2. Urban Vegetable Farming Sites, Crops and Cropping Practices

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The chapter describes the major sites of open-space vegetable farming in Ghana's main cities. It also presents the principal cropping systems and characteristics of urban farmers involved in irrigated vegetable production.

2.1 Key National Features

Ghana lies on the coastline of the Gulf of Guinea in West Africa and occupies a total area of about 239,460 square kilometres (km^2). It is bordered by Burkina Faso in the north, Togo in the East, Côte d'Ivoire in the West and the Gulf of Guinea in the south. The country is divided into 10 administrative regions and six ecological zones, dominated by semi-deciduous forest in the south and Guinea savannah in the north (Figure 2.1).

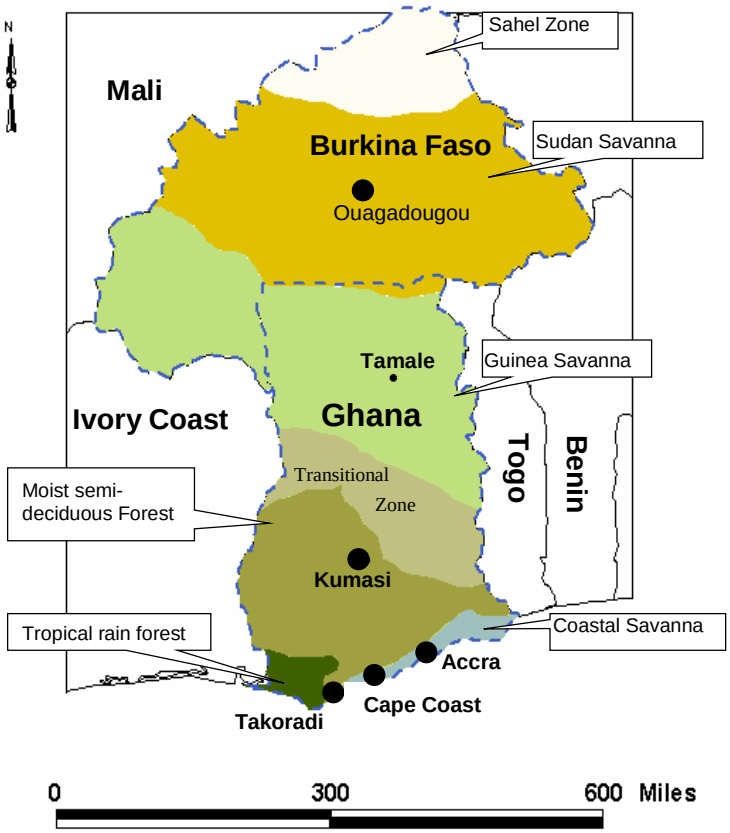

FIGURE 2.1. Ecological zones and major cities in Ghana (Source: IWMI).

The topography is predominately gently undulating with elevations mostly below 500 metres (m). Annual rainfall ranges from about 800 millimetres (mm) in the southeast along the coast in Accra to about 2,200 mm in the extreme southwest. While the southern parts of the country experience bimodal rainfall pattern with peaks in June and October, the north has a monomodal rainfall pattern with a peak in September. The mean annual temperature is about 30^{o}C. For most parts of the country, temperatures are highest in March and lowest in August. The north experiences hot days and cool nights between December and March due to the dry and dusty West African Trade Wind (Harmattan) which blows south from the Sahara into the Gulf of Guinea. In the south, the effects of the Harmattan are felt mostly in January. Humidity is high in the south particularly on the coast where relative humidity can be 95-100% in the morning and about 75% in the afternoon. The north experiences low humidity with relative humidity values of 20-30% during the Harmattan period and 70-80% in the rainfall season (April/May to September). Annual potential open water evaporation has been estimated as ranging from about 1,500 mm in the south to more than 2,500 mm in the north. The conditions in the synoptic stations in Accra, Kumasi and Tamale (Table 2.1) summarize the climate in the southern, middle and northern belts of Ghana, respectively.

TABLE 2.1. Climatic data from north, middle and south Ghana (Agodzo et al. 2003).

Long-term yearly averages	Unit	South (Accra)	Middle (Kumasi)	North (Tamale)
Rainfall regime		Bimodal	Bimodal	Monomodal
Rainfall	mm	810	1,420	1,033
Temperature	^{o}C	27.1	26.1	28.1
Relative humidity	%	81	77	61
Wind speed	km/day	251	133	138
Sunshine	Hours/day	6.5	5.4	7.3
Solar radiation	MJ/m^2/day	18.6	17.0	19.6
Potential evapotranspiration	mm	1,504	1,357	1,720
Aridity index*		0.54	1.05	0.60

* Aridity index = rainfall/potential evapotranspiration.

The final results of the population and housing census conducted in 2010 showed that the total population of Ghana in 2010 was 24,658,823 (GSS 2012a). Women represented more than half of the population (51.2%). All the 10 regions of the country experienced increases in population but the highest increases were recorded in Northern (36%), Central and Greater Accra (38% both). The intercensal growth rate (between 2000 and 2010) was 2.5% per annum, which is a decline from the previous growth rate of 2.7 % (between 1984 and 2000)

(GSS 2012a). The population density for the entire country recorded in 2010 was 103 persons per square kilometre. This figure is almost a double the 1984 figure (52 persons per square kilometre). This is an indication that the pressure on land is increasing. The pressure on land is highest in the Greater Accra region where population density is 1,205 persons per square kilometre. Comparing Accra, Kumasi and Tamale, the population density in Tamale was in 2000 with about 400 capita per km^2 less than 10% of the density recorded in Accra and Kumasi.

Ghana's economy is largely informal with about 90% of all the economically active people (age: 15-64 years) informally employed, mostly in the private agricultural sector. Agriculture, particularly small scale, is the backbone of the economy accounting for nearly one-third of the Gross Domestic Product (GSS 2012b). Agriculture is mostly rainfed, i.e. heavily dependent on the onset and reliability of precipitation. However, less than 1% of the arable land is currently under formal irrigation (Namara et al., 2011).

The following pages present brief descriptions of the main cities and their urban agricultural activities with particular focus on irrigated open-space farming.

2.2 Irrigated Urban Agriculture in Ghana's Major Cities

In Ghana, urban vegetable farming dates back to the arrival of Europeans. It is likely that the vegetables were grown in the gardens created around the castles and forts along Ghana's Gold Coast from the sixteenth century onwards (Anyane 1963). Also during the Second World War, agriculture was promoted everywhere in order to help feed the allied troops in the Gold Coast (Ghana). In the 1970s, in the economic post-independence crises, the government supported urban agriculture to meet the population's food demands. A national program called 'Operation Feed Yourself" was launched and the population was encouraged to plant anywhere and everywhere in the cities including the use of aquaculture (Asomani-Boateng 2002). In the late 1990s, the decentralization of the Ministry of Food and Agriculture provided urban farming with renewed support, as each district received its own Agricultural Directorate with extension staff (including all cities). However, staff were not necessarily trained in the idiosyncrasies of urban farming. To the present day back yard gardening remains a well-accepted activity socially, especially in the middle income group with sufficient space, such as civil servants.

Open-space farming on the other hand has received mixed feedback. Livestock roaming in the city center and the use of polluted water for vegetable irrigation in particular have been the

subject of considerable debate. The diversity of authorities with a stake in open-space urban farming (e.g. the Ministries of Food and Agriculture; Town and Country Planning; Forestry, Parks and Gardens; Urban Planning; and the Public Health Department) does not make such a discussion easy. However, in a Vision Statement on urban and peri-urban agriculture in Accra, the Ministry of Food and Agriculture pledged in 2005 its full support and called for ways to overcome any possible challenges (see chapters 10 and 15). The following sections describe the main features of urban vegetable farming across Ghana. Compared with the previous edition of this book (Obuobie et al. 2006), we see at those sites reported then in Accra and Tamale a 36 to 50% decline in urban vegetable farming areas, respectively. However, we also see many new sites, or at least sites we were not aware of at that time. A spatio-temporary analysis is challenged by the question of which city boundary/boundaries should be used as baselines in the different years (see also discussion in chapter 1.4).

2.2.1 Accra

Accra is the capital of Ghana and covers an area of around 200 km². In the current administrative boundary of the Accra Metropolitan Area (AMA), there is an estimated population of 1.85 million (GSS 2012a). Accra's population growth rate in 2000 was about 3.4% annually within the already densely populated AMA boundary. The actual population growth rate reached at that time 6 to 9% outside this boundary. This functional boundary of the Greater Accra Metropolitan Area (GAMA), as the urban dwellers perceive it, has 3.76 million inhabitants which is nearly the same as the 4 million population of the Greater Accra Region (Twum-Baah 2002; GSS, 2012a). The Greater Accra region appears to have reached a saturation point as it has shown consistent declines in the annual growth of its urban population from 6.1 percent in 1960 to 3.5 percent in 2010 (GSS 2012c).

About 60% of Accra's population lives in informal settlements in the center of the city while the middle and upper classes prefer its periphery.

Accra lies within the coastal savannah zone (Figure 2.1) with low annual rainfall averaging 810 mm distributed over less than 80 days (Table 2.1). The rainfall pattern of the city is bimodal with the major season falling between March and June, and a minor rainy season around October. Mean temperatures vary from 24ºC in August to 28ºC in March. Natural drainage systems in Accra include several streams, ponds and lagoons (e.g. Songo, Korle and Kpeshie lagoons). Floodwater drains and gutters are used for gray water, and often drain into the natural system, polluting heavily the lagoons and most beaches. About 60% of the urban

area drains into the Odaw River which passes the Korle Lagoon before flowing into the ocean. The wastewater and solid waste that the Odaw receives constitute a major environmental disaster (Figure 2.2).

FIGURE 2.2. Odaw River in central Accra (photo: IWMI).

Irrigated urban vegetable production takes place on more than six larger sites within central Accra (Figure 2.3). Within the AMA boundary, in 2005 about 680 ha were estimated to be under maize, 47 ha under vegetables and with seasonal variation about 251 ha under mixed cereal-vegetable systems. Some of the sites have been in use for more than 50 years (Anyane 1963) and their sizes are still changing under current development (Figure 2.4). Some farm areas, as in La, are shrinking or disappearing, while to date unused space, in the city and in new suburbs, are newly cultivated.

Apart from open-space farming, about 50-70 additional hectares are distributed over 80,000 tiny home gardens (often just a few plantains and chickens) involving nearly 60% of Accra's houses (Obuobie et al. 2006). This figure is much higher than the one of Maxwell and Armar-Klemesu (1999) who surveyed mostly low-income and high-density suburbs. The extent of the peri-urban area of Accra was estimated following the methodological approach described in Adam (2001) for Kumasi. Based on the results, we propose an average radius of 38 km from the city center, with more outreach along the Accra-Kumasi road, and less in-between the major roads. In this peri-urban area, farmland is increasingly converted into settlements but agriculture still plays a significant role. Large-scale pineapple plantations are a major feature of peri-urban Accra which supports, among others, the European market. Also foreign companies started investing in the Accra plains for the cultivation of high value vegetables.

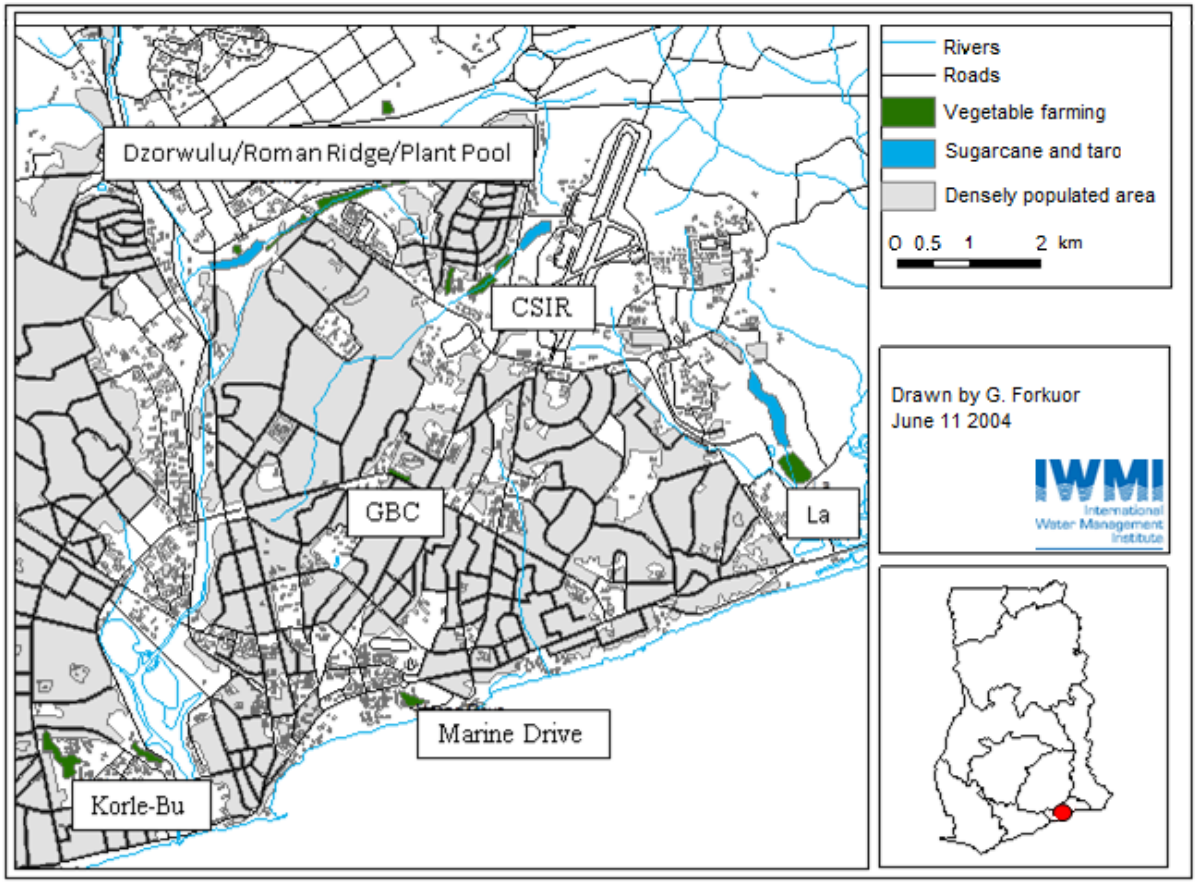

FIGURE 2.3. Vegetable-producing sites in central Accra (Obuobie et al. 2006).

Major Irrigated Vegetable Farming Sites in Accra

In Accra, including Ashaiman and Tema, there are about 800 to 1,000 vegetable farmers[1] of whom 60% produce exotic and 40% indigenous local or traditional vegetables. Some of the exotic crops cultivated are lettuce, cabbage, spring onions and cauliflower while the more traditional crops are tomatoes, okro (okra), *ayoyo (Corchorus sp.)*, garden eggs (aubergine) and hot pepper. Plot sizes under cultivation in the city range between 0.01 and 0.02 ha per farmer with a maximum of 2.0 ha in peri-urban areas. The plot sizes of several of these sites, especially behind the Korle-Bu hospital and in the La area, have diminished over time because of land loss to housing development or widening of drains. An additional problem faced by farmers in relation to their farms is tenure insecurity, as formal contracts are rare, and low soil fertility. The locations of some of the irrigated (open-space) vegetable farming sites in the city cited here are shown in Figure 2.4.

[1] See also MoFA (http://mofa.gov.gh/site/?page_id=1561; accessed 26 August 2014) with selected data on urban farms and farmers in AMA which are cited e.g. in Caradonna et al. (2012) and go back to Obuobie et al. (2006), RUAF surveys, and MoFA surveys on crop and livestock production between 2006 and 2009.

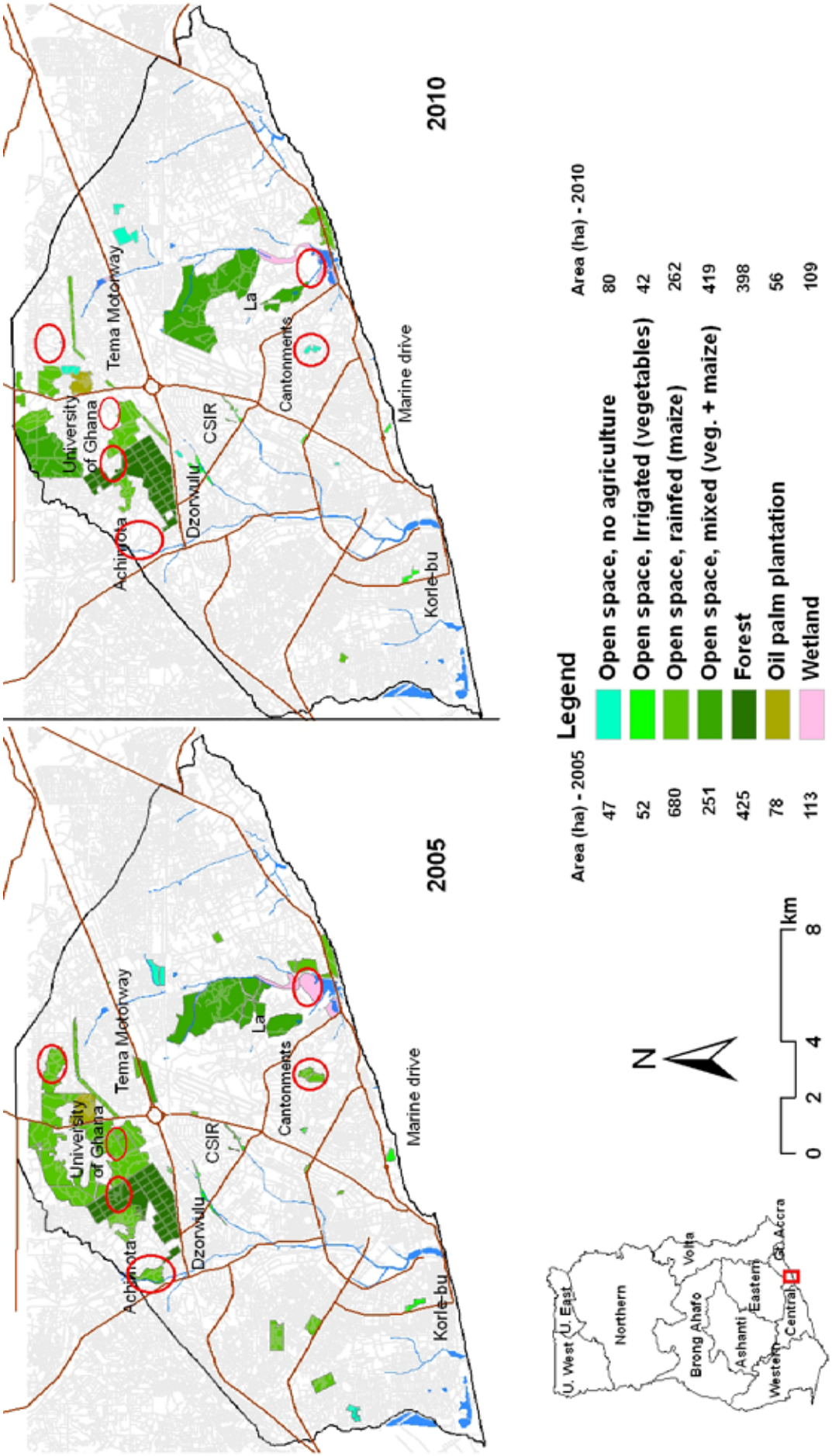

FIGURE 2.4. Map showing open spaces and farming activities in Accra in 2005 and 2010. Red circles indicate areas with significant change (IWMI, unpublished).

Some of the major farming areas are:

- **Dzorwulu/Roman Ridge/Plant Pool:** The three sites are in close proximity covering in total about 10 ha. During the early 1970s the Dzorwulu site served as the first model farm of the Ministry of Food and Agriculture (MoFA). The numbers of farmers vary between years but there are around 100 on all three sites together with only 10% of them being women. Most additional laborers are young migrants from Burkina Faso. A mutual agreement has been formalized with the local authorities for farming in the area as a way of maintaining the land and to prevent any nonagricultural encroachment. The Onyasia stream cuts across the farming sites (Figure 2.5). It is channeled in this part of Accra like a drain and has a similar function. Some farmers use pipe-borne water, most however water from the drain or smaller drains channeled into shallow reservoirs (dug-outs). There are about 130 of such small ponds on this site. Some are interconnected (Figure 2.6). Several are also filled with piped water.

- **Korle-Bu:** This farming site neighbors the largest hospital in Ghana. Many farmers are hospital staff like security guards, cleaners, etc. who farm to supplement their income. In 2008 about 8 ha were cultivated by 70 farmers (with one exception all men). Several attempts have been made at forming a farmers' association. The land belongs to the hospital and farming is done under an informal arrangement to keep the area clean and prevent nonagricultural encroachment. Water is derived from drains, which pass through the hospital compound and staff apartments.

FIGURE 2.5. Parts of the Dzorwulu site (photo: Mary Lydecker).

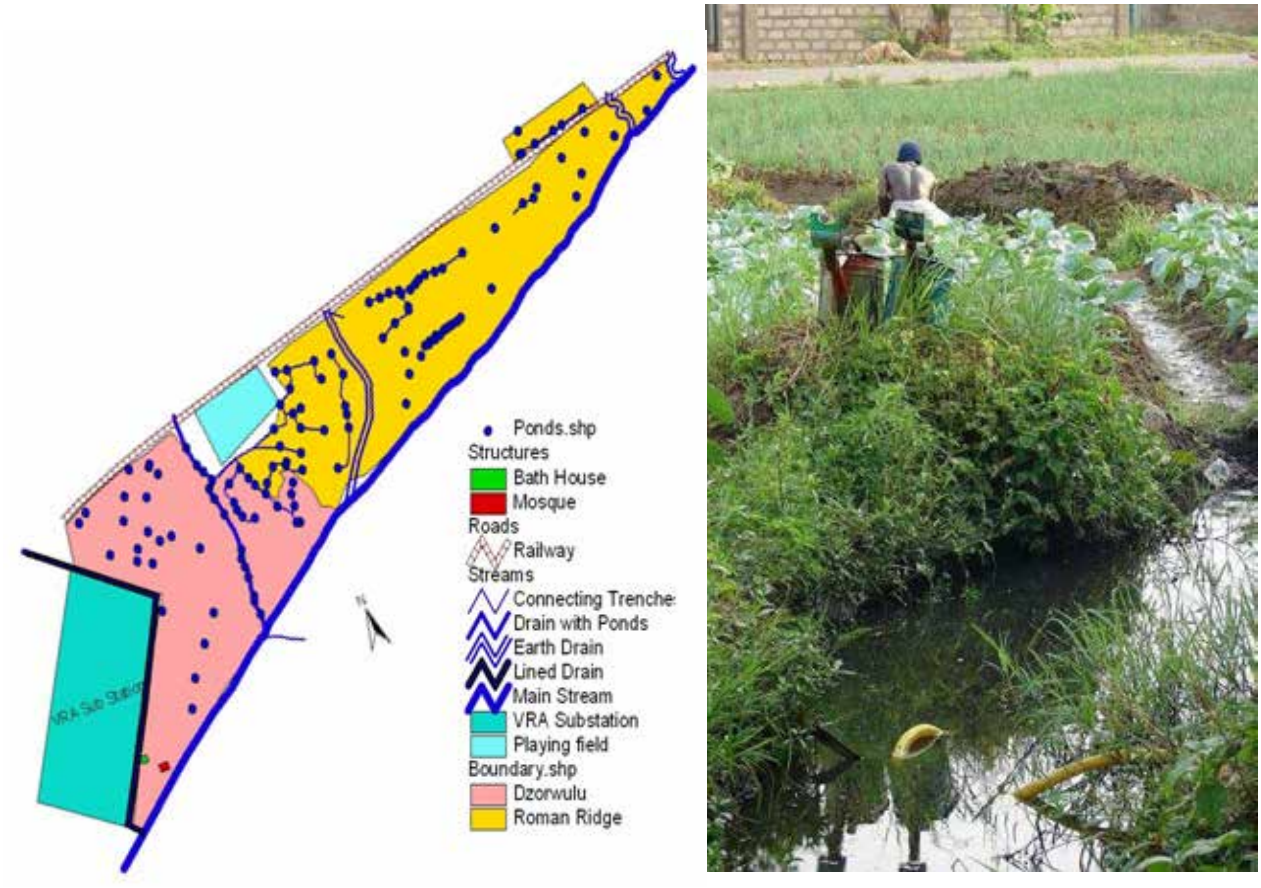

FIGURE 2.6. Distribution of individual and interconnected ponds and dugouts on the Dzorwulu and Roman Ridge sites in Accra, drawing water via pumps from streams and drains (photo: Philippe Reymond).

- **La:** This is probably the largest informally irrigated site in Accra with up to 400 ha under farming before 2000 of which at least 40 ha were under irrigation, rainfed farming or fallow land. However, the site which was once famous for its large-scale okro production, has experienced a development boom since mid-2000 and lost especially between 2009 and 2012 about half of its arable land to housing (Caradonna et al. 2012) forcing farmers to shift plots within and outside the La area.

  The most common water source is raw larger or diluted wastewater from the nearby (military) 'Burma' camp while other farmers also use pipe-borne water, stream water or water from the final treatment pond of the largely broken down Burma camp wastewater treatment plant. It is in this respect the only site where 'treated' as well as raw wastewater are used and also where furrow irrigation is practiced as farmers block the streams to divert the flow through a gravity-based system to their okro, tomato, pepper or maize fields. La is also unique as the gender ratio of farmers is nearly balanced. Since 1988 the

site has had a functional farmer association with a peak of 425 members in 1998. Landownership in La is complex with customary and statutory land rights. The current number of farmers in the south, east and north of the Burma camp is estimated at 200 to 340 cultivating about 140 to 200 ha, mostly rainfed (see also chapter 13).

- **Marine Drive,** near Independence Square**:** Farming in the area began before 1983 via a church and was aimed at providing employment for local youth and reclaiming the land. The land being cultivated belongs to the Department of Parks and Gardens and was originally zoned by the AMA as an open space in line with the beautification of the metropolis policy. However, lack of funds, time and logistics has motivated the Department of Parks and Gardens to enter into an informal agreement with farmers. The site still had 100 farmers (one woman) aged between 18 and 60 years in 2008. The potential farming area covered at that time was 3.5 ha. Water is provided through a narrow wastewater drain connecting the inner-urban area called 'Ministries' and the ocean. Recent reports indicate that farming activities on the site have been reduced by half or more.
- **Roman Down:** The site of approximately 22 ha is located in the Ashaiman Municipality, part of the GAMA, downstream of the Ashaiman Irrigation Scheme. The site is a natural floodplain receiving water from the reservoir and a stream draining the nearby township. The scheme area including Roman Down was leased by the Ghana Irrigation Development Authority from the traditional councils. Like the other sites, farmers have no formal tenure agreements but are allowed to farm on the site. There are approximately 40-60 farmers on the site of whom about 20 are women (see also chapter 13). Most are members of a local farmers' association which has been fighting increasing housing encroachment since 2006.

Other sites in Accra are, for example in the Airport Residential Area around the Council for Scientific and Industrial Research (CSIR) and IWMI office or close to the Ghana Broadcasting Company (GBC), at the University of Ghana in Legon, as well as east of the airport.

2.2.2 Kumasi

Representing the middle belt of Ghana, Kumasi is the capital of the Ashanti Region and the second largest city in Ghana with a 2010 population of 2.0 million (GSS 2012a). Between 2000 and 2010, Kumasi Metropolis contributed 20.2 percent to urban growth, the highest in

the country (GSS 2012c). Kumasi itself has a total area of about 250 km² of which about 40% is open land. Kumasi has a semihumid tropical climate and lies in the tropical forest zone (Figure 2.1) with an annual average rainfall of 1,420 mm over about 120 days. The rainfall pattern of the town is bimodal with the major season occurring between March and July and a minor rainy season around September and October.

Important streams and rivers include the Owabi River, which flows through the suburb of Anloga; Subin River, which passes through Kaasi and Ahensan; and Wiwi River, which runs through Kwame Nkrumah University of Science and Technology (KNUST) campus. As the rivers have a number of tributaries, the city is rich in waterbodies. The inland valley areas with low groundwater levels surrounding the streams are unsuitable for construction but of high value for urban vegetable production.

Vegetables are also produced in peri-urban Kumasi where more than 10,000 ha were recorded under seasonal vegetable farming (Cornish and Lawrence 2001), which is twice the area under formal irrigation in the whole country.

In the city, at least two out of three households have some kind of back yard farming. A much higher percentage has at least a few plantain crops or poultry (IWMI, unpublished). The peri-urban area of Kumasi has a radius of up to 40 km from the city center (Blake and Kasanga 1997; Adam 2001). It is characterized – among other features – by a concentration of large poultry farms (the largest farm had depending on the season up to 300,000 birds); however, the poultry industry is today under strong import pressure (Zachary 2004). Lying in the 'tuber belt' of West Africa, cassava, plantain, maize and other traditional staple food crops are dominant on upland sites, often accompanied by dry-season vegetable farming especially along streams.

Major Irrigated Vegetable Farming Sites in Kumasi

In urban Kumasi, most land where farming occurs belongs to government institutions, like the university, and private developers. In 2014, IWMI estimated 59 ha (145 acres) of vegetables in the dry season and 48 ha (118 acres) in the rainy season, cultivated by 300 men and 23 women farmers on about 20 farming sites (Table 2.2). This is more than what was estimated in 2005 in the same city boundary[2]. The largest agglomeration of farms remains in the lowlands around the KNUST University (Figure 2.7).

[2] The total area used for open space farming in the city (including tubers and cereals) was about 70 ha in 2005 with 41 ha under irrigated vegetable farming (Obuobie et al. 2006).

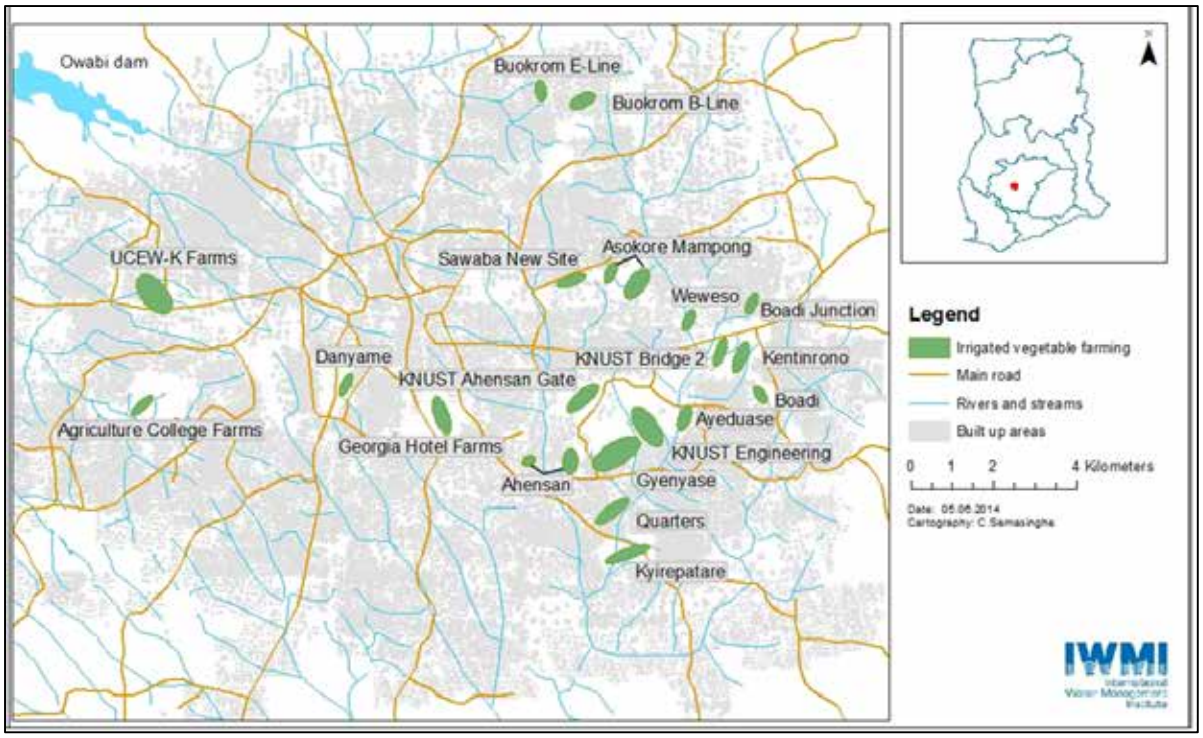

FIGURE 2.7. Vegetable-producing sites in urban Kumasi in 2014.

TABLE 2.2: Features of urban vegetable irrigation sites in Kumasi (IWMI, unpubl., 2014).

Kumasi Sub metro	Farming site names	Acres dry/wet season	No. of farmers (male/ female)	Commonly grown vegetables	Common water sources	Irrigation methods
KWADASO	Agric. College Farms and UCEW-K Farms	21/10	20 (19/1)	Cabbage, Green pepper, Carrot, Lettuce	Stream, pipe	Watering can, pumps
NHYIASO	Danyame and Georgia Hotel	3/3	6 (6/0)	Spring onions, Lettuce, Cabbage, Carrot	Shallow well, Stream	Watering can, pumps
MANHYIA	Buokrom B- and E-Line	3/2	7 (5/2)	Spring onions, Lettuce	Shallow well, Stream	Watering can
ASAWASI	Asokore Mampong; Sawaba New site	19/19	41 (41/0)	Cabbage, Spring onions, Cucumber	Stream, shallow well	Watering can, pumps
OFORIKROM	All sites at KNUST north of Gyenase	46/37	152 (134/18)	Spring onions, Cabbage, Lettuce, Pepper, Spinach, Garden eggs	Shallow well, Stream	Pump, watering can
ASOKWA	Kyirepatare , Ahensan, Gyenase, Quarters	53/47	97 (95/2)	Cabbage, Lettuce, Spring onions, Cauliflower	Stream, Shallow well, pipe	Pump, watering can
Total		145/118	323 (300/23)			

2.2.3 Tamale

Tamale is the capital of the Northern Region. The Tamale Metropolitan District covers a large area of about 930 km^2 including the city itself and about 30 surrounding villages. Its 2010 population was estimated at about 371,000 of which about 74% (274,000) lived in urban Tamale (GSS 2012a). Urban Tamale extends up to 10 km from the city center, while peri-urban Tamale extends up to 40 km northwards and 30 km southwards along the busy Accra-Ouagadougou highway. To the west and east, the peri-urban area extends approximately 16 km to Nyankpala and 20 km to Taha, with many rural pockets within the urban and peri-urban zones (IWMI, unpublished).[3]

Tamale lies in the Guinea-savannah belt (Figure 2.1) with only one rainy season from April/May to September/October, followed by a prolonged dry season. The city is poorly endowed with waterbodies. There are a few seasonal streams, with enough water during the rainy season, but they dry up during the dry season (Giweta 2011). However, the average annual rainfall is higher than in Accra with about 1,033 mm over about 95 days of intense rain. The dry season lasts usually from November to March. With a tenth of the population density of Kumasi and Accra, many households in Tamale, especially outside the city center still have a field next to the house with an average size of 0.1 ha. There are also many fenced plots reserved for construction as well as larger fields ('rural remains') in the city area which are commonly used for maize or okro in the rainy season and to a smaller extent for indigenous vegetable farming in the dry season.

Main Irrigated Vegetable Farming Sites in Tamale

As no permanent streams pass through Tamale, most vegetable farming relies on reservoirs, piped water or is carried out along stormwater drains. About 60% of the farmers grow vegetables only during the dry season, a minority year round, while most switch to maize in the rainy season. More than half of those farmers who irrigate depend on heavily-polluted water sources in the dry season. Nearly all use watering cans and buckets to apply water to their crops (Zibrilla and Salifu 2004; Abubakari et al. 2011). Attempts to explore groundwater for urban farmers have failed because of the high cost of achieving the required depth (about 60 m in many cases).

Figure 2.8 shows some of the major farming sites in and around the city center. The total area under informal irrigation appears to have decreased on the major sites from about 20 to 10 ha between 2006 and 2012, while new sites were reported in recent surveys by the University for

[3] The assessment of the peri-urban area in 2003 was based on the approach outlined by Adam (2001).

Development Studies (UDS). However, there are significant variations over the year making it difficult to compare surveys in dry and rainy season, especially in view of the number of hectares under irrigated crops. On most sites maize is grown during the rainy season.

The most common vegetable is cabbage, followed by lettuce, *alefu, bra* and sweet pepper, while less than 5% of farmers include spring onion, garden eggs, okro, tomatoes, carrot and *Corchorus* spp. (Abubakari et al. 2011; Giweta 2011; see Table 2.2).

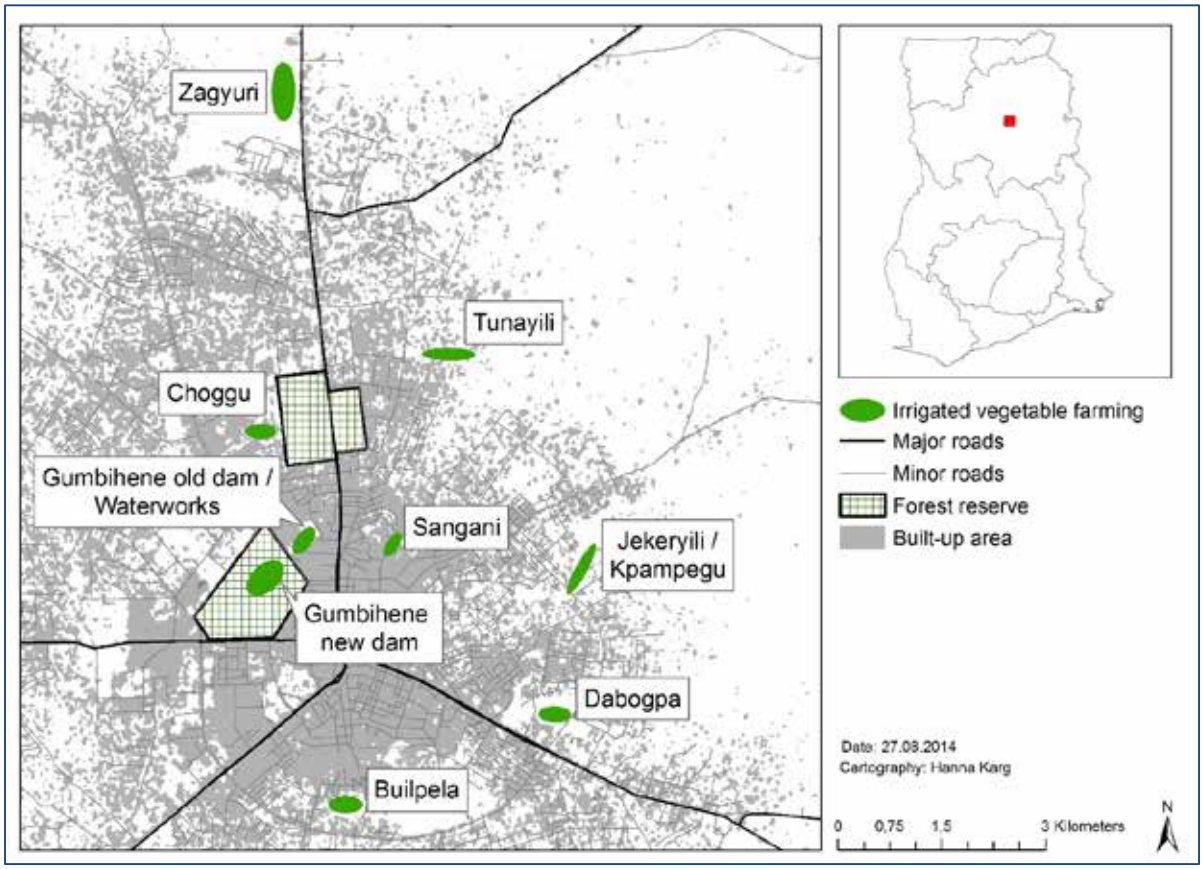

FIGURE 2.8. Main urban vegetable production sites in Tamale in 2014 (Hanna Karg; UrbanFoodPlus project, unpublished).

Examples of some well-known urban vegetable farming sites in and near Tamale are listed below. Most sites suffer from encroachment. Compared with our surveys in 2004, also new sites were reported like near the Ghanasco dam (Dabogpa), Tunayili (Duanayili), or outside the map Datoyili and Sakpalgu.

§ **Bulpiela (Builpela):** This site is about 2 km south from the center of Tamale. Between 20 to 50 farmers use a dam that was built in 1960 to supply water for domestic use, livestock and vegetable cultivation. The area under vegetable cultivation has decreased from 6 to about 2.5 ha over the last seven years due to house construction (Zibrilla and

Salifu 2004; IWMI, unpublished survey 2008, 2012). The numbers of farmers are reported to be still declining and are especially low in the rainy season.

§ **Sangani:** Located 2 km north-east of Tamale town center. Farmers use water from a hand-dug well while a borehole provides drinking water. Reported areas under cultivation and the number of farmers have declined due to competition for water – from about 2 ha in 2006 to 0.5 ha in 2012, and 90 to about 30 farmers. However, another source reports about 5 ha (Giweta 2011).

§ **Water Works/Gumbihene:** Water comes from a reservoir originally built to provide water for Tamale Municipality, but the reservoir is now too polluted for this purpose. Water flowing through the dam is used by vegetable farmers all season round while others use piped water, which is at Gumbihene Old Dam, treated water. Vegetable irrigation areas at Gumbihene Water Works, Gumbihene New Dam and Gumbihene Old Dam vary among different sources (13.5 to 22 ha, with up to 300 farmers). The downstream area declined since 2006 from 10 to about 6 ha.

§ **Zagyuri:** This site is near **Kamina Barracks** where in peak times up to 120 farmers on 20 ha use untreated sewage from a broken sewer/treatment plant. The site is about 8 km from the city center with currently 2 to 4 ha under dry-season vegetable production while in the rainy season up to 8 ha are under maize farming.

§ **Dabogpa (Dabokpa):** Located about 3 km to the south from the town center near the **Ghanasco dam**. Reports on the number of vegetable farmers vary between sources and seasons from three to 66, while maize is grown in the rainy season. Farmers have to compete with the Ghana Senior High School (Ghanasco) for the water.

§ **Choggu (Chafrini, Chefruguni):** Located about 3 km from Tamale central towards the north-west. Around the dam farmers use reservoir water (Figure 2.9ab). Slightly further away (towards the north-west) some farmers have access to piped water, likely from a well. In the beginning of the dry season a drain coming from the dam is still filled with water and farmers who are further away from the dam (towards the east) use that water. Around 60 farmers use the site for irrigation on about 7 ha.

In Tamale, some farmers' associations, NGOs, municipal authorities and research institutions have formed the 'Urban Agriculture Network – Northern Ghana' (UrbaNet) under facilitation by *Action Aid*. The main tasks of the network are farmer group development, capacity building and advocacy for land security (Amarchey 2005;

Abubakari et al. 2011). According to UrbaNet, there are seven vegetable grower associations in and around Tamale Metropolis, all forming part of The Northern Region Vegetable Farmer's Union (NRVFU), with total of 614 members (Giweta 2011).

FIGURE 2.9a: Vegetable beds near the reservoir at Choggu, Tamale (image by Google Earth, 6 January 2014).

FIGURE 2.9b: Detailed view of Figure 2.9a above taken by an UAV (Unmanned Aerial Vehicle), commonly known as "drone", by Johannes Schlesinger, UrbanFoodPlus Project; 2014 (unpublished).

2.2.4 Other Cities

Cape Coast: The Central Region in general and the Cape Coast Metropolitan area in particular are known for their high tourist potential. Many beach resorts, hotels and guest lodges warrant a high and unceasing demand for vegetables within this area. However, the region is also very dry or marshy and irrigated vegetable farming is limited to several small areas, with the exception of 0.5 ha near the Ameen Sangari office, and less than 1 ha on the Cape Coast University where exotic vegetables, okro, garden egg and carrots are cultivated year round using stream or pipe-borne water. In IWMI's 2008 survey only around 10-20 farmers were counted. The bulk (over 90%) of the vegetables consumed in and around the Cape Coast municipality comes from as far as Togo or Kumasi and rural areas surrounding the Cape Coast District.

Based on interviews and observations, reasons for the insignificant level of urban vegetable production include: (1) general scarcity of nonsaline surface or groundwaters including perennial streams; (2) the saline nature of the soils and (3) unsuitable hilly topography with flood-prone flatlands. Particularly during the dry season (October to March) when vegetable prices allow for high returns, the biophysical potential for irrigated urban agriculture is very low. Significantly fewer migrants from the north (compared to Accra for example) and a local preference for fishing are further factors limiting the in-situ development of irrigated vegetable production.

Sekondi Takoradi: There are smaller urban and peri-urban irrigated vegetable production sites in the Sekondi Takoradi metropolis where a considerable amount of vegetables is produced. These are located in areas commonly known as the Air Force Strip, Polytechnic, Airport Ridge, Pioneer Tobacco Company and Kwesimintsim (near the 'Obiri' lotteries building). Except for the larger site at Airport Ridge (4.6 ha in 2008), the total area of the other sites covers about 1 ha. Farm sites at both the Air Force Strip and Airport Ridge are all located on land that belongs to the Ghanaian air force. Here farmers by a small annual fee for land cultivation. Almost every farmer cultivates year round. Most farmers in Takoradi use streams as water sources. Streams crossing the town are highly polluted as they function as natural drains for urban wastewater. The total number of farmers in the city was estimated as 80 in 2008 (IWMI, unpublished).

Techiman: Within Techiman, which is a leading market town in Central Ghana, staple crops are significantly more often cultivated than irrigated vegetables (Turner, 2013). Vegetables follow in importance to maize, plantain, fruit trees and yam, and are mostly grown in back yards, but so far not on any noteworthy open space in the town (Mackay Niittylä, 2013). However, in the vicinity of Techiman, larger (formal) irrigation schemes, like in Tanoso and Akumadan, are specialized for example in tomato, okro and garden egg cultivation.

2.3 Farming Characteristics, Crops and Land Tenure

Open-space vegetable farming is conducted mainly for commercial purposes. Only farmers specialized in traditional (indigenous) vegetables consume a part of such produce. In Kumasi, vegetable farming is done year round, whereas in Accra and especially in Tamale many of the vegetable sites are (also) used for maize and sorghum in the rainy season. Also in peri-urban areas, in particular around Kumasi, vegetables are mostly produced in the dry season when prices are high. Farm sizes are increasing in urban and peri-urban areas with usually 0.02 to 0.1 ha in the cities and up to 1.0 ha in the peri-urban area. As rainfall is high, vegetable farming is done on raised beds, which can vary in size (mostly length) – between 3 to 14 m^2. Farmers might own 12 to 80 beds (Figure 2.10).

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FIGURE 2.10. Vegetable production on long beds in Accra (photo: IWMI)

Due to high labor requirements (land preparation, weeding, watering etc.) farmers with larger land areas have to hire labor or rent a water pump. Family labor is common (cousins, brothers) but also young migrants, especially from Ghana's north, Togo or Burkina Faso are working on urban farms. Poultry manure is generally the preferred and cheapest nutrient source, but commercial fertilizer is also used, e.g. on cabbage.

Most urban farming sites are on lands belonging to governmental institutions and departments or private developers who have not yet started constructing. Preferred farming sites are those in reserved areas along streams or other water sources. Farmers normally do not pay for access to land or water and only have an informal agreement with the landowner or caretaker. As such there is no security of tenure as they are allowed to farm only as long as the owners do not need the land. On other sites, belonging for example to the air force authorities in Takoradi, farmers pay a fee to use the land. Fees vary between USD5/year to USD10/month. In other cases, like in La or Dzorwulu, farmers function as caretakers to avoid any more permanent encroachment of the land. In general, land tenure becomes more secure towards the peri-urban fringe where land is usually owned under customary rights and distributed according to traditional regulations (Flynn-Dapaah 2002). One exception in the urban context is the site of La, where nonindigenous farmers formerly paid to the customary owners of the land or had to agree on sharecropping. The situation changed some years back after a Trust was created to settle nonagricultural land disputes in the area.

More than 15 types of vegetables are cultivated in urban Ghana. Tables 2.3 and 2.4 show that the most commonly-grown urban vegetables are also the most perishable (leafy) ones, which have to be produced in market proximity as long as cold transport is lacking. These are often 'exotic' (nontraditional) vegetables, which reflect 'imported' (urban) diets and are consumed raw in salads, such as lettuce, spring onions and cabbage[4]. In peri-urban areas, on the other hand, more traditional diet vegetables like *ayoyo* (*Corchorus* sp.) and *alefi* (*Amaranthus* sp.*)* or less perishable (fruity) vegetables like garden eggs and tomatoes are grown. Another noticeable feature is the specialization that sometimes occurs in farming sites. For instance, farmers in D-line in urban Kumasi predominantly plant spring onions while their counterparts at Gyenyasi plant lettuce. Availability of water is one of the factors influencing such a decision next to market demand and soil properties. Specialization is another reason; in some villages around Kumasi, farmers prefer certain vegetables, while in the neighboring villages

[4] In Francophone West Africa, the consumption of raw salads is significantly more common than in Ghana.

other vegetables are grown. In Tamale, many local vegetables are cultivated in urban areas, a response to a less multicultural demand.

TABLE 2.3. Main and secondary vegetables cultivated in and around Tamale in the dry season (UDS field study 2013, unpublished).

Farming community	Main crops	Minor crops (local names*)
Gumbihene new dam	Cabbage/lettuce	*Alefu*, *ayoyo*, okro, *bra*, spring onion
Gumbihene old dam	Cabbage	Onion, *bra*, *alefu*, cowpea leaves
Water works	Lettuce	Garden eggs, *alefu*
Zagyuri/Kamina	*Bra/ayoyo*	*Alefu*, cowpea leaves, okro
Sangani	Lettuce/cabbage	Cowpea leaves, *bra*, spring onion, *ayoyo*
Builpela	Cabbage/tomato	Spring onion, cowpea leaves, *bra*, lettuce
Dabogpa/Ghanasco	Cabbage	Spring onion, *bra*, cowpea leaves, *alefu*
Choggu	Cabbage/lettuce	*Bra*, *alefu*, *ayoyo*, cowpea leaves

* *Ayoyo* (*Corchorus olitorius*), *Alefu* (*Amaranthus candatus*), *Bra* or *Roselle* (*Hibiscus sabdariffa*)

TABLE 2.4. Common crops and crop combinations in urban Kumasi (IWMI, unpublished).

Main crops		Associated crops	
Crops	**Harvest/year**	**Crop**	**Harvest/year**
Lettuce	9-10	Cabbage	1
Spring onions	6	Cabbage	2
Cabbage/cauliflower	3-4	None	None
Carrots	6	Spring onions	2
Green pepper[b]	6	Lettuce	6
Radish: Red Radish: White	8 5	Green pepper	2
Ayoyo, *alefu*	6	Red onions	3

[a] Rotation and intercropping pattern depends on the season, rotation is the most common.
[b] Mostly intercropping.

Table 2.5 shows the most common peri-urban crop combinations within a given year. Crop rotation is carried out depending on the seasonal demand and likely returns for a particular product and with less priority as a strategy to control pests and diseases. Soil conditions also play a role; in wet areas alternative crops are often sugarcane and cocoyam.

TABLE 2.5. Common crop combinations in peri-urban Kumasi.

Main crop	Subsidiary crops in rotation
Cabbage	Lettuce/spring onion, cabbage, green pepper/sweet pepper
Lettuce	Cabbage/spring onion
Maize	Cassava, plantain/cocoyam/cassava
Okro (okra)	Tomato, cocoyam, cassava, garden eggs
Spring onion	Pepper, garden eggs, okro
Pepper	Cabbage, tomato, garden eggs
Tomato	Cabbage, pepper, okro
Plantain	Cocoyam, cassava, maize
Oil palm	Cassava, cocoyam, maize

Source: Gyiele (2002a).

Access to irrigation water is crucial for vegetable farming, especially for leafy salad greens. Due to high evapotranspiration exotic vegetables in Ghana are irrigated twice a day unless it rains. Water fetching and irrigation are usually done with two watering cans; each can holds up to 15 litres. This archaic[5] appearing type of irrigation is hard work, time consuming and in this sense a major cost factor. Since about 2005, the use of small motor pumps is on a steep increase. Pumping water to an intermediate storage place (usually a dugout) reduces walking distance and time while irrigation is still done with the can because irrigating directly from the hose would damage most vegetables. Irrigation costs are lower where the landscape is hilly allowing gravity flow, like at La in Accra, where farmers block narrow drains or streams to create an overflow feeding into furrows for irrigation.

In the rainy season vegetable supply increases as some crops can also be produced without irrigation or farmers can access seasonal streams or reservoirs. With increasing supply the sales price goes down and other crops, like maize, become a viable alternative. Though the production of vegetables continues on some urban farming sites also in the rainy seasons, on other farming sites, farmers shift to maize or yam, not only for market sales but also subsistence needs as mentioned by half of the farmers interviewed. About 40% mentioned the lower price of vegetables in the rainy season as reason for changing crops, and 8% the increased risk of pest attacks under continuous vegetable farming.

[5] As farmers have no land tenure agreements and can be expelled from one day to the next, they rely on mobile equipment and avoid infrastructure investments beyond planting bed construction and dugouts. Dugouts are used for either storing runoff or pumped water or to access shallow groundwater.