015).

Box 1 Urban agriculture in Tamale

In Tamale, urban and peri-urban agriculture (UPA) is an important source of food crops, especially vegetables. UPA plays an important role in diversifying diets and providing environmental services in urban and peri-urban areas.

UPA makes a significant contributor to the variety of foods found in urban markets. In Tamale, about 80 percent of cabbage found on the markets are produce of open-space farming in the cities (Bellwood-Howard *et al.*, 2015).

UPA provides supplementary sources of income for city dwellers (Bediako *et al.*, 2005), and provides employment and income for a chain of beneficiaries (such as farmers, market sellers, agricultural input suppliers, etc.), therefore contributing to Tamale's urban economy (Drechsel and Keraita, 2014).

In terms of challenges, the UPA sector in Tamale contends with poor access to adequate or suitable water for crop production (Gyasi *et al.*, 2014).

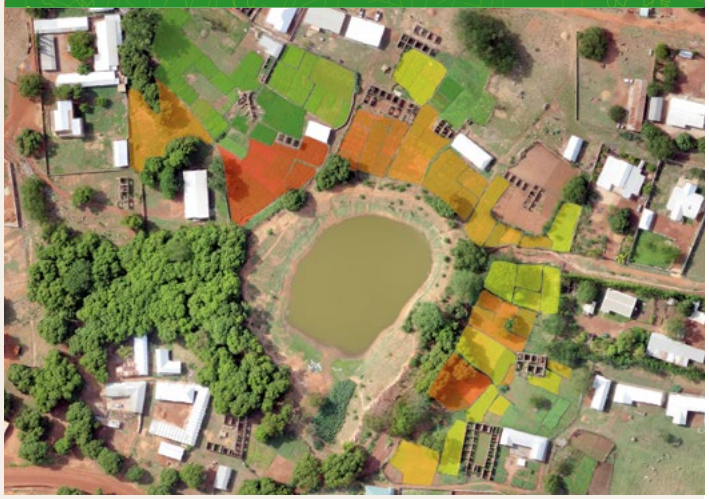
Main climate hazards impacting the CRFS

Main hazards (shocks and stresses) affecting the CRFS

- **Drought (long period without rainfall)**
  The combination of higher temperatures and decreasing rainfall leads to periods of drought; farmers have reported increased frequency and severity of droughts in recent times. The period of rainfall in Northern Ghana is followed by a longer period of drought from November to May (about 7 months). The majority (94 percent) of farmers in a CRFS assessment identified drought as the main hazard they face.
- **Rising temperatures and excessive heat**
  Mean annual temperatures rose by approximately 1° C between 1960 and 2010, and future projections are for a mean annual temperature increase of 1.0 to 3.0° C by the 2060s and up to 5.2° C by the 2090s (ALP, 2012).

↓ Livestock rearing in Tamale as a source on income and for subsistence

↓ Using drones in mapping UPA
(Photo Credit: Johannes Schlesinger)



- **Changing and erratic rainfall patterns**
  Overall there has been a constant trend of decreasing rainfall in Northern Ghana, and rainfall patterns have become increasingly erratic (Cameron, 2011). One prediction is that by mid-century, the months of July, September, October and November could become wetter than historical records, while August could become drier.
- **Extreme rainfall events and floods**
  Extreme rainfall events became more frequent during the 1980s and 1990s, recurrent storms and subsequent flooding, sometimes followed by drought that compounded the impacts.

Main impacts on the CRFS

Production

Agriculture experiences the greatest direct impacts from all climate-related hazards. Erratic rainfall results in declining yields, while floods and storms lead to poor plant growth, water-logging and rotting of crops, and loss of nutrients, all of which result in low yields (Amoako, Donkoh and Ansah, 2017). Drought has a significant impact on subsistence farmers, whose access to water is already limited, especially during the dry season. Drought also causes scarcity of animal feed, which significantly affects livestock health. The impacts of drought can be long-lasting, as prolonged periods of high temperature and low rainfall leads to deforestation and forest fires, and degradation/desertification of farmland. Such long-term stress factors adversely affect the growing conditions and potential yields.

Climate change and variability cause particular stress to smallholder farmers, making their livelihoods more precarious. While most farming households have adopted at least one practice/technology to minimize the negative impact of climate change on crop production, their adaptive capacity is affected by lack of economic and technical resources. Women and children have the least adaptive capacity.

Processing and manufacturing

Droughts and high temperatures result in inadequate raw material for food processing, leading to higher prices, increased processing costs, and lower sales and profit. Thereis,however,sufficientsunshinetodrygrainsandnuts. During floods and storms, on the other hand, there is insufficient sunshine to dry foods, resulting in poor quality grains and impaired sales and profits.

Distribution

Road infrastructure and access to markets is relatively poor in the Tamale city region (Gyasi *et al*, 2014) and this negatively affects transportation of food, especially during the rainy season and times of flood. Flooding in the Northern part of Ghana in 2007 destroyed about 1 500 kilometres of road, which severely affected transportation to and from production areas, resulting in high food prices in the city (UNDP, 2007). Related extra costs (like additional costs for transportation over longer distances) are eventually passed on to the customer by traders as a coping strategy. As a result, traders can make extra profit when they benefit from elevated prices based on the demand–supply gap.

Markets

Traders experience knock-on effects of climate hazards on production and processing, due to lack of supply. The effects of drought can be particularly harsh, as the dry season is usually the time when sales of grains and seeds boom.

Food consumption

Changing patterns of crop cycles affects availability, accessibility and stability of food supplies. The decline in output and yields aggravate the food insecurity and poverty incidence among smallholders whose livelihoods are solely dependent on agriculture. Moreover, food availability in the whole area is affected by climate events, as farmers have little or no surplus to sell. This means those who do not produce crops are faced with higher food costs, resulting in acute food insecurity and possible starvation.

The impacts of COVID-19

Restrictions on human mobility impacted agricultural production in the city region. Farmers experienced limited or reduced access to the markets, limited or costly labour and lack of access to inputs like fertilizer, seeds etc. Stephens *et al.*, (2020) reported that labour shortages due to the COVID-19 crisis caused severe disruptions in some sectors, such as livestock production, horticulture, planting, harvesting, and crop processing, which are relatively labour intensive. Other impacts were limited tractor services, and low demand for food items leading to food spoilage. Fear of infection meant farmers from the peri-urban and rural areas were reluctant to go to the main markets in urban areas either to sell or buy food; they believe COVID-19 to be an 'urban disease' since the majority of cases were reported in urban areas, especially in the middle and southern part of Ghana. The restriction on human movement also affected the start of the new planting season.

Measures taken by local or national government to mitigate the impacts of COVID-19 on agricultural production in the city region included:

- educating the general public on COVID-19 protocols;
- supporting farmers with fertilizer and other inputs at low cost;
- provision of sanitizers and nose masks.

Preliminary priorities identified to increase CRFS resilience

Food production:

- Provision of funds to some farmers to support their farming activities.
- Farmers' adoption of new practices to withstand climate stresses and most likely shocks Increased access to early warning systems for farmers.

Food distribution:

- Increased number and diversity supply chains of key commodities for the city/city region.
- Emergence of alternative supply chains in response to COVID-19 measures.
- Availability of alternative road routes suitable for food trucks in case the main routes within the city region/into the city are subject to extended closure.

Markets

- Measures to reduce fluctuation of food prices a result of COVID-19 measures.

Governance

- The inclusion of climate adaptation and mitigation measures in agricultural plans and strategies.
- Responses of food system stakeholders and governance actors to disruptions throughout the CRFS as a result of COVID-19 disruptions.

Notes

Note 1: This fact sheet is largely based on: Rapid Scan: Tamale City Region Food Systems and their vulnerability towards climate change related shocks (Amoah, 2019).
Note 2: RUAF and IWMI support the work on CRFS in Tamale under the Water Land and Ecosystems Programme (WLE).

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