

2015

# Urban and Peri-urban Agriculture in Tamale: A Policy Narrative



*for*  
**URBANET**  
**UrbanFood<sup>Plus</sup>**  
**RUAF Foundation**  
**Ghana WASH Programme**  
**University for Development Studies**  
*and*  
**International Water Management Institute**

*by* I. Bellwood-Howard, E. Chimsi,  
S. Abdul-Ganiyu, R. van Veenhuizen and P.  
Amoah.

**Urban and Peri-Urban Agriculture in Tamale:  
A Policy Narrative**

**2015**

## Acknowledgements

This policy narrative on urban and peri-urban agriculture in Tamale was produced under the auspices of the UrbanFood<sup>Plus</sup> research programme ([www.urbanfoodplus.org](http://www.urbanfoodplus.org)) and the Ghana Water Sanitation and Hygiene Programme (WASH: <http://www.washalliance.nl/country-alliances/ghana/>), with the involvement of the International Water Management Institute (IWMI: [www.iwmi.org](http://www.iwmi.org)), the RUAF Foundation ([www.ruaf.org](http://www.ruaf.org)), the University for Development Studies (UDS: <http://www.uds.edu.gh/>) and the Urban Agriculture Network (URBANET: [www.sites.google.com/site/urbanetghana/](http://www.sites.google.com/site/urbanetghana/)).



The parties who formed part of the core group of experts and contributed to the initial formulation of policy recommendations over the course of late 2014 and early 2015 were:

Alhassan Abdulai, Tamale Ministry of Agriculture  
 Baba Yakubu, Sagnarigu Ministry of Food and Agriculture  
 Bennet Sa Ambo, Sagnarigu Town and Country Planning Authority  
 Dennice Amponsah, Sagnarigu Ministry of Food and Agriculture  
 Hector Codjoe, Tamale Metropolitan Assembly  
 Karim Salifu, Northern Region Vegetable Farmer's Association  
 Seidu Sulemana, Sagnarigu District Assembly  
 Shaibu Abdul-Ganiyu, University for Development Studies  
 Zakaria Rashid, URBANET  
 Musah Adam Jafar, Environmental Protection Agency

Twenty four other stakeholders gave feedback at a Stakeholder Workshop held on 21<sup>st</sup> March 2015 at UDS International Conference Centre, leading to the reshaping of the policy narrative document into its current form.

This document can be cited as:  
 Bellwood-Howard, I., Chimsi, E., Abdul-Ganiyu, S., van Veenhuizen, R. and Amoah, P. (2015) Urban and Peri-urban Agriculture in Tamale: A policy narrative.

Unless otherwise specified, all illustrations, figures and tables are supplied by the lead author.

## Contents

Executive summary.....	4
Introduction.....	6
Urban and peri-urban agriculture in Tamale.....	8
Typology.....	8
Characteristics of urban and peri-urban agriculture in Tamale.....	14
Benefits of urban and peri-urban agriculture.....	22
Major issues.....	25
Policy recommendations.....	28
Conclusions.....	33
References.....	34

## Executive summary

Tamale, the capital of Ghana's Northern region, is a fast-growing metropolis situated in the Guinea savannah. It has a tradition of urban and peri-urban cultivation, and its current rapid growth means that there is a need to analyse the role of urban and peri-urban agriculture (UPA) in the city's sustainable development.

UPA in and around Tamale takes many forms, with various crop farm types characterised by different spatial and tenure arrangements and access to irrigation facilities. These can be broadly categorised as open space intra-urban sites, open space peri-urban sites, intra-urban backyard farms, isolated farms in interstitial intra-urban spaces, formal peri-urban irrigation schemes and peri-urban non-irrigated farming. Leaf vegetables are the major crops grown in urban areas, whilst maize dominates peri-urban rainy season production. Animal rearing is not particularly market oriented, and is based around ubiquitous ownership of fowl and a greater extent of peri-urban than urban ruminant keeping.

Farmers access land in multiple ways including through inheritance, borrowing, squatting and self-ownership. One of the most critical concerns in the sector is the decrease in available lands as chiefs allocate plots to developers. Lack of irrigation means that cultivation is concentrated in the rainy season. Farmers who cultivate in irrigated open space sites and those with access to piped water can crop in the dry season, but overall, poor water availability is a major constraint. Piped water is a common irrigation source, although it is not intended for such commercial use. Wastewater irrigation by a minority is a health concern. Soil fertility amendments entail a major financial outlay for farmers. Most currently use manure or inorganic fertiliser, but there is a receptive attitude towards use of co-composted products.

Much production is market-oriented, including that in backyard farms. This means that backyard farmers do invest in their enterprises, for example with fertilisers, irrigation and labour. Seasonal water availability influences prices of goods. Value addition through processing and packaging is very limited.

The benefits of UPA in Tamale, as elsewhere, relate to the maintenance of a livelihood through food production and income generation. Besides this, UPA may act as a sink for municipal solid and liquid wastes and promote the development of infrastructure and community cohesiveness.

However, challenges face the sector. Probably the most pressing and contentious concerns in Tamale are farmers' access to land and water in a situation of rapid urbanisation. Institutional advocacy for land law reform is seen as an answer to the issue of allocation and sale of agricultural land. Use of wastewater poses a health risk, and piped water is in short supply. Animal encroachment is a serious source of contention between crop farmers and animal rearers. Access to storage facilities, credit and extension services are limited.

Stakeholders associated with UPA have connected to each other through fora such as the Ghana Water Sanitation and Hygiene programme. They now need to work together, for example through groups such as farmers' unions, to mobilise more explicit local policy support

for UPA, as it is promoted in national agricultural policy. Land law needs to be reformed to this end.

Bearing in mind the potential that urban agriculture holds and the constraints it faces, a group of policy stakeholders convened in early 2015 to begin formulating a policy narrative for urban and peri-urban agriculture in Tamale. The core of the suggested Tamale plan involves municipal assemblies purchasing larger areas of flood prone land and specifically dedicating them to agriculture so that they cannot be reallocated or sold. The diverse statutory land planning and traditional institutions need to be more effectively linked up so that these areas are gazetted as agricultural land. Concentration of farmers in dedicated sites would facilitate training and water distribution. There is also a need to promote backyard cultivation as well as institutional strengthening of farmers' associations. Resources for education must be enhanced, as must market links and processing opportunities.

Tamale has the potential to incorporate agriculture into a holistic, sustainable city vision. The continued efforts of the core stakeholder group towards legal recognition and land allocation will be a starting point.

## Introduction

Tamale, the capital of Ghana's Northern region, is a fast-growing metropolis situated in the Guinea savannah. Its area has increased seven-fold in the past 30 years and population has approximately doubled since the year 2000. It is rapidly changing, reflecting the national context: in 2013, according to the World Bank, Ghana became a lower middle income country, and the Northern regional capital is one of the towns where this growth is evident, as development and urbanisation continue apace. Such rapid growth is associated with rising living standards and incomes, as well as challenges in terms of maintaining income generating opportunities, food provision and services such as waste collection and water supply for the growing population. City authorities and civil society organisations increasingly recognize urban agriculture for its capacity to strengthen the resilience of the urban food system, enhance the urban poor's access to nutritious food, generate (self-) employment and income, and help the city to adapt to climate change, whilst reduce its ecological footprint.

Urban agriculture can be defined briefly as the growing of plants and the raising of animals within and around cities. The most striking feature of urban agriculture, which distinguishes it from rural agriculture, is that it is integrated into the urban economic and ecological fabric: urban agriculture is embedded in and interacts with the urban ecosystem (Mougeot 2005).

In Tamale, as elsewhere, urban agriculture manifests in diverse forms and contributes to an array of functions. The aim of this policy narrative is to provide a background to the urban and peri-urban agriculture (UPA) situation in Tamale and suggest how policy may encourage its positive contribution to the city's development.

Agriculture remains a mainstay of the Ghanaian economy, alongside expanding manufacturing and energy industries. Government policies such as the Food and Agriculture Sector Development Plan, the Ghana Commercial Agriculture Programme and the Medium Term Agriculture Sector Investment Plan emphasise the importance of developing production of higher value agricultural goods for export. Simultaneously, there is recognition that semi-subsistence agriculture and production for local markets is still important for maintaining people's livelihoods, in urban as well as rural areas. UPA has therefore received much attention for this role lately. In tropical southern Ghana, for example, a policy narrative and strategic agenda has been produced for the capital city, Accra (Cofie et al 2005, CFF 2008). The case of Tamale, the largest city in Ghana's northern Guinea savannah, obtains interesting similarities and contrasts to the situation in the south. Ghana's Northern region has historically been less developed and more agricultural. This regional predisposition towards farming means agricultural activity manifests particularly strongly in Tamale, with a continuing emphasis on subsistence cultivation and local trade, despite the national policy focus on larger scale commercialisation: agriculture has historically been a majority subsistence livelihood activity in urban as well as peri-urban areas of Tamale (Adjei 2002). Cropping patterns, common varieties and the significance of irrigation are shaped by the savannah environment, with its monomodal rainfall regime. Tamale's northerly position means that, paradoxically, agriculture is environmentally more challenging than in southern Ghana. Primarily, the region experiences a dearth of water, having a single rainfall season that extends from June to

October, and no major river (Mekonnen 2011). Simultaneously, there is rapid and relatively uncontrolled urban expansion, alongside a land market associated with a strong traditional authority structure. Issues of diminishing access to land therefore arise here, just as they do in southern Ghana. Climate change is likely to exacerbate these vulnerabilities in and around Tamale (Gyasi et al 2014a). These are among the themes that are to be addressed by policy stakeholders concerned with planning the sustainable future of Tamale.

Attention has been given by to UPA in Tamale by the local University for Development Studies along with the Urban Agriculture Network (URBANET) and the International Water Management Institute (Drechsel and Keraita 2014, Gyasi et al 2014b). Recently the United Nations System for Analysis, Research and Training (START) has related UPA in Tamale to climate change (Gyasi et al 2014a). However, this has never led to a comprehensive policy narrative. With the recent focus on this topic by the (Dutch funded) Water, Sanitation and Hygiene (WASH) Alliance and the (German funded) UrbanFood<sup>Plus</sup> interdisciplinary research project, a multi-stakeholder forum on UPA has been facilitated since 2011, which has led to the formulation of this document.

In the following sections the status of UPA in Tamale will be outlined, followed by an exploration of the advantages and challenges associated with UPA in Tamale in particular. Finally, the policy recommendations for UPA in Tamale will be specified, as defined by the core group of experts listed on page 1 and validated by the larger group of interested parties convened in the ongoing multi-stakeholder forum.



## Urban and peri-urban agriculture in Tamale

Urban and peri-urban agriculture (UPA) is an integral part of Tamale's structure. This is a result of many factors. Tamale is a fairly young city, so dense infrastructure does not extend across its whole area, and, as mentioned, it is situated in a region where the majority of the population has historically been engaged in farming as a major livelihood activity. Tamale became the capital of Ghana's Northern Region in 1919. After rapid growth in the late twentieth and early twenty-first century, population in the 2010 census was estimated at 371000. The city extends about 10 km to the North from the city centre and 7km to the South. It is characterised by a concentric ring pattern and maintains two major markets. Tamale Metropolitan Assembly is the local government authority, and in 2012, Sagnarigu district was inaugurated and now has jurisdiction over a western section of the urban area, arguably a zone where UPA is more intensively practiced. Zones in contemporary Tamale where urban agriculture takes place were suburbs fifty years ago, and what is now classified as 'urban' agriculture takes different forms.

### Typology

Urban and peri-urban agriculture involves multiple functions related to food in and around urban areas, for example input supply, manufacturing, agro-processing and marketing. This document focuses mainly on crop farming; particularly vegetable production. This is not to imply that vegetable gardening is the only production system found in the city, nor that it is exclusive to it. Staples, especially cereals and to a lesser extent traditional field crops such as legumes and tubers, may indeed be cultivated in the town. Likewise, vegetable production takes place in rural and peri-urban areas. However, vegetable gardening has flourished in Tamale because of the good access to markets and water that urban farmers enjoy, and this is creating a pressing dynamic that is in particular need of attention. Following from this, the close links between production of crops - both vegetables and staples - and livestock mean that the latter must be mentioned, so this is a second important focus of the document.

There are many different types of urban farm. Classifications based on earlier research in capital cities tend to group them into subsistence backyard and commercial open space sites (e.g. Drechsel et al 2006). This typology needs to be revised for Tamale, as its shorter history as a major town and closer links to rural areas mean many farms have double subsistence and commercial functions. One of the most recent pieces of comprehensive field research on this is a survey conducted by the UrbanFood<sup>Plus</sup> (UFP) project in 2013 (Bellwood-Howard et al 2015). Based on the results, farms in and around Tamale may be grouped on the basis of spatial location, degree of isolation, proximity to irrigation and usufruct arrangement, emerging with the broad categories of farm listed in table 1. These are described in more detail in the sections that follow.

Table 1. Typology of Tamale's urban and peri-urban farms

<b>Farm type</b>	<b>Spatial characteristics</b>	<b>Irrigation</b>	<b>Usufruct</b>
<b>Open space intra-urban sites</b>	Contiguous plots used by different farmers.	Located around an irrigation source such as a gutter, a commercial pipe or a reservoir.	Usually not legally owned by the cultivator, although traditional usufruct may be assumed.
<b>Open space peri-urban sites</b>	Contiguous plots used by different farmers.	Located around an irrigation source such as a gutter, a commercial pipe or a reservoir.	User usually has traditional usufruct rights.
<b>Intra-urban backyard farms</b>	Isolated plots located between houses, for example on undeveloped building sites or interstitial wasteland.	May or may not have access to irrigation.	Owned by the cultivator.
<b>Isolated farms in interstitial intra-urban spaces</b>	Isolated plots located between houses, for example on undeveloped building sites or interstitial wasteland.	May or may not have access to irrigation.	Not owned by the cultivator.
<b>Formal peri-urban irrigation schemes</b>	Peri-urban system of contiguous fields.	Arranged around a formally provided irrigation canal system, sourcing water from a reservoir.	Allocation of plots by the irrigation authority may be based on traditional usufruct or as a result of application.
<b>Peri-urban non-irrigated farming</b>	Farming on contiguous fields in villages around the metropolis, linked to urban input and output markets. Some villagers also cultivate on isolated fields close to the house, analogous to backyards.	Non-irrigated.	User has traditional usufruct rights.

*Open space intra-urban sites*

There are several contiguous, open space sites where adjoining fields are farmed by different farmers. These sites are normally clustered around water sources, for example a gutter at the Gumbihini Volta River Authority (VRA) or Waterworks site and a reservoir at Dapokpaa. Piped water has been installed in two of the most well-known, Gumbihini old and new dam sites. Several of these sites are indicated in figure 1.



Figure 1 – Open space farm site in Gumbihini residential area.  
Source: UrbanFood<sup>Plus</sup> SP8, Freiburg University (2014)



Figure 2 – Gumbihini VRA site

Some such sites are on government land, notably those in Gumbihini. Others are on land held by traditional authorities, for example at Sangani. Ninety percent of land in Ghana is held under such a customary arrangement (Republic of Ghana, 1992). In Tamale, many such lands are now being acquired by private developers, for example at Tunayilli. Most open space farming is for the market.

*Open space peri-urban sites*

Peri-urban open space sites also exist, again generally where perennial water bodies facilitate dry season farming, for example at Fushegu, Tugu Yapala and Libga. These farms are usually also on traditional customarily held land, and less at risk of acquisition by developers and would-be home owners. Although they may be located in the administrative district adjacent to Tamale and Sagnarigu, they are connected to metropolitan markets.

*Intra-urban backyard farms*



Figure 3 – Backyard farm in Gumbihini residential area. Source: UrbanFood<sup>Plus</sup> SP8, Freiburg University (2014)

Backyard farms are situated around the cultivator’s house. They may contain rainfed maize or market vegetables, which, in Tamale, are usually traditional leafy vegetables, okra, tomatoes and pepper. In dry season these vegetables are often irrigated with piped water, straining the municipal supply. Backyard farms are widespread in Tamale due to fairly haphazard urban development.

Residential areas are planned, but landowners can allocate or sell plots at different

times. Developers rarely construct simultaneously, so vacant plots remain available for cultivation. IWMI research on backyard farming in Kumasi and Accra demonstrates that its market function is minimal (Dreschsel et al cited in Dubelling et al 2009), In Tamale, however, backyard farms have a significant market function (Bellwood-Howard et al 2015).



Figure 4 – Backyard farm in Manayilli residential area

*Isolated farms in interstitial intra-urban spaces*

However, not all isolated farms are located in the cultivator’s backyard. Some farmers crop on small, otherwise unused spaces such as plots owned by absentee landowners, undeveloped plots in industrial areas or by public institutions such as schools and toilets. The difference between this and backyard gardening is that farmers can lay no claim to the land they use in these isolated farms. Nevertheless, this is not always an insecure tenure situation: farmers may be welcomed by landowners as they offer a form of protection against encroachers trying to build illegal structures on the site. As in backyards and open spaces, farmers may cultivate cereals in the rainy season, turning to higher value market vegetables when they are scarce.



Figure 5 – Isolated farms around buildings in Gurugu and Tunayilli areas

*Formal peri-urban irrigation schemes*

Figure 6 – Golinga irrigation site

Golinga, Manguli and Bontanga are three peri-urban sites where government-installed facilities provide dry season irrigation, with water flowing along canals from dammed reservoirs. Although these sites are in the administrative districts adjacent to Tamale and Sagnarigu, they are connected to the input and output markets of the metropolis. Some farmers at Bontanga and Golinga are allocated plots on the basis of traditional usufruct of the land prior to the development, as are farmers at Manguli. Others

have applied to the irrigation authorities to be given a plot. Farmers pay fees to an association for access to the water. Some official plot owners may hire or rent land to other users for a season.

The executives of the irrigation associations open flood gates to let water into the irrigation channels, according to a schedule. Vegetables are the main dry season crop, and give way to rice in the rainy season. Year-round access to water means that the sites act as magnets for research associations and groups offering assistance to farmers, for example rice trials and vegetable-growing training groups.

*Peri-urban non-irrigated farming*

Besides the formally and non-formally irrigated sites described, many villages found in the peri-urban zone bear the characteristics of rural cultivation, that is, rainfed agriculture and an emphasis on staple cereals, legumes and tubers. However, they have strong links to the city through input and output markets. These sites are villages in that they are clusters of houses separated from the urban zone by belts of undeveloped land, and may be located within districts adjacent to Tamale as well as within the administrative areas of Tamale and Sagnarigu. Some villagers also cultivate on small fields directly next to their house, analogous to backyard farms in the intra-urban zone, but without irrigation.

Figure 7 shows a map of Tamale, indicating the location of some open space sites, along with their water source and characteristics.

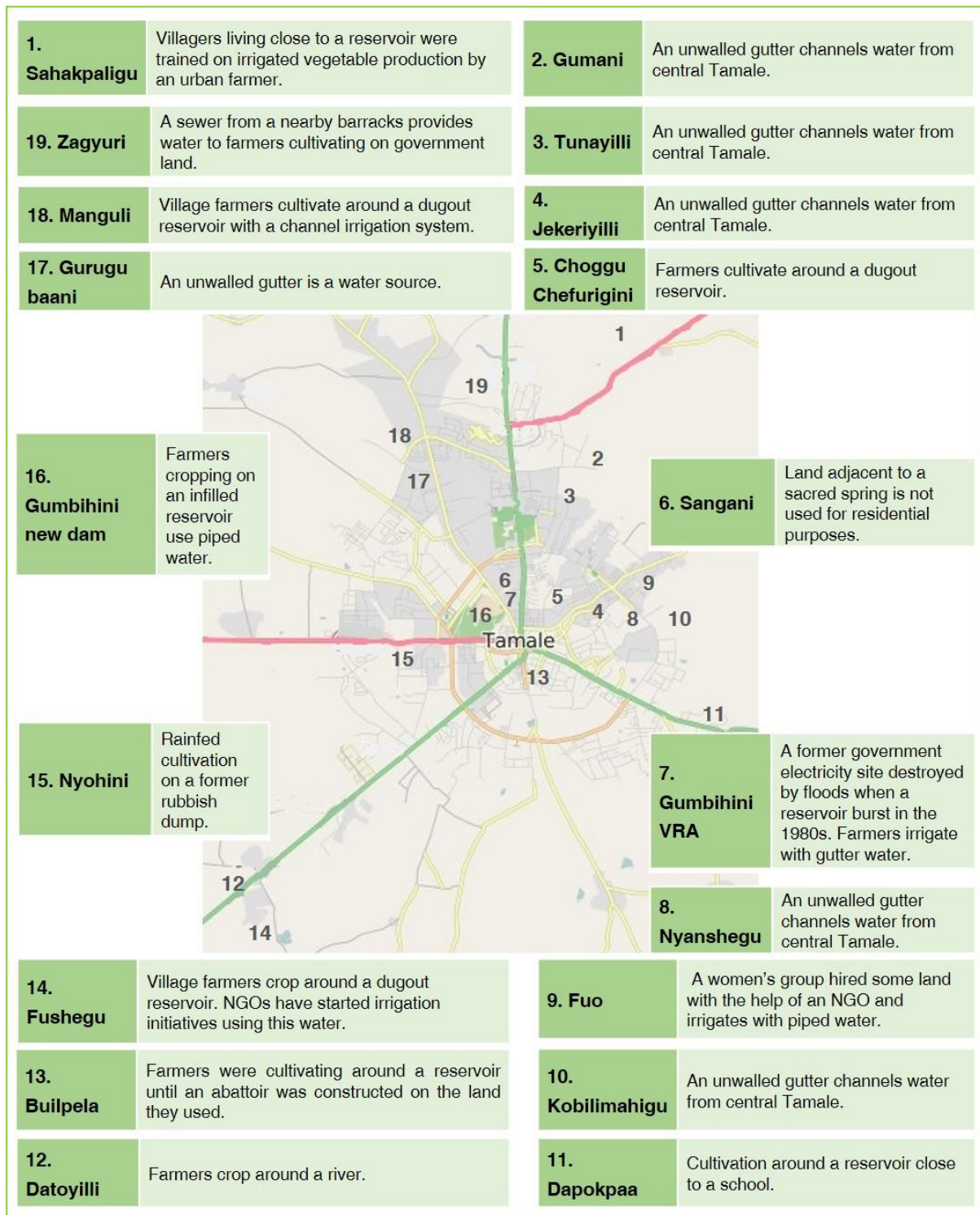


Figure 7 – Map of open-space urban and peri-urban agriculture sites in Tamale.  
Map source: Open Street Map 2015

## The role of livestock

This policy narrative focuses on crop cultivation, but such activity is inextricably linked to livestock production. Many individuals practice both. Primary synergies between these activities involve applying manure to crops and feeding crop residues to livestock, entailing exchanges of fodder between urban and peri-urban zones. However conflict is also evident, as livestock destruction obliges farmers to fence their plots. Within an individual farmer's livelihood strategy, the need to spend time sourcing feed for livestock competes with that spent tending crops. Conversely, the income from each activity can support the other, in terms of purchasing inputs such as seeds, fertilisers and livestock medication. As well as the small scale livestock enterprises that are usually integrated with crop production, there are a limited number of larger scale commercial livestock farmers in Tamale. Crop farmers source manure from these farmers. Their intensive rearing systems and usually peri-urban locations mean they are less implicated in crop destruction.

Animal rearing in Tamale is overwhelmingly dominated by ruminant and poultry enterprises (94% of farmers own poultry). Pigs are uncommon, especially in the urban area (Mohammed and Fiatussey 2001). The system is not very market oriented – just half of farmers sell animals. Herd sizes are larger in peri-urban than urban areas – 7.6 compared to less than 6 Tropical Livestock Units (TLU, 1 TLU = 250 kg liveweight) (Bellwood-Howard et al 2015).

### *Ruminants*

Small ruminants are kept in all areas of Tamale, often as a default possession in extensive or semi-intensive conditions, but with occasional examples of more intensive production for sale. Cattle are usually maintained in small herds for meat production, often in conjunction with small ruminants. There are a few instances of dairy production, but little transformation. Peri-urban cattle owners often employ Fulani herdspeople, and their traditional milk processing activities dominate the Tamale dairy market.

### *Poultry*

A small number of larger, commercial, guinea fowl and exotic poultry meat and egg enterprises exist, alongside the household ownership of local fowls that is almost ubiquitous in peri-urban areas. Larger scale poultry enterprises rely on imports of day-old-chicks from Kumasi.

## Characteristics of urban and peri-urban agriculture in Tamale

The heavy reliance on rainfall means that cultivation in Tamale is strongly seasonally differentiated and spatially clustered around water sources. Almost all of Tamale's open space and backyard farmers cultivate in the rainy season (Bellwood-Howard et al 2015). Year-round cultivation is concentrated in irrigated open space sites, where around half the farmers farm all year round (Abdul-Halim and Abdul-Ganiyu 2014, Slonimpa 2011).

Seasonality means prices fluctuate sharply between the seasons of plenty and scarcity for different goods. High dry season income is the foremost reason farmers take up vegetable

farming (Yelbe-ire and Raphael 2011), and seasonal farmers do not farm all year round because vegetable gluts depresses prices at certain points in the year (Slonimpa 2011). Shortfalls in local production of vegetables are compensated for by imports: large quantities of vegetables in particular come from destinations around Kumasi as well as from Bawku in Ghana's Upper East region, Burkina Faso and Niger. The product counting for the largest import weight is tomatoes, most of which are imported from southern Ghana in the rainy season and from northern destinations in the dry.

#### *Water access and quality*

As most urban and peri-urban farmers use rainfed cultivation, the absolute availability of water is one of the major constraints on production (Yelbe-ire and Raphael 2011). Many farmers claim to experience water shortage, especially between February and March (Akwowoye 2013). Those without access to perennial water holes, dugouts, reservoirs and springs or piped water are most vulnerable to such shortages. Less conventional solutions to these problems include damming seasonal springs such as the Kasalgu stream, which can potentially irrigate an area of 4ha (Odamtten, 2010).

Besides natural water sources, treated piped water is often used for irrigation, especially by backyard and isolated space farmers (Bellwood-Howard et al 2015).

Researchers, consumers, and policy makers are concerned about the health implications of using wastewater for irrigation, and this is exacerbated by the media. Estimates of the actual extent of usage of 'wastewater' vary enormously - between 1% (Gyasi et al 2014a) and 50% (Zibrilla and Salifu 2004) of farmers, depending on the sites surveyed and the definition of 'wastewater' used. A recent survey showed 4% of all open space farmers irrigating with such water, while another 6.3% used potentially contaminated irrigation sources such as wells and dugouts (Bellwood-Howard et al 2015).



Figure 8 – Watering at VRA site

Concern over wastewater use is justified by the International Water Management Institute's (2014) measurements of faecal coliforms and helminth eggs in all sources of water tested in Tamale, including piped water, and on market goods. Another study on the peri-urban site of Libga found *E. coli* and *Salmonella* in reservoir irrigation water (Odoi Koranteng 2014).

Water is applied to crops using buckets and watering cans or, to a lesser extent, hose pipes attached to pumps and taps (Appati 2013). There are isolated instances of furrow and gravity irrigation, for example at Sahakpaligu peri-urban reservoir. Watering takes a major effort: in a case study at Sangani, Abdulai and Abdul-Sami (2006) found that irrigation was the most expensive input.



*Access to land*

As mentioned, 90% of land in Ghana is owned traditionally (Republic of Ghana 1992), meaning that chiefs act as custodians of the land for the people. Chiefs allocate usufruct of land to individuals with a 'note', and receive symbolic gifts of kola when they do so. With an allocation note, accompanied by a site plan, landowners can secure their plots by applying for a 99-year lease. The pace of land allocations and subsequent sales in Tamale has accelerated with the increasingly dynamic land market of the 21<sup>st</sup> century (Ubink 2007, Naab et al 2013).

The issue of land sale and allocation is especially contentious in open space sites where farmers cultivate on land owned by the government, such as at Gumbihini. Disputes are less common in the peri-urban zone, where land is less at threat of allocation or sale, as much has not yet been demarcated and the land market is less vigorous. The local NGO URBANET and the Northern Region Vegetable Farmers Union have engaged in advocacy to try to persuade chiefs to limit land allocations, attempting to draw local government in to this dispute. Current legislation has little to offer by way of solution: planning documents do not allocate tracts of urban land specifically to agriculture. The current planning regulation CAP 84 says that UPA may only be practiced without special permission in settlements under 5000 people in Ghana. However, based on the 1945 Town and Country Planning Ordinance, CAP 84 is somewhat outdated and not strictly enforced. This may change in the future, as the Land Use Planning Bill 2010 is currently under discussion in parliament.

The status of land ownership in different open space sites varies widely, but the largest proportion of farmers generally considers that they are using family, inherited or communal land (Abdul-Halim and Abdul-Ganiyu 2014, Abdul-Halim and Mahama n.d., Akwwoye 2013, Slonimpa 2011). More than anything else, these studies point to the need for standardisation of categories relating to land ownership by a panel of experts, and a randomised or comprehensive survey using such categories and disaggregating data by site.

Peri-urban field sizes are on average around 1 ha, open space fields are below 0.3 ha, and backyard farms even smaller (Shahibu 2002, Joshua and Nyameke 2001, Bellwood-Howard et al 2015). In 2013, open space farm sites in Tamale covered between 20 and 25 ha (Johannes Schlesinger unpublished data 2015). Two recent studies measured the total area of open space farming sites over the past ten years, recording increases in the peri-urban zone, decreases in the urban zone and an overall decrease in open space farming area in the metropolis (Nchanji 2015, Okwwoye 2013).

*Crops grown*

Leaf vegetables and okra are the most commonly grown vegetables in Tamale, especially in the urban zone, with ayoyo and cabbage being cultivated by over 25% of farmers (Bellwood-Howard et al 2015, Gyasi et al 2014a, Shaibu 2002, Abdul-Halim and Abdul-Ganiyu 2014). Maize dominates production in the rainy season, and this staple cultivation is concentrated in peri-urban villages. The vast majority of farmers grow more than one crop (Mohamadu 2003).

Table 2. Percentage of farmers cultivating different crops in Tamale

	<b>Intra-urban backyard and isolated farms (n=96)</b>	<b>Intra-urban open-space farms (n=75)</b>	<b>Peri-urban villages (n=98)</b>
<b>Main dry season crops on sampled fields (% of households)</b>	Amaranthus (5) Okra (5) Roselle (4)	Okra (9) Amaranthus (8) Roselle (5)	< 1% of any crop
<b>Main wet season crops on sampled fields (% of households)</b>	Maize (70) Tomato (32) Okra (31) Roselle (28) Pepper (21) Amaranthus (16) Ayoyo (12)	Maize (59) Rice (24) Pepper (24) Okra (23) Roselle (21) Tomato (15)	Maize (78) Pepper (22) Okra (19)

Source: Bellwood-Howard et al 2015

Amaranthus has the highest market share of all indigenous leafy vegetables in terms of units sold (based on data from Tamale's two main markets and five minor markets), and the highest market share on average, followed by roselle and then jute mallow, in both the rainy and the dry season (Kusiator 2012).

### *Inputs*

The most common inputs are those tackling soil fertility i.e. manure, fertiliser and compost. In urban zones, farmers use more manure, whereas in peri-urban areas, use of inorganic fertilisers is very common in the maize season, raising use statistics (Bellwood-Howard et al 2015, Gyasi et al 2014a, Mohamadu 2003) Availability of some organic sources is problematic: although a majority of farmers claim to prefer compost to chemical fertiliser, less than 50% of farmers in any site do composting (Joshua and Nyameke 2001, Abdul-Halim and Abdul-Ganiyu 2014). Low compost use rates are largely because of lack of space, time and raw materials with which to produce it. There is a low-tech commercial compost plant, Decentralised Compost Organisation (DeCO), which sells a costed product. Uptake is low, because of the availability of free manure.



Figure 9 – Fertiliser application in a backyard farm

As compost production resources are in short supply and market access is fairly good, use of costed chemical fertiliser and gifted manure is attractive, especially as they cost less effort to store and apply (Abdul-Halim and Abdul-Ganiyu 2014). Fertiliser markets are well developed in Tamale, and 18% of farmers' input costs are for SFM inputs (Mohammed and Fiatussey 2001). Manure markets, however, are less prevalent: most farmers who use farmyard manure obtain it without payment.

Farmers have expressed willingness to use municipal waste co-composted with rice straw as a soil amendment, linking UPA to waste management imperatives. Faecal sludge and shea butter slurry were also found to be acceptable compost ingredients to cereal and vegetable farmers respectively (Abdul-Ganiyu et al 2014). Faecal sludge is already used by some farmers, who obtain it informally from waste truck drivers.

Backyard and interstitial space farmers spend a significant amount of effort on fencing materials to avoid damage from animals. These costs are especially significant in the dry season when many animals are left to graze freely (Abdulai and Abdul-Samii 2006).

Half of Tamale's farmers use herbicides or pesticides on their crops, mostly some form of inorganic pesticide (Gyasi et al 2014a). Around 10% use organic means such as neem and ash. Farmers also gather information about pesticide use from agrodealers, which has little guarantee of accuracy.

Many farmers produce and use their own seeds. However, inputs from agrodealers are also important, and farmers increasingly have access through them to improved varieties of exotic and tropical species.

In a system of low mechanisation, labour is very important, especially in intra-urban agriculture where land preparation can be one of the most expensive inputs, along with fencing, irrigation and fertilisation (Abdulai and Abdul Samii 2006, Mohammed and Fiatusey 2001)

Access to credit is limited. With little collateral, poorer urban farmers are rarely eligible for bank loans, and high interest rates anyway deter borrowing. The warehouse inventory style schemes available to rural farmers, where farm goods themselves act as collateral, have hitherto been less available to urban than rural farmers. However, the high numbers of NGOs concentrated in Tamale means there is potential for such initiatives to develop, following a 2014 scheme offering fertiliser loans facilitated by the Urban Agriculture Network (URBANET).

*Market and subsistence activity*

Figure 10 – Crops being harvested from a backyard farm in Gumbihini and sold near the central market.



A large proportion of farmers sell part of their goods. Over 70% of marketing in urban backyard and open space sites takes place through farm gate sales to middle-women (Abdul-Halim and Abdul-Ganiyu 2014, Abdul-Halim and Mahama n.d.). Farmers from peri-urban communities, however, are obliged to take their own goods to the markets. Both of Tamale's major markets are being redeveloped in 2015, partly to relieve the congestion occurring as more marketers enter the system. Fruits and vegetables are also sold at multiple smaller markets around the city.

In dry season, unit weights decrease and prices increase (Kusiator 2012). To mitigate shocks to their businesses caused by seasonal variation, marketers cultivate trading relationships with farmers, trade with family members and diversify into multiple goods.

*Processing*

Waste from perishing is a major threat to farmers' and traders' profits - when market demand is low, farmers' crops can even spoil on the field for want of a buyer. In the absence of refrigeration, traders preserve their goods by sprinkling them with water (Agbenorto 2014). When contaminated water is used, this poses a health risk. Traditionally, sun drying has been the preferred preservation method for peppers, okra and some leaves as well as cereals and beans. There is potential for the practice to be improved and extended to other goods such as tomatoes and garden eggs/aubergines: dried tomatoes imported from Burkina Faso have been sold in Aboabo market. There are currently no large-scale pickling or canning facilities in Tamale.

*Consumption and packaging*

There is a small consumer health movement in Tamale, but this is secondary to an overall concern about food security. Just over half of a sample of people who did not eat vegetables said that this was because they couldn't afford them, whereas 18% cited hygiene concerns (Mensah 2013). Traders are responding to this with packaging, unfortunately of a less sustainable nature, as the majority use polythene bags (Adjei 2011). Health interests in organic vegetables have existed at least since Mohamadu's 2003 study reported consumer preference for organic products. Nevertheless, these still fail to attract a price premium.

*Urban and peri-urban farmers*

The sector is heavily dominated by men, and IWMI data shows that three quarters of farmers are 10 to 40 years old (Appiah 2013, Abdul-Halim and Mahama n.d.). House sizes are not inordinately large, and around 15% of urban farmers live alone.

Farmer organisations are common in Ghana, but mostly mobilise in rural areas in response to opportunities for support from the Ministry of Food and Agriculture (MOFA) or NGO inputs. The Northern Region Vegetable Farmers Union was formed partly in response to a recognised need to advocate for land security. This union acts as an umbrella for local vegetable farmers' associations, of which there are currently seven, with differing levels of activity. It organised conflict management training to help farmers address their grievances against traditional rulers who were allocating lands formerly used for farming to property developers. Since then, lack of farmer interest has constrained growth of the associations. Nominal associations gathering producers of animal products also exist.

*Institutions and stakeholder groups*

Diverse institutions and stakeholder groups are involved in urban agriculture. There are potentials for collaboration between practitioners and policy makers. Key stakeholders include:

- Ministry of Food and Agriculture (MOFA)
- Local Assemblies (Tamale Metropolitan Assembly and Sagnarigu District Assembly)
- Farmers and their associations e.g. Northern Region Vegetable Farmers Union (NRVFU), Faecal sludge farmers, Livestock owners' association
- Marketers
- Consumers
- Traditional Chiefs
- Town and Country Planning Authority (TCPA)
- Lands Commission (LC)
- Survey Department (SD)
- Environmental Protection Agency (EPA)
- The Savannah Agricultural Development Agency (SADA)
- Research bodies, e.g. Savanna Agricultural Research Institute (SARI) and University for Development Studies (UDS)
- NGOs, including the Urban Agriculture Network (URBANET)
- Media
- Health service

These stakeholders are necessarily linked in the performance of their everyday duties, and have joint stakes in various forums including the Ghana Water Sanitation and Hygiene (WASH) alliance and the Tamale Urban Waste and Sanitation Project (TUWSP). However, coordination in terms of forward planning is at an early stage and the issue of urban agriculture has little institutional recognition: there is no land yet officially zoned for agriculture. Few MOFA

resources are dedicated specifically to *urban* agriculture, or to vegetable farming in particular. Nevertheless, various NGOs fill the gaps in training and sometimes physical resources. For example, training on organic production, e.g. neem pesticide and compost making, has been delivered by ActionAid in collaboration with UDS, as well as the NGO Presby Mile 7. URBANET, funded by the Business Sector Advocacy Challenge (BUSAC), delivered the above-mentioned conflict management training to farmers dealing with land disputes. As a large proportion of Tamale's population is connected to UPA, either as a farmer, a marketer or a consumer, there is some willingness to act upon these issues. Also, law and policy is not prohibitive of UPA: the 1947 law discouraging unregulated agriculture in larger settlements is not enforced in Tamale, so there is potential for recognition and development of UPA.

### *Policies and legislation*

The guiding strategic policy documents on Ghanaian agriculture are the Food and Agriculture Sector Development Policy II and The Medium Term Agriculture Sector Investment Plan (METASIP). Both recognise and nominally encourage development of UPA: METASIP even dedicated 0.9% of the agricultural budget to UPA between 2011 and 2015 and aimed to increase output by 20% over the period. The major constraint METASIP identified was the lack of formal institutional recognition for UPA, corresponding exactly with the stance of the stakeholders who developed this policy narrative. METASIP suggests this be tackled through the zoning of land for UPA by local government. Secondly, METASIP aimed to tackle health issues associated with UPA. This is yet to be translated into a specific guiding policy at national or, more importantly, local level. The primary issue is that the contradiction between agricultural policy and existing land law also needs to be addressed: as mentioned, according to a relic colonial law that has not yet been updated, unregulated UPA is technically illegal in settlements over 5000 people such as Tamale. The Land Use Planning Bill 2010, an update to CAP 84, is in parliament in 2015. This document therefore hopes to serve as an impetus for incorporating UPA specifically in a new local land legislation, and in the follow up to METASIP, as well as in more holistic urban planning agendas.

## Benefits of urban and peri-urban agriculture

Urban and peri-urban agriculture provides opportunities for improvement of the urban environment through several routes.

### *Enhancing food and nutritional security*

Cultivation in both backyards and open spaces is a source of livelihood for urban dwellers, through subsistence and market routes. Goods produced in the city are generally cheaper than those imported, as lower transport costs are incurred. Thus, cheaper fresh food becomes available, even to those who are not cultivating. Self-subsistence is an opportunity to provide a more varied and nutritious diet than could otherwise be purchased.

### *Income generation*

Adding to the money that urban producers save on foodstuffs, the sale of agricultural products in urban zones generates income for producers and marketers. General quality of life is enhanced as these sums are used for other essentials such as healthcare.

As farmers purchase inputs such as seeds and agrochemicals, markets for these agricultural accessories develop, employing people, circulating goods and cash and generally boosting the economy. Import substitution, less well developed in Ghana, also saves foreign exchange.

### *Reuse of liquid and solid wastes*

As mentioned, irrigation is the primary constraint upon urban agriculture in Tamale. Urban agriculture can thus act as a sink for urban grey- and wastewater. Collection, treatment and use of wastewater contributes towards preventing its stagnation in ponds and gutters, protecting public health and thereby saving public revenue in the long term. URBANET have therefore developed and installed a multi-filter wastewater drip irrigation demonstration.

Waste management infrastructure is poorly developed in Tamale, as the rest of Ghana, and much research attention has been paid to waste disposal. Over 50% of Tamale's solid waste is biodegradable, and UPA is a potential sink for such organic materials. The Ghana WASH alliance recently worked on Ecosan toilets for urine diversion and biogas systems for households and institutions. As there is no sewage treatment facility, this, along with other unsorted municipal waste, is dumped in the peri-urban zone. UDS research on co-composting has shown that it can be an acceptable input to cereal and vegetable farmers. The WASH alliance collaborated with the compost factory DeCO to investigate households' ability to produce organic material for composting. They found it would take 800 households 6 months to produce the raw materials DeCO needed for a seasons compost supply. Organic compost

not only regenerates soil structure and nutrients, but means less pollutants are released into the environment, illustrating the multifunctionality of UPA within a sustainable and resilient city.



Figure 11 - Separated waste being collected from households by DeCO in Tamale  
Picture source: S. Abdul-Ganiyu

The Tamale Urban Waste and Sanitation Project (TUWSP) is a subsidiary consortium of waste management and re-use organizations, comprising

- Community Life Improvement Programme (as a facilitating/ coordinating partner),
- Tamale Metropolitan Assembly (as custodian and supervisory agency of sanitation services within the metro)
- Zoomlion (as the largest private waste management company)
- Presbyterian Church of Ghana Cooperative Credit Union (as a financing institution)
- Decentralised Composting Organisation (as a private organic composting group)
- URBANET (as an urban farmer network for farmer mobilization and training for composting and compost use).

The consortium seeks to develop a one-stop shop for urban sanitation services and facilitates a multi-stakeholder platform to reduce the cost of sanitation services.

#### *Promotion of integrated infrastructural development*

Markets for manure and compost have started to deepen in Tamale, and purchases of the DeCO product indicate potential for development. There is also an informal market for sewage from public toilets: tankers that have emptied out municipal cesspits sometimes dump this waste on farmers' fields for a fee. UDS have started researching how this waste disposal channel may be institutionalised. The aforementioned UDS work on co-composting indicates that this could be a viable solution for the disposal of such sludge, as could drying. The interaction of WASH, TUWSP, UDS and URBANET, all with interest in these waste disposal issues, indicates potential for the sector's development in the near future.





Fig 11 - Windrow method of co-composting at UDS Nyankpala campus  
Picture source: S. Abdul-Ganiyu

### *Links to climate change*

Urban agriculture is loosely associated with mitigating the effects of climate change. In Tamale in particular, urban agriculture takes place on sites that are prone to flooding and therefore should not support residential development. The cultivation of vegetation on such sites contributes to enhancing their water retention and infiltration capacity, potentially mitigating one of the effects of climate change. Conversely, the UN START programme recognises the potential risk that climate change poses to land availability in the metropolis (Gyasi et al 2014a).

At the macro level, the production of foodstuffs close to the site of their consumption reduces the fossil fuel use associated with their transportation to urban centres.

### *Social inclusiveness*

To the extent that it is associated with the formation of professional groups and organisations, UPA contributes to community cohesiveness. Links between marketers and farmers deepen existing community livelihood networks. As a low entry barrier activity, it facilitates economic inclusion of vulnerable groups falling outside the formal economy, or seeking to integrate into urban markets. As a community-based activity, it can also play a role in developing governance capacity.

## Major issues

### *Land*

The most contentious issue related to urban agriculture in Tamale is land availability and access. As described earlier, certain lands unsuitable for building have been designated as flood plains, but this does not prevent chiefs allocating them to speculators and developers. When an allocation note is given, it is only when the allottee applies for the 99-year lease that they might discover the plot is on a land designated as not for construction. As many begin construction without applying for a lease, conflict between farmers and developers continues.

The planning department currently develops 'land use plans', but there is as of yet no agricultural land use category and no interdepartmental planning. Landowners often change the function of a piece of land to development without consulting the plans or the planners. Allocation of land to agricultural purposes is only feasible if the town and country planning department zones it as such, so there is a need for especially tight liaison between town planning and land commission authorities, alongside other concerned institutions such as traditional authorities.

Gyasi et al (2014a) speculate that a shift from traditional compound style dwellings to self-contained single houses will further reduce the amount of land available for agriculture.

### *Water*

Before arriving at consumer's concerns about water quality, absolute availability of water is a primary preoccupation for producers. Due to the low water table and lack of a major river, access to water bodies in the dry season is limited by proximity to gutters and reservoirs. Development of more such reservoirs is constrained by urban expansion onto open spaces. Larger scale damming projects have been considered, for example rehabilitation of the old Gumbihini dam within a project conceptualised by the Italian city of Trento.

Another irrigation option involves use of municipal drinking quality water, already used by backyard and some open space farmers. Commercial rates apply for this service, but this does not mean it is a total solution. Indeed, Ghana Water Company (GWC) does not encourage use of piped water for agriculture. Tamale's water supply mostly comes from the treatment plant at Dalun, 25km North of the city. This produces ten million barrels of water daily, but only 50% of that is billed. The remainder is unlikely to be entirely lost through leakage, as there is no evidence of such massive flooding. Thus, illegal use, particularly through night watering, may be to blame (GWC personal communication, UFP stakeholder meeting March 2015).

### *Waste management*

In light of the scarcity of treated water, wastewater reuse is another option that has been suggested. Research on filtration and application of wastewater dates as far back as 2008 (Kranjac-Berisevlavic et al 2009). Results point toward the need for facilities with larger surface areas. However, larger scale trials are yet to be implemented. An associated option is drip

irrigation. Trials are being implemented by UDS as well as NGOs New Energy and Presby Mile 7. Steps would need to be taken to alleviate the high costs of the equipment involved. Rain water harvesting is more feasible and has been developed to a certain extent at the personal scale.

Wastewater use is an issue in the media and public discourse, as there have been occasional outbreaks of disease attributed to consumption of raw vegetables, for example cholera cases in 2011. Indeed, waters used in urban irrigation do contain *E coli* and faecal coliforms (IWMI 2014, Odoi Koranteng 2014).

UPA has close links to waste management, and hence the potential to contribute to holistic city functioning. Although WASH research on co-composting has been described, parties are still working towards institutionalising the process. The main market for DeCO compost products comprises institutions delivering them to beneficiary farmers. Institutionalisation of the process is on the cards: in 2014 the mayor announced on TV the metropolitan assembly's intention to develop a municipal composting plant; as of yet the imperative rests with the private sector. The outlook is cautiously optimistic, as research has indicated the feasibility of household waste collection and farmers' willingness to use such products.

#### *Animal encroachment*

Animal encroachment is a highly contentious issue, especially for unfenced sites (Yelbe-ire and Raphael 2011). Akwwoye (2013) names this as a particular problem at Zagyuri, Dapokpaa and Builpela, where there are no fences, and Gumbihini new dam, where the fence needs repairs. Encroachment is concentrated in the dry season, when the availability of pasture is limited and unsupervised cattle in particular search for food. Conflicts between farmers and herders result in crop destruction and livestock deaths, notably at Zagyuri (Bellwood-Howard and Nchanji 2013). Extensive livestock keeping is also inappropriate for urban areas due to issues such as manure disposal, traffic disruption and ingestion of litter.

#### *Storage and marketing*

Limited storage infrastructure means prices are dictated by seasonal availability and shelf life. Although larger scale market traders have refrigerated storage facilities, farmers do not have access to these. This particularly affects the market value of perishable crops, such as lettuce and cabbage, rather than those that may be harvested multiple times, like amaranthus and okra. Drying has gone some way towards improving storage of many more traditional goods. Poor infrastructure is a major constraint to marketing in Tamale: traders without shelters or selling places are exposed to animals eating their goods and dirt contaminating them (Kusiator 2012). By 2015, the redevelopment of several markets, including Lamashegu, Old market and Aboabo, was going some way toward tackling that problem for some traders.

#### *Extension*

MOFA capacity is limited. Each extension agent may deal with thousands of urban and rural farmers, and agents struggle to connect effectively with all those in their operational areas.

Some gaps are filled by the plethora of NGOs established in Tamale. Farmers have called for translation of research efforts into action, particularly with regard to loans for critical inputs such as water pumps and fertilisers.

Research on UPA in Tamale is poorly catalogued and barely available. A host of works have been produced by local research organisations, but few are available to a wider public (or electronically), leading to duplication of efforts. This in turn causes research fatigue amongst farmers and marketers and erodes trust between practitioner and research communities.

#### *Access to finance*

Access to loans is problematic for farmers with little or no collateral. Bank interest rates may be up to 30%. NGO loan schemes, such as that run by URBANET in 2014, giving access to one bag of fertiliser, are popular. However, loans and subsidies for urban and especially dry season farmers are fewer than those for rainfed rural farming. For example, the financial NGO CARD (Campaign for Agricultural and Rural Development) loans fertiliser to rural rainy season maize and rice farmers, which they pay back at harvest in kind.

#### *Legislation*

As mentioned, there is, as of yet, no specific *urban* agriculture policy. Land and agriculture policies need to be aligned and the consensus is that this be through zoning urban land for agriculture. The impending reform to CAP 84 provides an opportunity to achieve this, but it needs action on the part of local authorities; specifically TAMA, alongside national policy. There is an ordinance against stray animals roaming in the city centre, which has occasionally been invoked in instances of farmer-herder conflict, but is in general poorly enforced.

#### *Institutional organisation*

The NRVFU is the organisation most associated with urban rather than peri-urban or rural farming, due to its focus on vegetables. Such farmer associations are often responses to input packages. Self-mobilisation is difficult: in the NRVFU case, this manifests in declining active membership and unwillingness to contribute dues. The livestock association also shows minimal activity. There is at least one example of autonomous organization of larger scale backyard vegetable farmers, who have the intention of commercialising further, in Gurugu.

MOFA needs more capacity to deal with urban farmers. As elaborated, the bulk of agricultural policy focuses on rural traditional agriculture and initiatives to improve productivity.

In order to push for specific action on urban agriculture in local policy, it appears promising for practitioners and policy makers to engage through less formal organisations like the NRVFU. This means that such associations need to be supported to connect with formal institutions.

## Policy recommendations

Considering the potential urban agriculture holds and the constraints it faces, a group of policy stakeholders (see page 1 for the full list) convened in late 2014 to begin formulating a policy narrative for UPA in Tamale. The cornerstone of their policy recommendation is the deepened involvement of metropolitan and district assemblies in UPA. All policy areas are therefore linked in a holistic plan. This is ambitious, even for cities that look favourably on UPA: it is an achievement for authorities to communicate with farmers, and more so if there is willingness to allow for lands to be used for farming. Stakeholders proposed that one sensible way of structuring their recommendations is to group them into short, medium and long term targets. Successful short term activities can lead to policy change, and it is the hope of the stakeholder group that a UPA policy will be a starting point for developing a more resilient urban environment. This stakeholder group will work towards a joint vision and agreed city agenda on urban and peri-urban agriculture, and will continue to facilitate this discussion after the WASH and UrbanFood<sup>Plus</sup> programmes have finished.

In line with METASIP, the core of the suggested Tamale plan involves the assemblies purchasing larger areas of flood prone land. These would be specifically dedicated to agriculture. The diverse statutory land planning and traditional institutions need to be linked up so that these areas are gazetted as agricultural land and cannot be acquired by speculators or property developers. A new requirement would be that allocation notes are endorsed by statutory land authorities alongside traditional institutions. Were the land authorities better connected, they would all be aware of the plots that fall on these agriculture-dedicated lands, and illegal allocation notes for them would not be signed. Thus, when individuals attempted to acquire plots on these lands, they would become aware at the first stage that they are not for development.

The farmers who use these secure lands would need to pay a token fee to the assemblies to farm there. They would be organised into committees for the collection of these fees, making it easier for them to receive training and extension.

There needs to be a more centralised system of water collection that would facilitate filtration and distribution to these agricultural sites. Householders who are not using their wastewater for backyard cultivation must be encouraged to divert their water into this system.

Within and in addition to this plan, specific areas were elaborated, as follows:

*Improving farmers' access to land*

- The Town and Country Planning Departments should be responsible for demarcating and zoning areas that are not for building upon, which would primarily be flood-prone lands. These areas would be dedicated to agriculture. The Land Use Planning Bill 2010 is in parliament in 2015: actors should exercise pressure to ensure that agriculture-dedicated areas are inscribed in that law and local byelaws following from it.
- The assembly should be responsible for officially acquiring these lands and registering them as specifically for agriculture, rather than merely designating lands that belong to other actors. If such lands were registered for the community rather than the assembly, a community chief could easily re-appropriate them. Other stakeholders should exercise pressure on the assembly to encourage them to achieve this. Considering the likely prohibitive costs, SADA should be contacted to help with land acquisition.
- Byelaws should require the planning department to incorporate urban agriculture into town plans and landowners to adhere to such zonation.
- The assembly should liaise transparently with the five paramountcy's around the Tamale urban area through the house of chiefs to decide which areas of land will be designated for agricultural production. Chiefs could possibly contribute cash towards the safeguarding of specific lands for agriculture. The support of paramount chiefs will be imperative in dealing with sub-chiefs.
- Farmers on designated agricultural land should pay a fee to the assembly in order to farm there, in the same way that market traders pay for their stalls. In the past the farmers' union has refused to pay for land use, so sensitisation will be necessary.
- Allocation notes should be redesigned so they need the approval of the Lands Commission, Survey Department and/or or Town and Country Planning to be valid.
- The public should be educated about these changes and about the need to register land in order to prevent illegal allocations by chiefs. Related to this, there is a need to change attitudes to land acquisition.
- Planning should be integrated across departments. Land institutions and assemblies need to work together to enforce the bans on purchasing flood plain land.
- The national development planning commission should recognise the importance of urban farming, because it is currently considered at the local level only.
- There is a need for a specialist research and advisory committee of experts on land matters to deliberate the legal ramifications of the above mentioned moves, and identify possible loopholes and stumbling blocks.

*Policy and legislative support*

- Within the district assemblies, the social services sub-committees currently deal with agricultural issues. There is a need to sharpen the focus on agriculture by having a dedicated agriculture subcommittee, as exists in one assembly in Ghana.
- Agricultural policy should explicitly support backyard farms as a way to generate income and support urban livelihoods. Individuals should be encouraged to allocate portions of their own land to backyard farming.

*Integrated agriculture and strengthening benefits*

- The strong tradition of ruminant rearing in Tamale should be recognised by research and extension services in order to redress the balance of activities related to livestock in comparison to those involving crop production.
- Attitudes towards livestock rearing should be remoulded towards perceiving it as a business activity rather than a hobby. Urban livestock rearers should house or tether their stock throughout the year and buy or harvest feed for stall feeding.
- Livestock owners need training on livestock housing construction.
- Byelaws forbidding roaming animals should be better enforced and publicised.
- 'Ranching' initiatives, like those that have been proposed for settling and supporting Fulani people, should be considered.

*Synergies with environmental functions and risk minimisation*

- In the short term, runoff from storm water should be harvested, and its use by individual households for backyard gardening should especially be encouraged.
- Sinking wells is another feasible short term goal.
- Municipal wastewater treatment is realistically only a long term possibility. Treated water would be channelled into centralised collection facilities near to farming zones, to facilitate irrigation. Such a system could use the existing gutter infrastructure. In the meantime, households should be encouraged to divert wastewater into municipal gutters. Greywater collection points comprise another interim strategy.
- High water pressure from large storage facilities would facilitate filtration, possibly linked to drip irrigation. Again, this costly technology is only realistic in the long term.
- Canal dredging is an associated long term strategy.
- Currently, householders in newly settled neighbourhoods access water through the individual who first developed the local pipe infrastructure. Water supply should rather be centralised, like electricity, so that Ghana Water Company is responsible for this.
- Organic farming should be promoted in the interest of ecosystem and human health.
- Research is ongoing into use of human waste as a nutrient source. Attention should be paid to the use of Personal Protective Equipment during application of such waste.
- The agrochemical market should be regulated. Education from EPA and MOFA on safe, appropriate agrochemical use is necessary for agrodealers and farmers.
- Universal provision of toilet facilities, including pit latrines, but ideally those such as Ecosan that facilitate urine collection, should be a long term goal.
- Assemblies should support farmers to legally obtain water, ideally not drinking water.

*Institutional development and enhancing governance*

- As indicated above, closer links are needed between the statutory land authorities, the traditional authorities and the assemblies.
- Farmers are beginning to organise themselves, but need support. To some extent, spatial aggregation of farmers in agricultural zones acquired by the assembly will encourage this, by facilitating organisation and regular meeting.

- Farmer groups should strengthen themselves for advocacy, drawing away from mobilisation around potential flows of external support.
- Whilst advocating self-mobilisation, it must be recognised that self-organisation and involvement with external organisations are mutually reinforcing. To that end, extension services to vegetable farmers from MOFA should be improved.
- Alongside emphasis on site-based groups, a mechanism should be developed for involving backyard and isolated space farmers in associations.
- NGOs should identify urban farmers and provide assistance to them.
- MOFA should produce a positive statement on urban farming.
- These plans can serve as an urban agriculture policy formulation guide for surrounding districts such as Savelugu Nanton that will urbanise in the future.

#### *Developing markets and involving the private sector*

- Market infrastructure should continue to develop and include storage facilities.
- Assemblies should put such projects out to tender, for example for Public-Private Partnerships (PPPs) to adopt, but assemblies should provide the physical infrastructure, e.g. through physical market segmentation.
- Market associations should be developed. They should lobby for and source help from government, NGOs or businesses.
- In rebranding, the focus of the Agricultural Development Bank (ADB) has shifted. ADB board members should be involved in this policy making process. Account members should pressurise the bank to return to serving their original clientele.
- To relieve the burden on the assemblies, institutions such as ADB and SADA should be approached to finance such projects as dam rehabilitation and land acquisition.
- Reintroduction of subsidies should be reconsidered.

#### *Education and public awareness*

- The lands sector agencies need to be sensitised to UPA.
- EPA and MOFA should be responsible for training agrochemical dealers.
- Farmers need sensitisation to the high yields and income generation potential of UPA, for which EPA and MOFA should again be responsible.
- The public must be sensitised to issues around land acquisition, particularly the need to register land when it is acquired.
- There is a particular need for education about appropriate livestock keeping.
- The public and farmers need to be better informed about health issues, including accurate information about the risks associated with crop protection products and wastewater irrigation, alongside the advantages of organic production for ecosystem and human health.
- Raised awareness of the advantages of backyard cultivation for income generation and health is central to the promotion of backyard farming.



- Sensitisation exercises may take place through:
  - The mainstream media
  - Community engagement exercises
  - Posters and flyers at chief's palaces and mentions in community meetings
  - Second cycle and tertiary institutions
  - Dedicated seminars on UPA for specific stakeholder groups
  - Meetings organised at the assemblies for assembly men and women

*Promotion of sustainable production, processing and marketing practices*

- An increased number of MOFA agents is not practicable while public services are being downsized, so alternative community volunteers should be introduced.
- Farmers need training on sustainable practices such as neem seed pesticide production.
- There should be development of warrantage-style vegetable storage warehouses where a percentage of produce is taken as payment. This model has been investigated for cereals.
- There is a place for research into and development and distribution of appropriate post-harvest storage and processing equipment, e.g. mango dryers and tomato puree production facilities.
- Linked to this, there is a need for research into the most appropriate model for the development and distribution of such technology, e.g. whether it should be state-run, privately supplied, outsourced, cooperatively-run, a PPP etc.
- There should be research into and development of a market for new products like garden egg/aubergine purée.
- Specialisation in different agricultural sectors, e.g. production, processing and marketing, should be encouraged and the training mentioned in the previous section designed towards that end.
- There is a possible role for spatial market segmentation, involving designated sections of markets for vegetables and other foodstuffs as well as for organic and conventional goods. Market design should take this into account.

*Gender and generational issues*

- It is useful to bear in mind that agricultural sector activities are a way to curb youth unemployment for both genders.
- There should be equal access to productive agricultural resources, especially land, for all groups.

## Conclusions

Stakeholders agree about the need to pursue a more sustainable and progressive policy agenda for UPA in Tamale. Current national agricultural policy is sympathetic to this intention. The next steps are to streamline local policy towards the same objective in a more specific fashion. Plans for improved UPA centre on a redefined land allocation and use system, with specific zones dedicated to agriculture. Following this, it will be more feasible to tackle issues related to the connection of UPA to health, environmental improvement, income generation, waste management social cohesion. The shape of this agenda illustrates the nestedness of UPA in institutional as well as technical concerns. In Tamale, institutional consensus around this issue will allow UPA to fulfil its potential to contribute to a holistic and sustainable city system.

## References

- Abdul-Halim, A. and Abdul-Ganiyu, S. 2014. Food production systems in the Tamale metropolis and Sagnarigu district in Northern Ghana. Report commissioned by URBANET
- Abdul-Halim, A. and Mahamu, G. n.d. Draft Report on Vegetable and Animal Production in Urban Agriculture in the Tamale Metropolis. Report Commissioned By URBANET
- Abdulai, B. and Abdul Samii, R. 2006. Profitability and sustainability analysis of dry season vegetable production in the Tamale Metropolis. Agricultural Economics and Extension thesis, UDS
- Akwowoye, B. 2013. Assessment of current status of urban irrigation in Tamale Metropolis. Agricultural Mechanization Irrigation Technology thesis, UDS
- Adjei, E. O. 2011. The status and consequences of existing consumer packaging in the Tamale Metropolis. Horticulture thesis, UDS
- Adjei, J. 2002. The study of livelihood and infrastructure of peri-urban settlements as compared to that of urban and rural settlements in and around Tamale. Agricultural Economics and Extension thesis, UDS
- Appati, R. 2013. Evaluation of the methods of waste water application in vegetable cultivation: Case study in Tamale Metroplis. Agricultural Mechanization Irrigation Technology thesis, UDS
- Appiah, M. I. 2013. A survey on the production of leafy vegetables in urban and peri-urban Tamale. Horticulture thesis, UDS
- Bellwood-Howard, I., Häring, V., Karg, H., Roessler, R., Schlesinger, J. and Shakya, M. 2015. Characteristics of urban and peri-urban agriculture in West Africa: Results of an exploratory survey conducted in Tamale (Ghana) and Ouagadougou (Burkina Faso). IWMI Working Paper 163. . Colombo, Sri Lanka: International Water Management Institute. 30pp
- Bellwood-Howard, I. and Nchanji, E. 2013. Governance for Development in Urban Agriculture, 6th Harmattan School conference, Institute for Interdisciplinary research, UDS
- CFF (Cities Farming for the Future) 2008. A strategic agenda for urban and peri urban agriculture in Accra, Ghana.
- Cofie, O. Larbi, T., Danso, G. Abraham, E. Kufogbe, S.K., Henseler, M., Schuetz, T. and Obiri-Opareh, N. 2005. A Narrative on Urban Agriculture in Accra Metropolis. RUAF, Accra
- Drechsel, P., Graefe, S., Sonou, M. and Cofie, O. O. 2006. Informal irrigation in urban West Africa: An overview. IWMI Research Report 102. Colombo, Sri Lanka: International Water Management Institute. 40.pp.
- Drechsel, P. and Keraita, B. (Eds.). 2014. Irrigated urban vegetable production in Ghana: characteristics, benefits and risk mitigation. 2nd ed. Colombo, Sri Lanka: International Water Management Institute (IWMI). 247 p.
- Dubelling, M., Caton Campbell, M., Howekstra, F. and Van Veenhuizen, R. (2009) Building resilient cities. Urban Agriculture magazine 22, 3-11
- Gyasi, E.A., M. Fosu, G. Kranjac-Berisavljevic, Mensah, A.M., Obeng, F., Yiran, G.A.B and Fuseini, I. 2014a. Building urban resilience: Assessing urban and peri-urban agriculture in Tamale, Ghana. United Nations Environment Programme (UNEP), Nairobi, Kenya
- Gyasi, E. A., Kranjac-Berisavljevic, G., Fosu, M., Mensah, A., Yiran, G. A. B. and Fuseini, I. 2014b. Managing threats and opportunities of urbanisation for urban and peri-urban agriculture in Tamale, Ghana. In Maheshwari, B., Purohit, R., Malano, H., Singh, V. and Amerasinghe, P. (Eds.) The security of water, food, energy and liveability of cities: Challenges and opportunities for peri-urban futures. New York: Springer. pp 87-97
- Kranjac-Berisavljevic, G., Bizoola, G. and Abdul-Ghanyiu, S. 2009 Experiences with the design and production of locally manufactured drip system for wastewater irrigation in the Tamale metropolis, Ghana. p.47-52 in Addo, A., Owusu-Sekyere, J. and Amoah, R. (Eds.) Proceedings of the 4th national conference on agricultural engineering. University of Cape Coast, Ghana Society of Agricultural Engineering
- Kusiator, A. 2012. Estimating the market share of indigenous leafy vegetables sold in Tamale Metropolis. Horticulture thesis, UDS

- Mekonnen, G. 2011. Mainstreaming wastewater management in urban planning: A case study of Tamale metropolis, Ghana. Thesis, Wageningen University and Montpellier Sup Agro/IRC., Netherlands and France
- Mensah, Z. K. 2013. Factors influencing the consumption of vegetables by households in urban and peri-urban communities in the Tamale Metropolis. Horticulture thesis, UDS
- Mohamadu, A. 2003. Organic farming and urban gardening. The case of urban Tamale. Agriculture and Extension Economics thesis, UDS
- Mohammed, R. and Fiatusy, V. 2001. Benefits cost analysis of house hold farming activities in the urban and peri-urban areas of Tamale. Agricultural Economics and Extension thesis, UDS.
- Mougeot, L. J. A. 2005. Agropolis: The social, political and environmental dimensions of urban agriculture. London: Earthscan
- Shaibu, H. 2002. The contribution of urban agriculture to household food security in Tamale municipality. Thesis, UDS
- Slonimpa, D. 2011. Categorising vegetable production systems and the effects of development on production site in Tamale Metropolis. Horticulture thesis, UDS
- Naab, F. Z., Dinye, D. R. and Kasanga, R. K., 2013. Urbanisation and its impact on agricultural lands in growing cities in developing countries: a case study of Tamale, Ghana. *Modern Social Science Journal* 2 (2), 256–287
- Nchanji, E. 2015. Land use changes: effect on sustainability of vegetable production in urban and periurban Tamale, 2008-2014. Submitted to *International Journal of Agricultural Sustainability*
- Odamtten, T. M. 2010. Evaluating the prospects of Kasalgu stream as a source of water for irrigation. *Agricultural Mechanization Irrigation Technology* thesis, UDS
- Odoi Koranteng, K. 2014 water availability and quality in rural communities: study of water sources at Libga community in Savelugu-Nanton district. *Agricultural Mechanization Irrigation Technology* thesis, UDS
- Republic of Ghana, 1992. The 1992 constitution
- Joshua, A. and Nyameke, K. F. 2001. Cost benefits of urban and peri-urban farming systems in Tamale. *Agricultural Economics and Extension* thesis, UDS
- Ubink, J. M. 2007. Traditional authority revisited: Popular perceptions of chiefs and chieftaincy in peri-urban Kumasi, Ghana. *Journal of Legal Pluralism* (55)
- Yelbe-ire, C. and Raphael, T. 2011. Adoption of dry season vegetable production in the Tamale Metropolis. *Agricultural Economics and Extension* thesis, UDS
- Zibrilla, I. and Salifu, A. A. 2004. Information gathering from urban and peri-urban communities with potential land areas for vegetable production. Report submitted to Urban Agriculture Network - Northern Ghana. 30 June 2004. 16pp