



PBL Netherlands Environmental
Assessment Agency

IMPACT OF PERI-URBAN LAND GOVERNANCE ON GREEN SPACES

Insights from research in the Kumasi landscape in Ghana, a collaboration
between PBL, IHS and BIRD

July 2021

Collaborating partners:



PBL

Colophon

Impact of peri-urban land governance on green spaces. Insights from research in the Kumasi landscape in Ghana, a collaboration between PBL, IHS and BIRD

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PBL Netherlands Environmental Assessment Agency is the national institute for strategic policy analysis in the fields of the environment, nature and spatial planning. PBL contributes to improving the quality of political and administrative decision-making by conducting outlook studies, analyses and evaluations in which an integrated approach is considered paramount. Policy relevance is the prime concern in all of our studies. PBL conducts solicited and unsolicited research that is both independent and scientifically sound.

Institute of Housing and Urban Development Studies (IHS) is an institute of education, advisory services, and applied research with Erasmus University in Rotterdam. The primary thematic focus areas of IHS are strategic urban planning and policy, urban environment, sustainability and climate change, urban equitable housing and social justice, urban land governance for sustainable development, urban economic development and resilience, and green cities and infrastructure. This report gathers the insights from six Master students' theses from the Urban Management and Development programme.

Bureau of Integrated Rural Development (BIRD) is a research centre of the College of Agriculture and Natural Resources (CANR) of the Kwame Nkrumah University of Science and Technology (KNUST) in Kumasi, Ghana. BIRD conducts comprehensive inter-disciplinary research, training, consultancy and advisory services encompassing many topics in the fields of rural development, rural enterprise development, natural resource management, capacity building and rural institutional development. BIRD aims to enhance the development efforts of government, international development agencies, grassroots organizations, and private individuals.

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Summary

Context and objectives of the research

The research on the Kumasi landscape in Ghana is a part of PBL's broader research project on integrated landscape planning and management, performed under the work program for the Dutch Ministry of Foreign Affairs. The Kumasi landscape in the Ashanti region is characterised by a complex system of land governance coupled with challenges in regional sustainable growth posed existing development trends such as peri-urban sprawl, mining activities, and agricultural expansion. The region has connections to various global supply chains, including cocoa, palm oil and mineral resources. Also, numerous Dutch (funded) actors are involved in the region, with both short- and long-term objectives in various development and commercial sectors such as urban planning, mobility and finance, agriculture, forestry and conservation. Therefore, the Kumasi landscape provides an interesting case and the research can provide useful insights for other/new projects addressing sustainable land use and planning challenges, initiated in various development partner countries by the Dutch Ministry of Foreign Affairs.

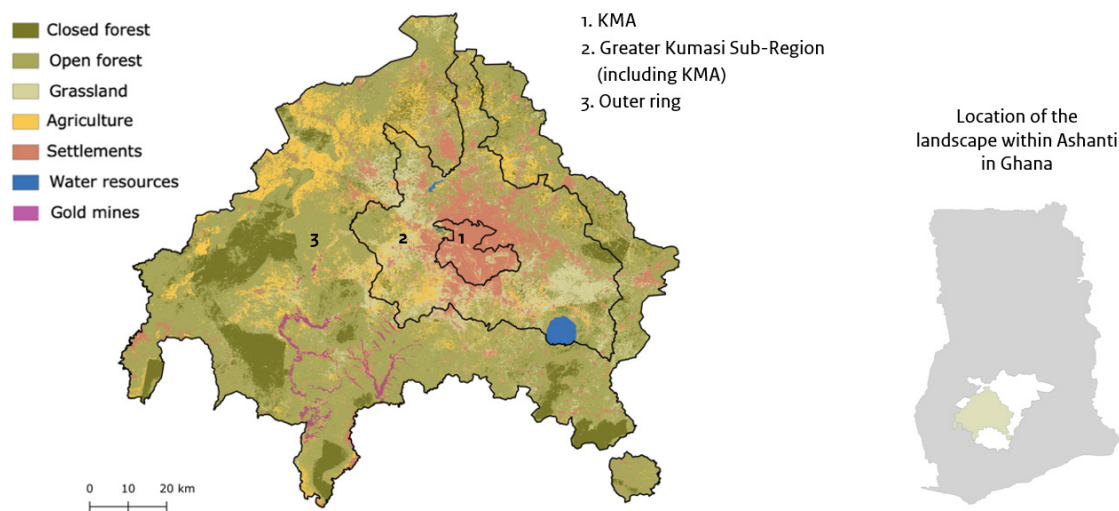
The governance of and changes in green and blue infrastructures (GBI) are the key thematic topics of this research and report, as these are considered elements that connect the various actors and stakeholders in the landscape. The significance of the project is embedded in the threat to the quantity and quality of GBI posed by competing and often conflicting land-use activities, particularly along the urban fringe. The peri-urban zone is in a constant state of flux, characterised by migration, changing livelihoods, and high land prices. Due to rapid change, it is an interface that is challenging to monitor and regulate. Current patterns of peri-urbanisation have significant human costs, and pose a challenge to achieving progress on various Sustainable Development Goals (SDGs), particularly those relating to poverty (1), food security (2), health (3), water and sanitation (6), clean energy (7), sustainable urbanisation (11) and biodiversity (14, 15). Applying a landscape approach is therefore relevant in this context, as it aims to achieving the SDGs at the scale of the landscape with the active involvement of local stakeholders, also in governing GBI and managing the associated trade-offs. Landscape approaches emphasise on the need for bottom-up participatory planning, which requires a better understanding of the objectives of landscape stakeholders, particularly of vulnerable sections of society. In addition to accounting for stakeholder objectives, achieving global goals such as the SDGs, climate and biodiversity goals and land restoration commitments, engaging with local governing processes and institutions is essential.

Therefore, the aim of the Kumasi landscape research is to increase awareness among stakeholders involved in landscape planning of the various dynamics affecting GBI. This report will provide basic information on the institutional, economic, and sociocultural drivers of GBI de-gradation to inform a multi-stakeholder workshop organised by BIRD. The workshop will focus on developing scenarios and interventions to inspire a more integrated, inclusive, and landscape-oriented planning and management process in the region.

The geographic focus of the Kumasi landscape research identifies two rings of districts surrounding the Kumasi Metropolitan Area (KMA) (Figure I), one of Ghana's fastest growing cities. Drawing insights from six student theses conducted in 2020 and secondary data from academic literature and government reports, this report aims to provide an overview of various institutional, economic, and sociocultural processes that impact GBI present across the urban-rural spectrum, but with a sharper focus on dynamics along the urban fringe.

Centred around the KMA, capital of the Ashanti region of Ghana and throne to the Asantehene (King of Asante), the landscape, covering about 9,500 km², is a juxtaposition of rich historical and sociocultural heritage and a wide range of contemporary land-uses and economic activities. The Asante, the indigenes of Ashanti, have for centuries protected the region's high canopy forests and rivers through traditional land management systems administered through a hierarchy of chiefs who owe their allegiance to the Asantehene. According to indigenous tradition, land is considered sacred for the Asante who believe that land ownership resides with the living, the dead, and those yet to be born. In modern-day Ghana, approximately 80% of land is owned customarily, and traditional and statutory land laws are practiced in parallel.

Figure 1. The Kumasi landscape - 2015 land cover



Source: PBL, Forestry Commission

Green and blue infrastructure (GBI) are central to the well-being of communities by providing, among others, water and food security, regional climate resilience, and liveable environments. The landscape comprises of a mosaic of urban and rural settlements, farmlands, grasslands, forests, and a complex network of rivers. Land-uses vary significantly between KMA, the inner, and outer rings, presenting a range of different challenges to the region's ecosystems. Urbanisation trends surrounding KMA characterised by sprawl, pollution, and unregulated resource extraction threaten natural landscapes and local livelihoods. On the other hand, the outer ring, which is predominantly rural, consists of denser forests that are threatened by increasing cash and food crop cultivation and mining activities.

Impact of peri-urban dynamics on green spaces

Institutional dynamics

There are several state agencies governing different types of GBI through several conservation policies. Many aspects of sectoral, national and regional development plans are realised through spatial planning and land administration through state planning institutions and customary actors. However, local planning institutions are challenged by the high demand for peri-urban land, informal development, and rapid growth of settlements. In particular, limited enforcement of land-use and zoning regulations and inadequate cooperation between state and customary institutions has led to the conversion of green spaces and riparian land for urban land-uses. Haphazard development in ecologically sensitive zones with limited access to waste and water management services contributes to heavy soil and water pollution.

Economic dynamics

Across the landscape, agriculture, mining, construction, and manufacturing industries contribute to landscape degradation. At the urban fringe where diverse land-use activities compete for space, land prices become unaffordable, often leaving certain communities to access land for housing and farming in flood-prone areas such as riparian zones. Additionally, the capacity of local governments in regulating local land markets and providing necessary utilities, transport, and housing infrastructure for sustainable development is challenged by limited financial resources. As a result of inadequate public utility services, unregulated use of groundwater and wood-based cooking fuels, and widespread waste-dumping practices threaten ecosystems. Further, without public investment in real estate and amenities through financial services to homeowners and real-estate developers, integrated and denser residential development within the inner ring is largely absent. Additionally, research shows that prevalent land speculation in peri-urban areas encourages leap-frog development patterns.

Socio-cultural dynamics

The Asante people have lived with various traditions, values, and beliefs developed around preserving ecosystems. Communities were closely involved with customary chiefs in managing land. However, traditional practices are dissolving, particularly in urbanising settlements, with economic as well as socio-cultural changes driven by migration and conversion to Christianity and Islam. However, citizen perception of communities and chiefs as the rightful owners/custodians of land and water resources persist strongly even today. Despite cultural changes, traditional values of green spaces persist in rural areas, and peri-urban settlers value green spaces for their contribution to the social and mental well-being of communities. These values have contributed to bottom-up initiatives and actor collaborations aimed at preserving GBI in rural and urban pockets within the landscape.

Considerations for inclusive and sustainable development

This research has demonstrated that current trends of resource use by individual actors, communities and commercial businesses are accelerating the loss and contamination of GBI. The objectives of these actors can be aligned through long-term goals towards sustainable development. These can be achieved through opportunities such as existing institutional arrangements and indigenous knowledge, and must consider regional perspectives of governing natural resources.

Regional governance

Functional systems such as watersheds and ecosystems exist beyond administrative boundaries and are governed by national institutions such as the Water Resources Commission and the Forestry Commission. Spatially confined resources such as closed forests and lakes within the landscape are protected and managed directly by these national institutions. On the other hand, rivers and open-access forests are supposed to be protected through local land-use planning. As local governments struggle to prioritise and implement natural resource management even within their own jurisdictions due to financial restrictions, coordination between neighbouring districts in environmental planning is currently limited despite the presence of the Regional Coordinating Council. Insubstantial public participation, even in local land-use planning, deters the demand for institutional accountability at a regional scale, despite the presence of laws that encourage public participation at all levels of planning: local, regional and national. The feasibility of implementing a landscape approach to planning could be challenged by lack of political will among state and customary actors, limited mandates of existing promising multi-stakeholder platforms and collaborations, lack of capacity at institutions tasked with integration of planning and

policies at various levels and even logistical challenges such as the lack of appropriate data-sharing, all required for advancing regional, integrated and inclusive governance. Therefore, there is a need for increasing awareness on GBI governance and capacity development in landscape governance and participatory planning targeted at local state institutions, and also at non-state stakeholders within the landscape.

Currently, the Greater Kumasi Sub-Region has been identified as a regional governing unit for spatial planning due to KMA's uncontrolled spill-over development in the surrounding districts. However, the agro-ecological and economic impacts of KMA were observed as far as 40 km from the city centre in a study conducted in 2001. The impact today is possibly much greater. Therefore, local and regional governing institutions and landscape stakeholders need to be made aware of the spatial extent of urban-rural linkages, and what these linkages signify in terms of the region's carrying capacity, and how urban, peri-urban, and rural systems can be linked to enhance regional sustainability and socio-economic development.

A landscape perspective to food systems

Similar to GBI, food sheds exist beyond administrative boundaries and connect stakeholders across the urban-rural spectrum. At the urban fringe, land fragmentation and pollution of water resources impact the quality and quantity of peri-urban food production. Inadequate transport, storage, and market infrastructure contribute to losses in the food supply linkages between urban and rural areas. In the outer ring, increasing cultivation is a major driver of deforestation. Hence, food shed management requires a landscape management perspective to ensure food security, land tenure security, small-scale farmer income, and nature-inclusive production is sustained through integrated planning and stronger urban-rural linkages.

Existing institutional arrangements for collaboration

Existing institutional arrangements for collaboration present tremendous opportunities to introduce alternative landscape management strategies. Community Resource Management Areas (CREMA) and River Basin Boards are unique state-initiated actor networks with representation from communities, local governments, traditional authorities, sectoral agencies, NGOs, and other private actors. CREMA has also been tied with agroforestry initiatives such as the Environmentally Sustainable Production Practices in Cocoa Landscapes. Although implementation of resource management through these arrangements is still evolving, these arrangements are supported by legal frameworks that can help sustain long-term projects.

However, the implementation of CREMA is currently restricted to rural landscapes where actor networks are relatively homogeneous in their dependence on natural resources for livelihoods. The peri-urban context, on the other hand, is characterised by socio-economically diverse communities and dominant secondary and tertiary economic sectors. Hence, peri-urban collaborative initiatives maybe restricted in terms of spatial scale and collaborating parties, but can be upscaled in numbers while being tied by broader planning policies/strategies.

Indigenous knowledge

Indigenous knowledge is built over generations of site-specific empirical observations and offer an intimate understanding of numerous natural processes. Indigenous practices of natural resource management consider the intricate functioning of different ecosystems and can contribute to effective landscape management. Scholars argue that the health of sacred groves is a direct result of resilient social structures built around protecting them. These structures utilise mechanisms of voluntary compliance

and cost-effective conservation practices; characteristics that sustain long-term participatory resource management.

Balancing technical and process-oriented solutions

Systemic changes in governance and planning reforms to build transparency, accountability of powerful landowners, public participation, and inclusivity are necessary in the Kumasi landscape. However, such changes are often outpaced by environmental degradation. Given the complex nature of land governance and challenges in enforcing top-down land regulations, landscape management could explore bottom-up technical and process-oriented interventions that function as short-term adaptive strategies with long-term goals. Moreover, as local governments are challenged by financial limitations, interventions need to be planned around actor collaboration with innovative financial arrangements that can sustain long-term projects.

Inclusive governance

Urbanisation offers developmental opportunities that are unevenly distributed across socio-economic groups. Victims of peri-urbanisation are often indigenous and local communities (especially women) comprising of subsistence farmers that lose access to community land. Due to high land prices, low-income migrants are also vulnerable as they resort to occupying flood-prone lands. Local government action-plans insufficiently recognise the specific peri-urban vulnerabilities such as food insecurity, health risks faced by low-income communities, unsafe housing, and gender inequalities in accessing alternate livelihood opportunities. Incorporating the objectives of socially and economically marginalised groups in landscape strategies is essential in ensuring inclusive and sustainable development.

FULL RESULTS

1 Introduction

1.1 About the Kumasi landscape research

The research on the Kumasi landscape in Ghana is a part of PBL's broader research project on integrated landscape planning and management. The broader project aims to improve knowledge on participatory strategies and scenarios for advancing inclusive and sustainable development. The project is a part of the PBL work programme for the Dutch Ministry of Foreign Affairs and it intends to provide insights on how to effectively integrate landscape level planning and action in partner countries, as one of the instruments that contributes to the various policy agendas such as those addressing food security, water management, climate change mitigation and adaptation, and the conservation of nature (Van der Horn and Meijer, 2015). Following previous work in Ghana (Meijer et al, 2018), the Kumasi landscape in the Ashanti region provides another interesting case for research, with insights useful for development programs in other partner countries. The Kumasi landscape, characterised by a complex system of land governance, faces several sustainability challenges. Numerous Dutch (funded) actors working in various sectors such as urban planning, food production, commercial agriculture (including those involved in global supply chains of cocoa and palm oil production), community development, biodiversity conservation, infrastructure, governance, finance, and sanitation have an active long-term presence in the landscape.

To adopt an integrated perspective and to reflect on the importance of urban-rural linkages in the landscape, PBL has conducted this research in collaboration with researchers from the Institute for Housing and Urban Development Studies (IHS) of Erasmus University in Rotterdam, the Netherlands, and from the Bureau of Integrated Rural Development (BIRD) of the KNUST University in Kumasi, Ghana. The governance of and changes in green and blue infrastructures (GBI) are the key thematic topics of this research and report, as these are considered elements that connect the various actors and stakeholders in the landscape. The quality of GBI also affects current and future progress on securing livelihoods, mitigating/adapting to climate change impacts, and preserving nature and biodiversity. The Kumasi landscape research aims to increase awareness among actors in the landscape of the various dynamics affecting GBI. It will also provide basic information for a multi-stakeholder workshop on the Landscape Approach organised by BIRD, that will focus on developing scenarios and interventions to inspire a more integrated, inclusive, and landscape-oriented planning and management process in the region.

The geographic focus of this project has been identified to include the Kumasi Metropolitan Area (KMA) and two rings of districts surrounding KMA. Kumasi's peri-urban development is characterised by rapid development and low-density sprawl, posing grave challenges to regional institutional capacity and environmental sustainability. From a socio-economic perspective, peri-urbanisation has led to the inevitable loss of agricultural livelihoods and spatial segregation of low-income groups (Cobbinah and Amoako, 2012). Urbanisation offers numerous developmental opportunities too; broadly, peri-urban communities around Kumasi have benefitted from increased access to social infrastructure and economic opportunities. However, a considerable portion of peri-urban livelihoods is challenged by unemployment, high living costs, and rising food prices (Afriyie et al, 2014). Strengthening the rural-urban relationship has been identified to have a crucial role in encouraging inclusive growth and sustaining rural livelihoods (de Bruin and Dengerink, 2020).

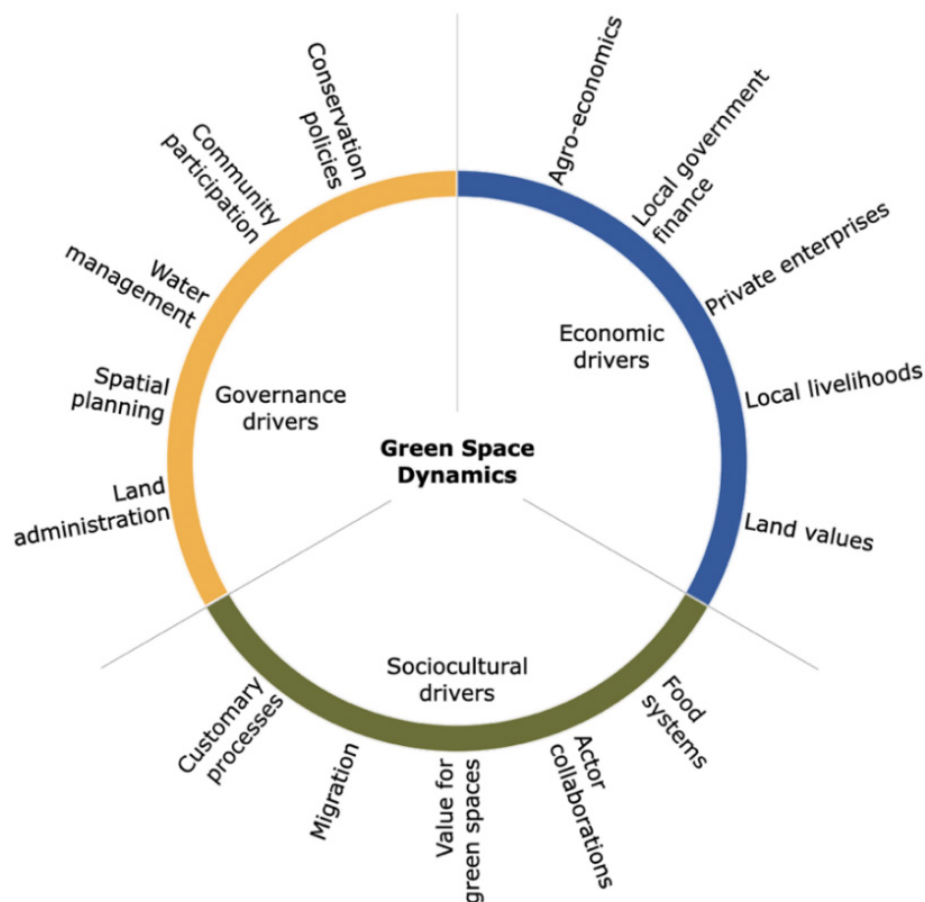
As already touched on above, the significance of this project is also embedded in the threat posed by urban spatial expansion on biodiversity and essential resources such as land, water, and food. How

competing land-uses across the urban-rural spectrum are managed determines the extent of biodiversity loss in the region. With the core principles being participation, inclusivity, and multifunctionality, the landscape approach concept is useful here as it aims to involve all landscape stakeholders in planning processes and decision making, while trying to combine and balance multiple, often competing, land-use demands (van der Horn and Meijer, 2015). In the Kumasi Landscape, peri-urban land-use dynamics are largely influenced by the customary land tenure system and the associated sociocultural values and attitudes toward natural resources. Understanding these values (whether intrinsic, utilitarian, or cultural) of different stakeholders is central to developing land management strategies. The landscape approach aims to streamline the objectives of different stakeholders through an iterative and participatory process, while stressing on the importance of natural landscapes to socio-economic development and environmental sustainability.

1.2 Report objective

The objective of this report is to provide a broad overview of factors impacting GBI across the urban-rural spectrum and to establish a foundation upon which further research, participatory scenarios, and policy recommendations can be developed.

Figure 1. Research perspectives on green spaces



Source: PBL

The data presented in this report is a combination of key findings of six IHS Masters student theses that were conducted within the inner ring in 2020 (as an initial step of the Kumasi landscape research), supported by additional research and literature. The report identifies aspects of economic, sociocultural,

and institutional dynamics and their role in driving land-use change which consequently impacts green and blue infrastructure (GBI)¹ across the landscape, but with a sharper focus on the inner ring. Figure 1 presents a thematic model of important factors contributing to peri-urban land-use dynamics that impact green spaces. Sub-aspects of themes in Figure 1, including those explored through the student theses², are presented in this report.

1.3 Reading guide

- *Chapter 2* provides an overview of the regional context with an introduction to how green and blue infrastructures are categorised and governed in the landscape by state institutions with the involvement of non-state actors. The chapter also presents a background of customary institutions, the spatial planning sector, and Ghana's unique land administrative system.
- *Chapter 3* presents the range of land-use patterns across the Kumasi landscape and within the focus districts studied through the student theses. Drawing from the student theses and additional secondary data, the chapter discusses how institutional, economic, and socio-cultural dynamics drive land-use changes and the loss of GBI.
- *Chapter 4* discusses challenges and opportunities observed in sustainably managing GBI through existing regulatory frameworks, institutions, and actor networks.
- *Chapter 5* presents recommendations in developing the Landscape Approach further in the Kumasi landscape. It also includes an overview of key recommendations from academic literature on how to progress towards sustainable development in the region.

¹ In this report the terms 'green and blue infrastructures (GBI)' and 'green spaces' are used synonymously as explained in Section 2.2.

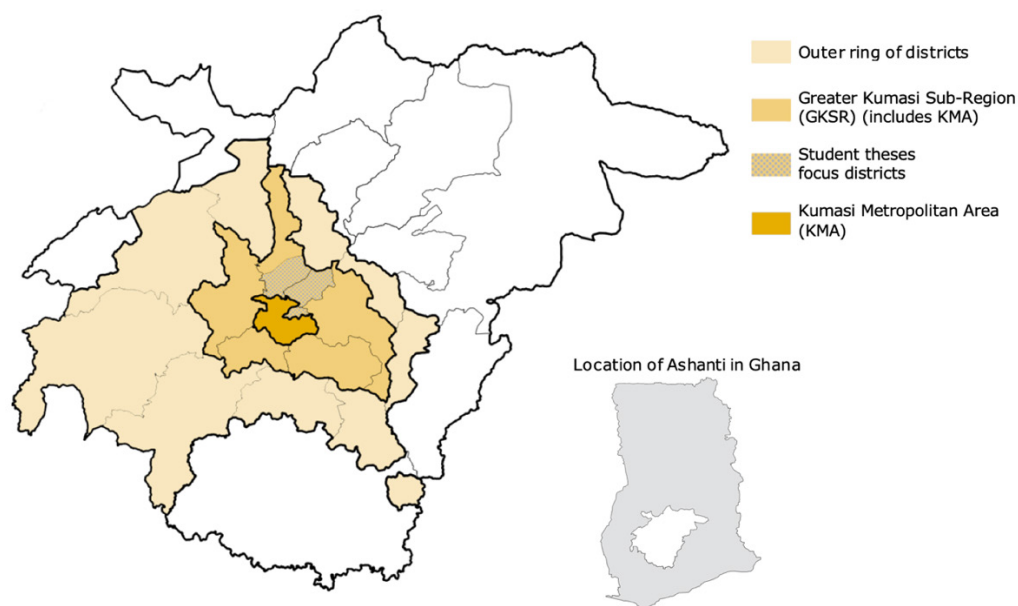
² Refer Appendix 1 for student theses topics.

2 Context

2.1 The Kumasi landscape

Located within the Pra river basin and Ghana’s High Forest Zone (HFZ), the landscape has been identified for this research to include two rings of Kumasi’s surrounding districts as depicted in Figure 2. Kumasi, the administrative capital of Ashanti and throne to the *Asante* King, came to be known as the ‘garden city of West Africa’ due to its urban greenscape in the 1940s (Cobbinah et al, 2020). The significance of the region’s economy, since its historic role in the trans-Saharan trade route, is rooted in its strategic location as an important trade link between northern and southern Ghana. The region is known for its production of various goods such as gold, palm oil, cocoa, and timber. However, a general lack of public investment in rural and small-town development and public perception of lifestyle and employment opportunities offered by the city have caused considerable in-migration from northern Ghana and rural areas (Cobbinah et al, 2020). Consequently, the Greater Kumasi Sub-Region (GKSR – Figure 2) is home to over 2.7 million people, representing close to 60% of Ashanti’s population, and is experiencing the spatial expansion of peri-urban settlements (Acheampong et al, 2017).

Figure 2. Boundaries of the Kumasi landscape within Ashanti³



Source: PBL

The peri-urbanisation process entails changes in ecological and socio-economic processes with evolving urban, agro/productive, and natural ecosystems (Allen et al, 1999). The peri-urban interface is in a constant state of flux and is therefore challenging to monitor and govern with responsive policy (Amirinejad et al, 2018). Scholars agree that despite the presence of shared characteristics across the urban-rural spectrum, the peri-urban interface is sufficiently distinct to qualify as a special zone of intervention set within a framework of regional governance (Allen, 2003; Adam, 2001).

³ Refer Appendix 2 for names of districts within the landscape

In the Kumasi landscape, peri-urbanisation is characterised by rapid land-use change, increasing land values and disputes, changing livelihood sources and food habits, improvements in access to social infrastructure and electricity, better connectivity to urban markets, and increased challenges in waste management (Afriyie et al, 2014; Cobbinah and Amoako, 2012; Adam, 2001). Cultural structures too transform at this interface with growing in-migration and with indigenous communities being absorbed spatially and economically into the urban system (Cobbinah et al, 2015). In addition to these changes, governance of the peri-urban interface is challenged by ambiguities in territorial definitions and overlapping statutory and customary legal frameworks.

2.2 Green and blue infrastructure (GBI) in the Kumasi Landscape

Green infrastructure can be defined as “an interconnected network of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations” (Benedict and McMahon, 2002). The term ‘green and blue infrastructure’ (GBI) is increasingly used to include existing aquatic ecosystems and to acknowledge the role of green spaces in managing hydrological disasters (Silva and Wheeler, 2017). GBI can consist of a wide range of green spaces depending on the scale of focus; regional, local, building site levels, etc. (Perini and Sabbion, 2017). In this report, GBI discussed include forests, rivers, groundwater, and grasslands at the regional level, and urban parks, wetlands, and other forested public spaces such as campuses and cemeteries at the local level.

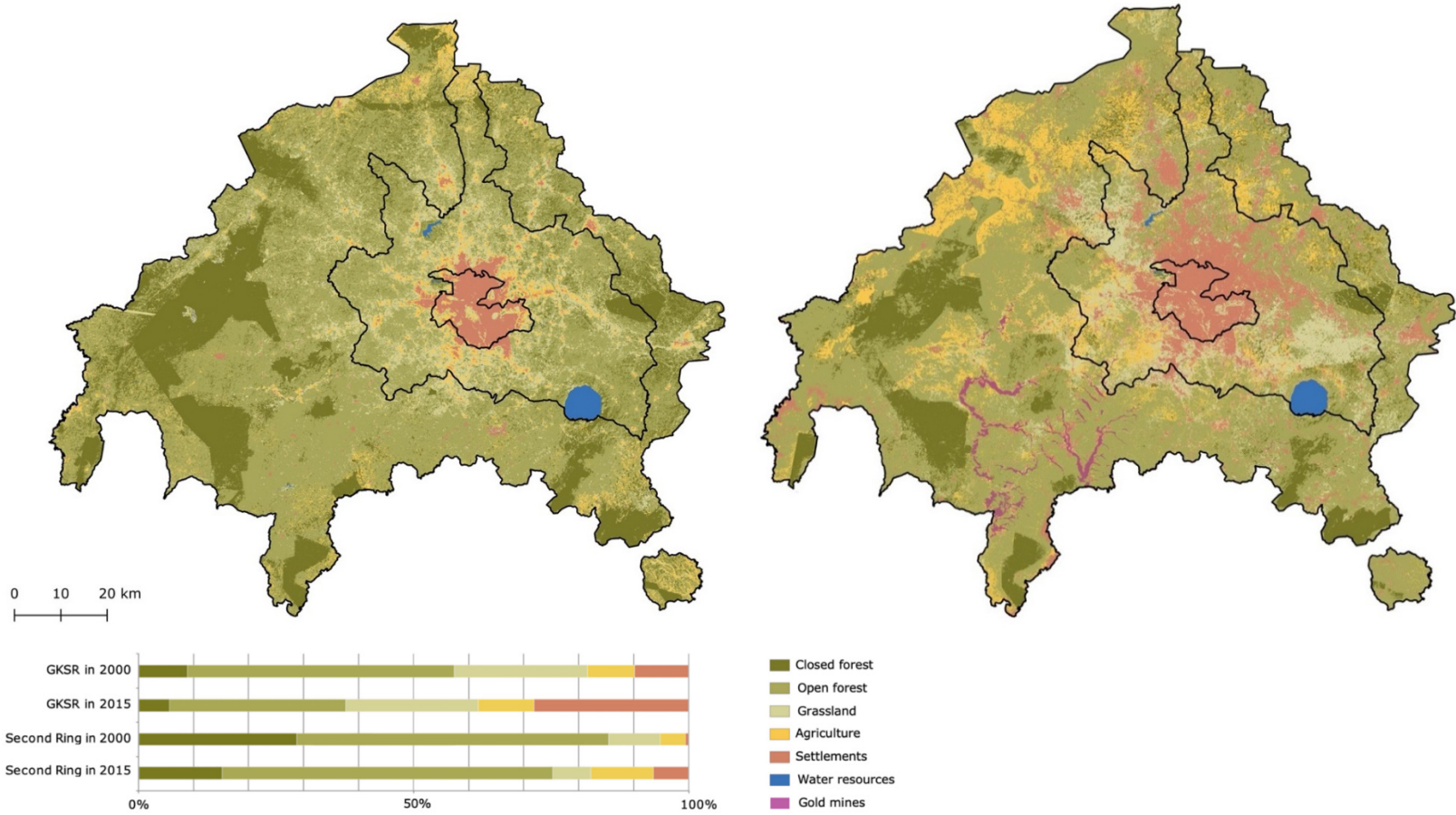
Green spaces in the Kumasi landscape have a long history of governance. Before British colonisation, the region was governed by the Asante empire which preserved important ecosystems that were valued for environmental and spiritual reasons. The introduction of modern urban infrastructure in the early 1900s by the British led to the loss of numerous traditional green spaces, becoming the advent of spatial conflicts that continue to influence urban morphology today (Amoako and Adom-Asamoah, 2019). KMA’s urban spaces used to be interspersed with well-protected city parks, gardens and green belts including along some of the major rivers passing through the city (Mensah, 2014), a few of which continue to exist today. With abundant annual rainfall and a mildly undulating terrain, the Kumasi landscape is characterised by an intricate network of waterways and different types of green land covers. Beyond KMA, the landscape comprises of mosaics of small settlements, farmland, grasslands, and closed and open forests⁴ (Figure 3). Northern portions of the GKSR fall within the Owabi river basin, from which KMA’s water is collected through the Barekese and Owabi reservoirs.

However, the spatial extent of GBI has reduced drastically under the pressure of unsustainable urbanisation patterns within the GKSR. In 2018, the first ring of districts contained 70% of the GKSR’s built-up area while accommodating only 26.3% of GKSR’s population (Cobbinah et al, 2020). Prevalent development of floodplains has also led to heavy water pollution and increased flood incidences in urban and peri-urban settlements (Amoateng, 2016). In the outer ring of districts, increased cultivation and mining is driving forest and river de-gradation. Figure 3a and Figure 3b illustrate the significant loss of green land covers across the landscape within a span of 15 years.

⁴ Closed forests and characterised by dense canopies covering more than 60% of the forest area, whereas open forests comprise of canopy covers that range between 15-60% (FAO, 2015).

Fig 3a. Land use in the Kumasi landscape: 2000

Fig 3b. Land use in the Kumasi landscape: 2015



Source: PBL and Forestry Commission Ghana

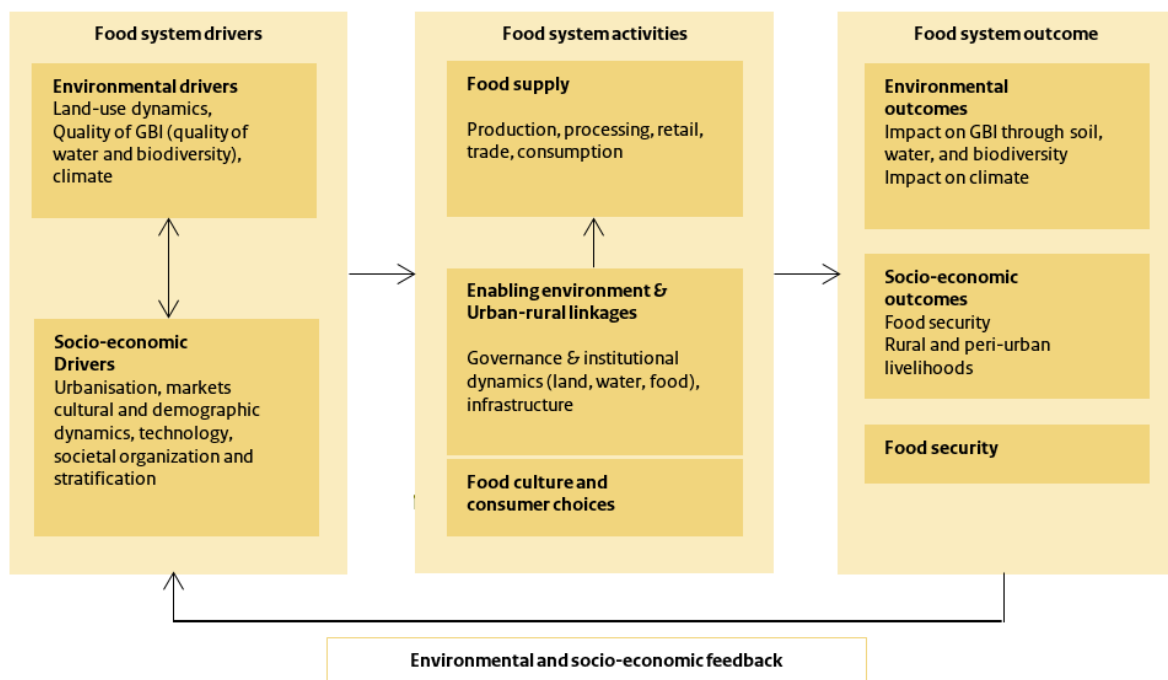
⁵ Gold mines mapped are based on 2019 Google Earth images, Closed forest = greater than 60% cover, open forest = 15%-60% cover

Linkages between GBI and food systems

Farming systems vary distinctly across the urban-rural spectrum, and can even be used as a basis to identify a geographic boundary of the peri-urban zone (Adam, 2001). Across the Kumasi landscape, small-scale semi-subsistence farmers dominate agricultural production. In the outer ring, cash crops including cocoa, oil palm, and food crops are grown in different sub-regions (Asibey et al, 2019; JICA, 2013). Despite a high competition for land, urban and peri-urban agriculture is driven both by urban market demand and household food insecurity (Akinyoade et al, 2014). Peri-urban production is a combination of perishables, staples, and dairy contributing to about 36% of KMA’s consumption on a seasonal basis⁶. Urban agriculture usually contributes to more specific parts of the urban diet. For example, up to 90% of urban leafy vegetable consumption is met by urban production (Drechsel et al, 2007).

However, current trends of urban/peri-urban agriculture threaten GBI as well as public health. Firstly, as settlements expand, farmlands are marginalised to surrounding natural landscapes. Secondly, urban/peri-urban agriculture is often irrigated by polluted wetlands and untreated wastewater from city drains. Intensive chemical farming practices further degrade water quality too (Amoateng, 2016).

Figure 4. Linkages between food systems and GBI



Source: Re-adapted from de Bruin and Dengerink (2020)

Therefore, food systems, along with GBI, connect stakeholders from across the landscape and are an integral aspect of urban-rural linkages. Figure 4. illustrates the relationship between food systems and GBI as drivers as well as outcomes of each other. It also suggests that GBI and food system activities are influenced by common socio-economic drivers. From a landscape management perspective, the potential food system outcomes are relevant to the objectives of the landscape approach which also aims at

⁶ This study identifies the peri-urban zone to include areas within a 40 km radius from the heart of KMA. This radius was identified by Adam (2001) based on the distinction of farming systems, market and transportation systems, socio-economic variables such as indigenous/immigrant composition of the population.

biodiversity conservation, GBI preservation, livelihood security, etc. Moreover, similar to natural landscapes, food systems exist beyond jurisdictional boundaries, hence requiring a landscape management perspective to ensure that stakeholder objectives, including sustainable and healthy livelihoods, are addressed through integrated planning.

2.3 Governance of GBI

Ghana has an elaborate institutional framework to govern a wide range of natural habitats from the national to local levels. This section presents an overview of the categories of green spaces present within the landscape and the various state and non-state actors with stakes in managing them. Different green spaces including protected ecological zones, riparian land, and small pockets of urban green spaces such as parks and gardens all contribute to the maintenance of the larger GBI system. As policies targeting natural resource management are drafted at the national level, this section presents the role of spatial planning and the dual land management system, designed around a collaborative process between state and customary institutions, in realising GBI preservation at the local scale.

2.3.1 Actors governing and influencing green spaces

Ghana's National Biodiversity Strategy and Action Plan (MESTI, 2016) identifies five broad biodiversity systems; forest, agricultural, dry and sub-humid lands, inland water and coastal and marine biodiversity systems. Of these, three systems; forest, agriculture and inland water systems are abundantly present in the Kumasi landscape. The action plan identifies numerous environmental services such as watershed protection, climate regulation, carbon sequestration, and soil fertility as important attributes to biodiversity conservation. It acknowledges the dependence of over 6 million Ghanaians on various products from these ecosystems as alternative sources of income. To manage these habitats, a system of protected areas has been developed (explained below). Figure 5 indicates the various protected zones within the landscape. It is to be noted that while specific wetlands such as the Owabi reservoir and Bosomtwe lake are protected within this framework, river systems, that exist beyond jurisdictional boundaries, are protected through spatial planning policies that are implemented through local planning institutions.

Forest reserves are specially earmarked permanent protected forests. Nationally, 75% and 25% of reserves have been assigned for productive (timber) and protective purposes respectively. Access is provided through a permitting system administered by the Ministry of Lands and Forestry (MESTI, 2016). Some reserves have also been assigned the status of Globally Significant Biodiversity Areas (GSBA) and Important Bird Areas (IBA).

Wildlife reserves are designated conservation areas further categorised as strict nature reserves, national parks, wildlife sanctuaries, resource reserves, biosphere reserves, and Ramsar sites (protected wetlands). Generally, different terrestrial habitats are better represented and protected when compared to wet habitats including inland wetlands (MESTI, 2016; MESTI, 2002).

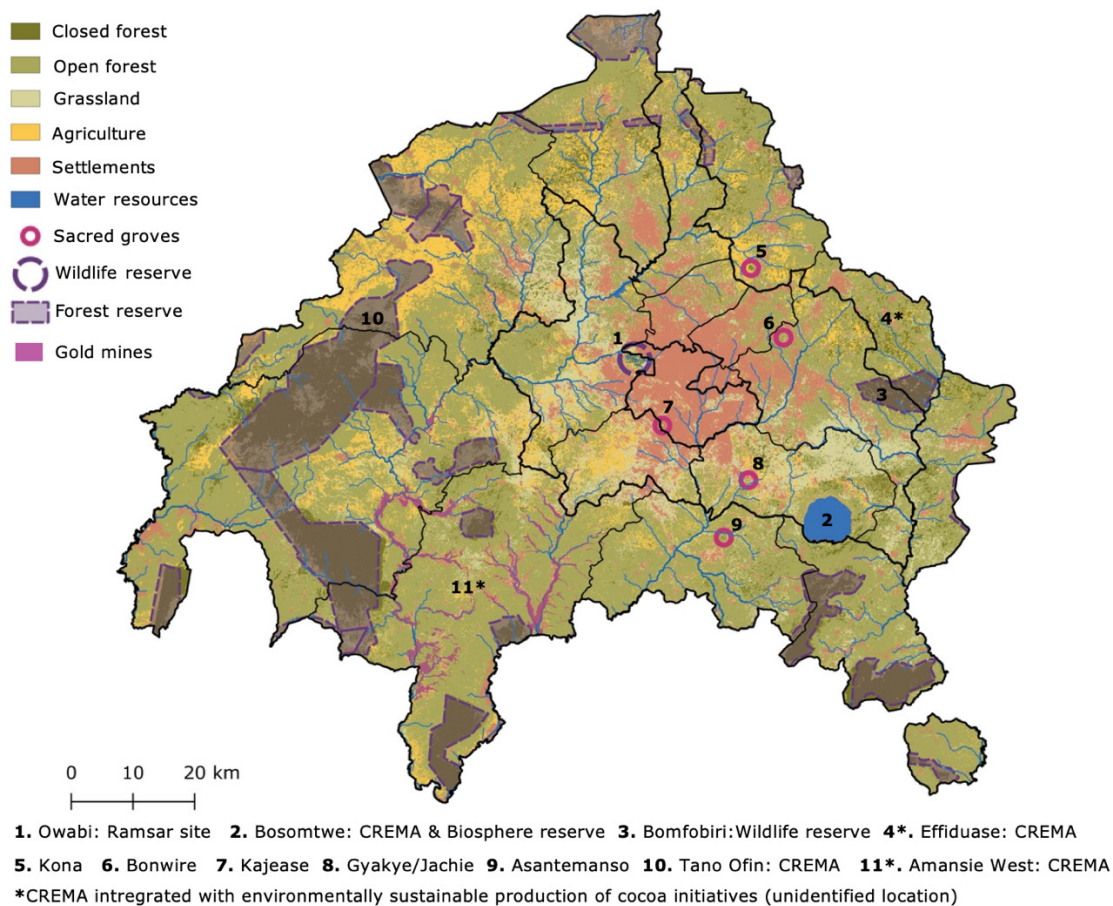
Community Resource Management Areas (CREMA) are areas designated for conservation (typically outside the protected areas system) with the active involvement of local communities. CREMA has been implemented as an integral part of the Environmentally Sustainable Production Practices in Cocoa Landscapes initiative in Ashanti (MESTI, 2018). The objectives of CREMA have also been found to be broadly in line with the objectives of the landscape approach compared to a few other initiatives in the

West African context (Foli et al, 2018). However, the concept is still evolving and is yet to be widely implemented, as the formation of CREMA typically takes at least two years.

Off Reserve Areas are those open to free access. As evident in Figure 5, the Kumasi landscape comprises mainly of these areas. They include wetlands, farmlands, open forests, and urban forests and are typically prone to rapid degradation due to extensive human intervention and exploitation. It must be noted that the Ministry of Lands and Natural Resources also controls off-reserve areas together with local governments to control deforestation and logging practices.

Sacred groves are traditionally protected areas by indigenous communities. Typically, communities preserve select ecosystems, particular species, and regulate human access to resources. Though not controlled by state institutions, they have been acknowledged as an important part of ecosystem conservation. It has been estimated that only about 1% of high canopy covers remain outside state control and sacred groves include most of it (Boadi et al, 2017). Sacred groves presented have been identified with limited data available on their locations, hence it can be assumed that their numbers are under-represented in Figure 5.

Figure 5. Categories of protected green spaces within the landscape



Sources: MESTI, 2016; MESTI, 2018; Bossart and Antwi, 2016; Darku, 2016; Google Maps, 2021

Institutions and implementing agencies - Natural resource and environmental management in Ghana are implemented mainly by agencies under four national Ministries presented in Table.1. While most of these agencies' work focuses on specific sectors (such as the Forestry Commission or the Water Resources Commission), a few possess cross-sectoral functions such as the Environment Protection Agency (EPA).

Table.1 presents a non-exhaustive list of state institutions involved in the management of the various biodiversity systems and protected area categories.

Table 1. Overview of state institutions governing green spaces and their objectives⁷

Sector	Institution, incl. ministerial embedding if applicable	Objectives
Forest and biodiversity	Forestry Commission (FC), MLNR	Conservation and regulation of utilisation of forest and associated wildlife resources
	Forest Services Division (of the FC), MLNR	Preservation of humid forests to protect river catchment zones and or cash crop production
	Wildlife Division (of the FC), MLNR	Management of all wildlife reserves for conservation and socio-economic benefits (in-situ and ex-situ)
Agriculture sector	Regional and District Agricultural Development Units, MoFA	Improve household food security; Secure agricultural livelihoods, increase farmer productivity; Coordination of state, NGO, donor and private agriculture initiatives and develop stakeholder linkages for agricultural development.
	Ghana Cocoa Board (COCOBOD) (State controlled institute)	Regulation of cocoa pricing to protect local farmers from macroeconomic fluctuations; Environmentally sustainable cocoa production practices.
	Department of Cooperatives	Facilitation and regulation of agricultural (and other) cooperatives; Generation of micro-enterprises and local leadership.
Water resources sector	Water Resources Commission and River Basin Boards, MSWR	Ensure supply of good quality of water supply from ground and surface water resources; Mitigation of hydrological events such as droughts and floods; Preservation of aquatic and dependent terrestrial ecosystems.
	Ghana Water Company Limited (GWCL), MSWR	Potable water supply and sanitation solutions for small towns and rural settlements.
	Community Water and Sanitation Agency (CWSA), MSWR	Potable water supply and sanitation solutions for small towns and rural settlements.
	Ghana Irrigation Development Authority	Efficient water management and soil conservation for livestock, farming, and aquaculture practices.
Land -use planning sector	Inland Fisheries Division (Fisheries Commission)	Sustainable management of aquatic resources for local livelihood generation. Development of aquaculture to reduce dependence on natural fish populations.
	Land-use and Spatial Planning Authority (LUSPA), (National and Regional level), MESTI	Development of sustainable, efficient, safe, and healthy human settlements.
	Town and Country Planning Department (TPCD) (At regional and district level), MESTI	Development of sustainable, efficient, safe, and healthy human settlements. Physical Planning Department (Recently established to combine TPCD and DPG)
	Department of Parks and Gardens (DPG)	Beautification of urban areas and public spaces through landscape design Physical Planning Department (Recently established to combine TPCD and DPG)

MESTI = Ministry of Environment, Science, Technology, & Innovation, MSWR = Ministry of Sanitation and Water Resources, MLNR = Ministry of Lands and Natural Resources (MLNR), MoFA = Ministry of Food and Agriculture

⁷ Sources and citations of government and organization websites are included in the References section

Non-state actors influencing GBI - Although this report focuses more on governance perspectives on GBI management, there are important non-state actors to be considered who influence GBI through formal and informal processes. The presence and type of non-state actors including NGOs, the private sector, communities, and international development organisations, varies across the urban-rural spectrum due to varying economic and socio-demographic characteristics and the type of GBI present. From the perspective of the Landscape Approach, the type and range of non-state actors is a primary consideration in implementing landscape management strategies. Peri-urban areas, for example, are home to socio-economically diverse communities and consist of a mix of primary, secondary, and tertiary economic sector activities. Hence, developing collaborative initiatives in peri-urban areas might be more complex than in predominantly rural or urban areas. Table 2. presents examples of non-state actors present in the Kumasi landscape.

Table 2. Examples of non-state actors that influence GBI

Non-state actors	Objectives/demands influencing GBI
International biodiversity development organisations (Ex. IUCN, WWF, Conservation Alliance, Rainforest Alliance, etc.)	Biodiversity conservation for its intrinsic value and ecosystem services
Other international organisations (African Timber Organisation, ITTO Fairtrade Africa, etc.)	Sustainable management of natural resources for economic development
Local NGOs (Ex. Ghana Wildlife Society, A Rocha Ghana, Friends of the Earth, etc.)	Biodiversity conservation for local socio-economic development and ecosystem services
Research institutes (Ex. BIRD, Nature Conservation Research Center, etc.)	Research on development strategies and sustainable production systems
Private sector (Ex. Mining corporations, agro-businesses, construction sector, breweries, etc.)	Exploitation of natural resources, including land, forest, minerals and water
Small-scale miners, farmers, fishermen, community (Ex. Indigenes, settlers, religious organisations, etc.)	Livelihood opportunities, alternative income sources, housing, wood-based fuels

Sources: *Clearing House Mechanism of Ghana (website), Organisation websites, BIRD*

2.3.2 Land-use planning

Of the various governing institutions, the role of land-use planning institutions is crucial for two reasons. Firstly, spatial planning is an important tool through which various policies governing GBI are realised. Secondly, though the Forest Commission retains certain powers over off-reserve areas (Baruah, 2017), local government and land-use planning institutions play a significant role in managing off-reserve landscapes, particularly in urban and peri-urban areas.

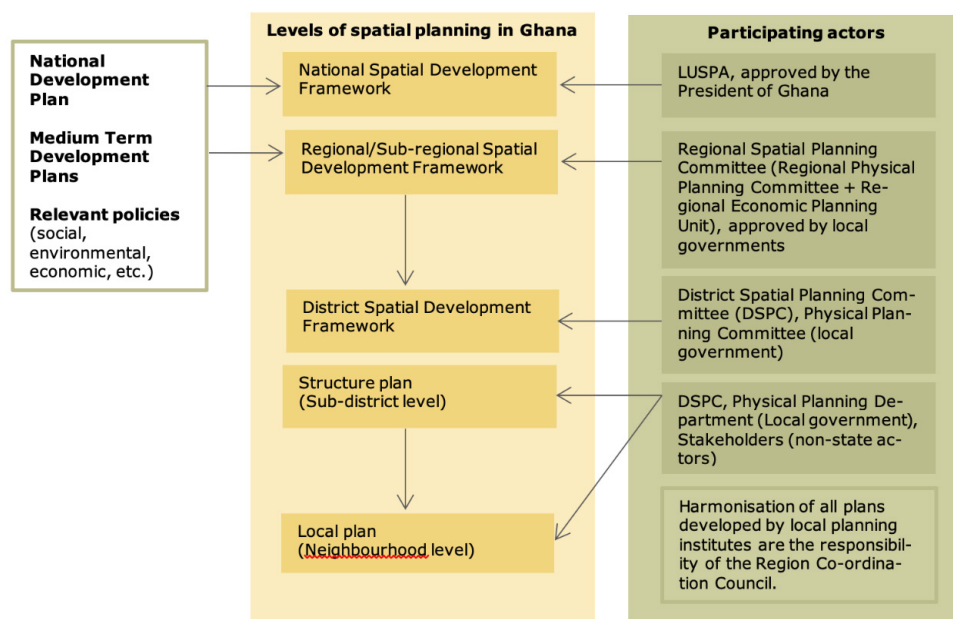
Multi-scalar land-use planning - Land-use planning in Ghana is carried out at three spatial scales: national, regional, and local. The Land-Use and Spatial Planning Authority (LUSPA) functions at the national and regional levels to oversee spatial development in line with the National Development Plan, Medium Term Development Plans and other relevant policies. The process is largely top-down, as the Spatial Development Frameworks (SDF) created at national, regional, and district levels set broad visions for social, economic, and environmental development guided by spatial development, which the Structure and Local Plans have to be integrated into (TPCD, 2011a).

The Structure Plan, developed at the district level, defines and broadly demarcates different land-uses including areas for agriculture, mixed-use areas, cultural/natural conservation areas, and transportation routes. Local land-use plans are supposed to demarcate individual land plots and designate their use.

They take into account local building by-laws and enforce details such as permitted heights and density of development. The Local Plan is also supposed to identify areas that are unfit for development such as flood-prone areas. All building and development permits are to be distributed in accordance with local land-use plans.

Scope for public participation has also been integrated with different levels of development of each framework/plan. The terms of stakeholder consultation is dictated more specifically at the Structure and Local Plan levels by the spatial planning guidelines (TPCD, 2011a). At these scales, private sector actors, customary authorities, landowners, and relevant local state sectoral institutions are mandatorily expected to be consulted. Figure 6 presents the spatial planning framework including how different actors are involved at various levels of the process.

Figure 6 Spatial planning process and associated actors



Source: Adapted from LUSPA (2011)

Zoning regulations, established by LUSPA, are statutorily enforceable guidelines to assist sustainable local land-use planning. The zoning guidelines present a more detailed categorisation of green spaces within human settlements. In addition to ecosystem services, urban green spaces are primarily valued for their aesthetic and recreational purposes by governing institutions. The Zoning Regulations (LUSPA, 2011b) categorises green spaces as follows:

- **Public Open Space Zones** include designated gardens, parks, children’s playgrounds, and buffer zones between industrial and other land-uses.
- **Protected Coastal Zones** aim to protect land surrounding surface water resources (as required by the Water Resource Commission’s Buffer Zone Policy.)
- **Conservation Zones** include, but are not limited to, the various protected areas discussed in section 2.3.1. Other such zones include areas of historical and cultural significance.

The described spatial planning and zoning regulations are applicable to land owned by customary authorities. The following sections describe who customary actors are and what their role is in customary land management.

2.3.3 Customary institutions

Customary land tenure - The complexity of land administration in Ghana is attributed to overlapping systems of customary and statutory laws. Customary land is owned by indigenous communities and land rights are administered with traditional laws through traditionally appointed decision-makers (or chiefs). Customary tenure is defined by communal tenure which implies that communities collectively possess exclusive rights to own and manage natural resources such as land, water, and forests. Boundaries of customary land are often defined to allow the community to exclude outsiders in order to protect the community's exclusive rights (Andersen, 2011).

Typically, in customary land tenure systems, an entity's access to land is linked to their negotiating power determined by their socio-political identity (Ubink, 2008a). While some scholars maintain that customary land tenure presents equality, as access to land is not determined by an entity's financial capacity, others argue that the system places some actors at a better bargaining position than others, hence leading to unequal access to land. Some scholars also suggest that the negotiability of customary tenure presents tenure insecurity, leading to actor unwillingness to invest, hence resulting in the inefficient and unsustainable use of land (Ubink, 2008a).

Akan land traditions - In Ashanti, customary land has been ruled by the Asante empire, the throne of which is located in Kumasi. The Asante people are a part of the Akan ethnic group, the predominant cultural group found in southern Ghana. Akan land laws are maintained through a hierarchy of chieftaincies managed by the Traditional Council comprising the Paramount Chief, divisional chiefs, and village chiefs. Heads of households from each village's community are also important actors within the customary process (Arko-Adjei, 2011). In the Akan tradition, land is organised into chiefdoms that are held in trust by chiefs on behalf of communities. Territorial disputes between chiefs, and between communities and chiefs are to be resolved by the Asante King (or the *Asantehene*) (Ubink, 2008b).

Ecological conservation - Customarily, important ecological elements such as rivers and forests were protected by numerous traditional practices. Examples of such practices include the establishment of sacred groves, religious norms restricting destructive land-use activities in ecologically sensitive areas, categorisation of activities that were permitted in upstream and downstream riparian zones, and even restrictions on visiting forests and rivers on certain days of the week (MESTI, 2016; Agyenim and Gupta, 2010). The intrinsic value of human-nature relationships and utilisation of natural resources as upheld by customary practices is increasingly recognised to have lasting positive impacts on biodiversity. Globally, indigenous communities have been known to protect ecosystems from exploitation for economic gain (Forest Peoples Programme, 2020). Historically, the Akan tradition of land management has been a part and parcel of people's way of life, and the essential purpose of these traditions is to preserve natural resources for generations to come (Arko-Adjei, 2011). However, customary structures and land practices have evolved with economic and cultural changes brought about by colonialism and urbanisation.

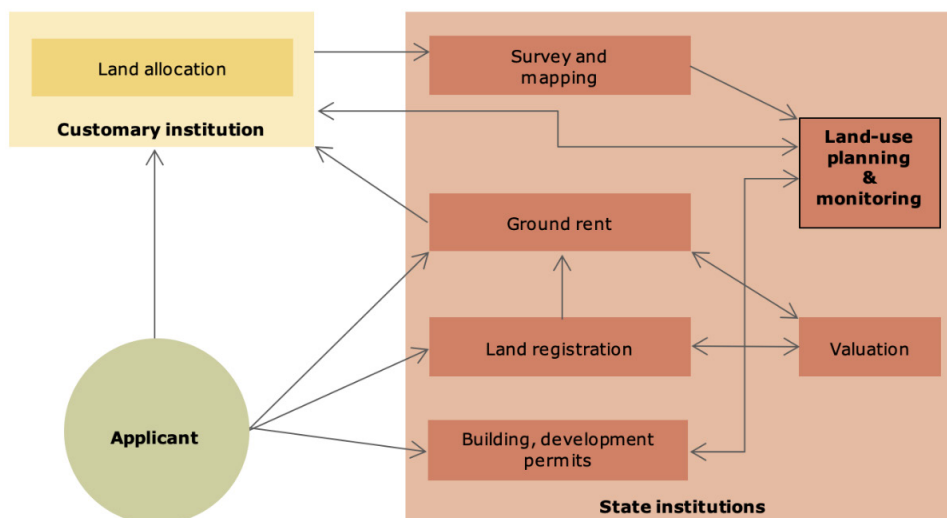
Customary institutions today - Compared to other African nations, the traditional authorities of Ghana are exceptionally powerful, controlling about 80% of the nation's land today (Ubink, 2008a). Customary law was recognised in 1992 by the Constitution of Ghana, establishing the Traditional Councils, and Regional and National Houses of Chiefs. The Traditional councils, headed by Paramount Chiefs, are composed of divisional and village chiefs. They facilitate decision-making between customary communities and local governments, handle land and chieftaincy disputes with an exemption to issues relating to paramount chief (Arko-Adjei, 2011). The Regional Houses of Chiefs consist of Paramount Chiefs and some Traditional Council members. They manage the nomination and disposition of chiefs at different governing levels including Paramount Chiefs (Arko-Adjei, 2011). Finally, the National House of

Chiefs links customary institutions to the executive, parliament, and judiciary. It regulates customary law, resolves chieftaincy issues, and gazettes appointed Paramount Chiefs. It constitutes five internally elected Paramount Chiefs from each of the ten regions in Ghana to represents customary institutions in land management in national interest (Arko-Adjei, 2011).

2.3.4 Dual land management system

In light of these overlapping systems of land governance, the dual land management system presents a collaborative process through which customary land is developed formally and in line with land-use planning established by the state. This process presents the final component of the land management system and is crucial to local implementation of broader goals of green preservation. It also lays the route through which individuals and private entities outside indigenous communities can gain access to customary land. Figure 7 summarises the administrative responsibilities of local customary and state land institutions. While the responsibility of customary land allocation lies with customary actors, all development is required to occur in line with state land regulations and planning. This implies that citizens/developers are required to negotiate directly with customary authorities to lease a given parcel of customary land, while valuation, land registration, and development permits are offered by the government (Arko-Adjei, 2011).

Figure 7 Dual land administration: institutional functions



Source: Re-adapted from Arko-Adjei (2011)

3 Impact of peri-urban dynamics on GBI

The Kumasi landscape presents a wide range of development patterns and challenges. KMA and its surrounding urban agglomeration is the most dominant spatial feature in the region. In the absence of comparable urban competition within Ashanti, Kumasi's growth displays monocentric development. The city is also at the converging point of seven major highways, leading to ribbon development patterns characterised by growing demographic and built-up densities along key transport corridors (Oduro et al, 2014). Within the outer ring, the landscape is dominated by forests and farmland. In peri-urban districts, natural, agricultural, and urban ecosystems co-exist and influence each other, producing distinctive features both structurally (land-use, population distribution, morphology, etc.) and functionally (linkages in transportation, production-consumption, etc.) (Allen, 2003; Amirinejad et al, 2018).

This chapter presents an overview of various institutional, economic, and sociocultural processes that shape peri-urban land-use dynamics and the consequent loss of GBI across the landscape, but with a particular focus on the three focus districts within the GKSR studied through the six student theses developed around specific themes linked to GBI⁸. Additionally, this chapter draws on data from academic literature, policy documents, and other government reports to reflect upon differences in socio-economic dynamics between the rings.

Relevance of case studies

The three focus districts, Afigya Kwabre South (AKS), Kwabre East (KE), and Asakore Mampong (AM) were chosen to employ a case study strategy due to the contemporary nature of the phenomenon under study and the inseparability of the phenomenon from the context itself (Yin, 2018). The selection of districts was motivated primarily by the visibility of various challenges in planning and managing green spaces due to the high degree of contestations over land observed within the GKSR. Tensions between governing actors and competition between diverse land-uses observed in these districts could be expected to occur in regions that are now predominantly rural and could pose a threat to conservation efforts with the expansion of urban settlements. Moreover, the case studies allowed for diversification of data sources in the Ghanaian context where informality prevails in key sectors including in land markets, water, and housing, and therefore secondary data is often difficult to obtain.

Research limitations

The choice of case studies presents limitations due to the type of GBI and actors present, a dynamic that varies considerably in the outer-ring comprising of more reserved forests controlled by different institutions (than in the GKSR), and where the pressures on GBI are driven by different types of human activities (ex. agriculture and mining). Although the report compares certain features of development in urban, peri-urban, and rural areas, a more detailed discussion on institutional, economic, and sociocultural dynamics is presented based on data and literature from the GKSR. Finally, datasets presented in this report are obtained from different years. For instance, Landsat images are from 2000 and 2015, census data is from 2010, mining areas have been mapped based on satellite imagery from 2019-2020, and most of the reviewed Medium-Term Development Plans (MTDPs) were drafted in the

⁸ Refer Appendix 1 for student thesis topics

year 2013 for the years 2014–2017. In a region as dynamic as the Kumasi landscape, even a duration of five years can present considerable changes in development.

3.1 GBI and peri-urban morphology

The stark contrast in urban, peri-urban, and rural morphologies is portrayed in Figure 8. The difference in settlement densities between KMA and its surrounding districts is evident in the upper part of Figure 8. Organisation patterns of emerging residential development vary, but their sprawling characteristic is commonly observed. Roads, major and minor, are seen to intersect waterways and forested areas. Major roads are often designed over bridges to permit water flow, whereas minor roads in many places are observed to be built over filled-up bunds. It is also worth noting that several minor roads emerge spontaneously with emerging residential areas that are a result of informal development discussed later in this chapter (Amoateng et al, 2013). Extractive land-uses, typical of peri-urban areas due to the growing construction industry, include stone quarrying and sand mining along rivers and are commonly observed (Allen et al, 1999). As seen through the lower part of Figure 8, rural settlements and small towns are observed near road infrastructure, and in certain districts, along small-scale gold mines. These settlements are also observed to be denser than peri-urban settlements. Riparian land in the outer ring is generally free of built development, but tree crops (oil palm in this case) and gold mines are observed near riverbanks.

Within the focus districts, (Figure 9a and Figure 9b), forested land mainly exists as natural landscapes often along waterways. They also exist in pockets as public open spaces such as urban parks, children's playgrounds, cemeteries, and institutional land-uses. AKS and portions of KE fall within important water catchment areas feeding directly into the Owabi and Barekese reservoirs which serve as Kumasi's primary potable water sources. Waterways are an integral aspect of the interconnectedness of the urban-rural continuum. Most green spaces within the focus districts fall outside the protected area system discussed in section 2.3.1. However, land along some of the major rivers is supposed to be protected by the Buffer Zone Policy, categorised as Protected Coastal Zones through the Zoning Regulations and implemented through local land-use plans. Hence the management of natural landscapes in the focus districts along with public open spaces is primarily the responsibility of local planning authorities.

At the scale presented in Figure 9a and 9b, it is evident how KMA's monocentric and ribbon development has led to the drastic depletion of the region's forests and its intricate network of waterways. Other than a few exceptions of roads which seem to synchronise with the natural topography, roads and adjoining development grow into and divide existing GBI. The maps also indicate the relationship between agricultural development and built elements. In Kumasi and other major urban centres in Ghana, a considerable amount of peri-urban production of nutrition-rich vegetables and dairy caters to urban markets (Drechsel et al, 2007). The link between urban markets and peri-urban food production is evident through the concentration of farmlands along the fringe of settlements and minor roads (Figure 9a). By 2015, however, agricultural land too is observed to have undergone considerable fragmentation and displacement towards the northern boundaries of AKS and KE (Figure 9b). Sprawling urbanisation within watersheds and increasing distances between food production and consumption areas are examples of the impact of peri-urban growth patterns on urban ecological footprint. The peri-urban interface, therefore, is an important area for planning interventions and its growth pattern can determine many aspects of regional sustainability.

Figure 8: Peri-urban morphologies within the GKSr

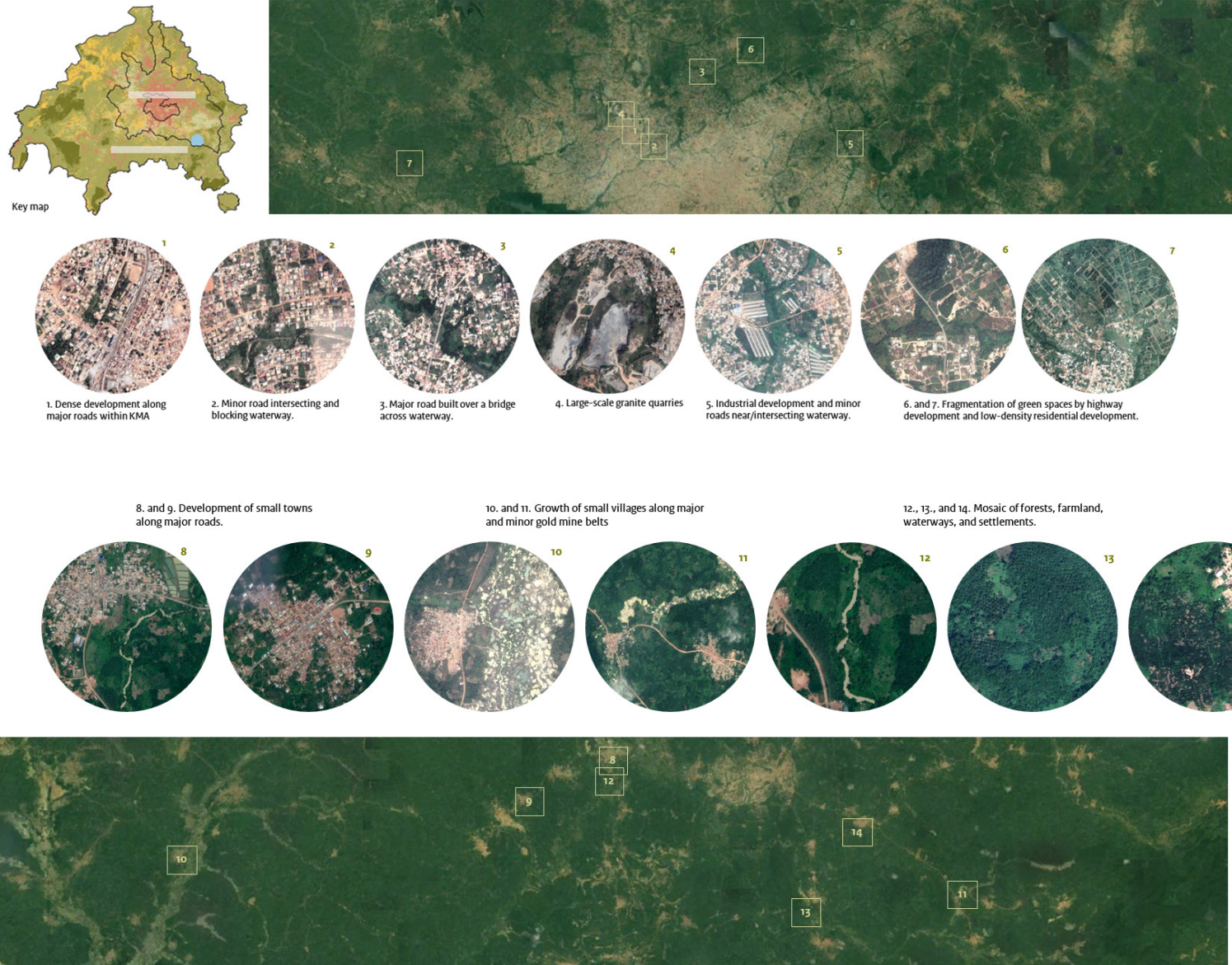


Figure 9a Land-use in focus districts in 2000

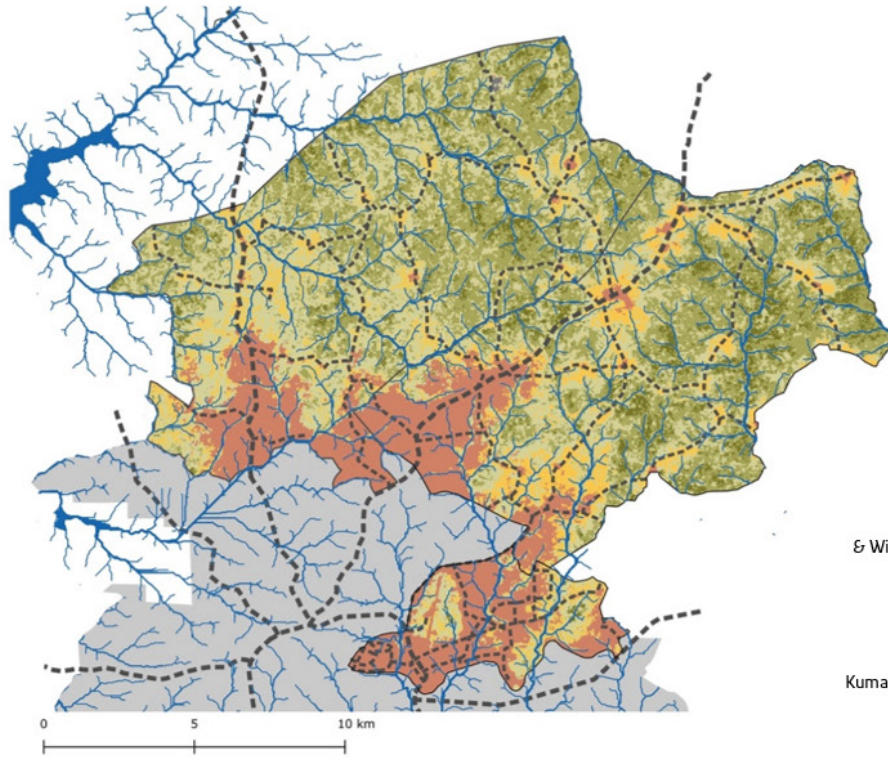
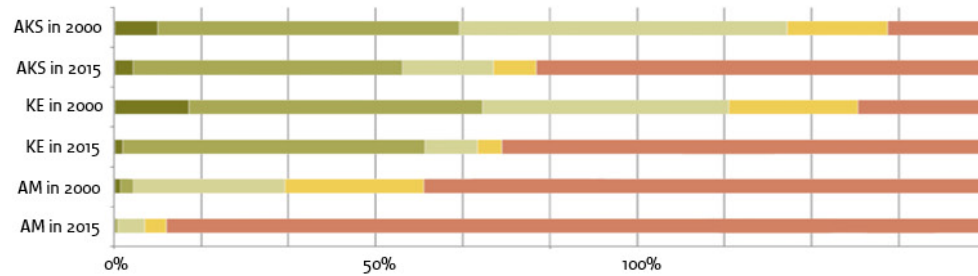
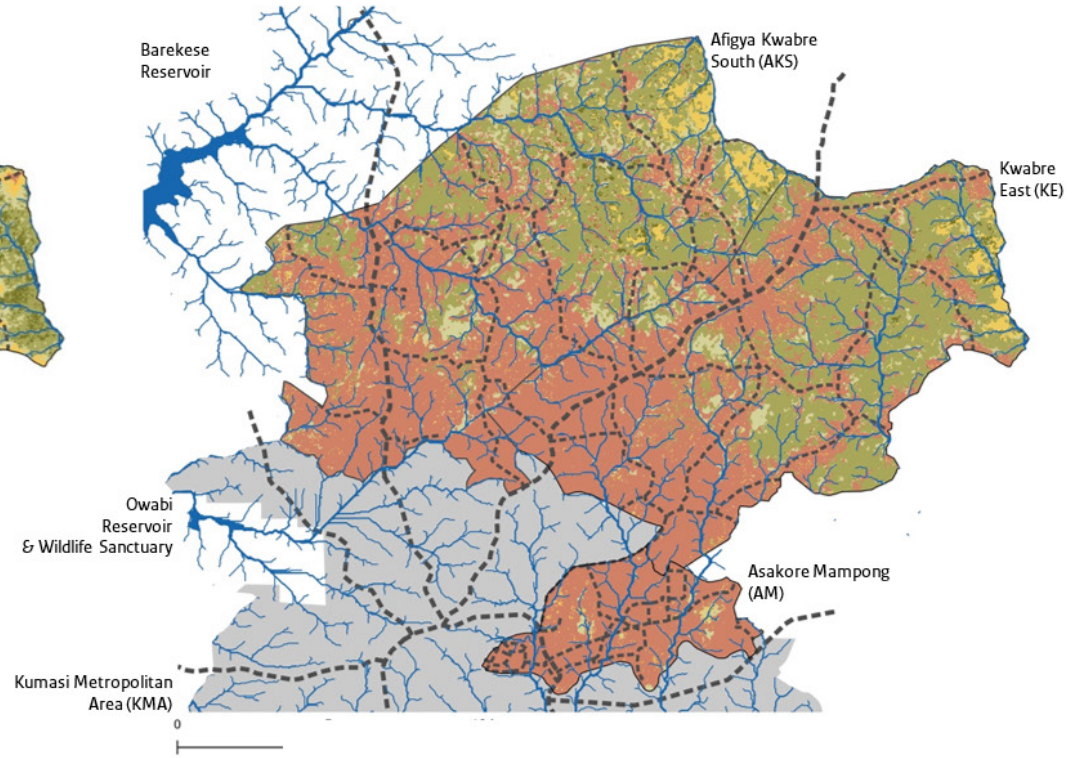


Figure 9b Land-use in focus districts in 2015



Sources: PBL and Forestry Commission

3.2 Influence of institutional dynamics on GBI

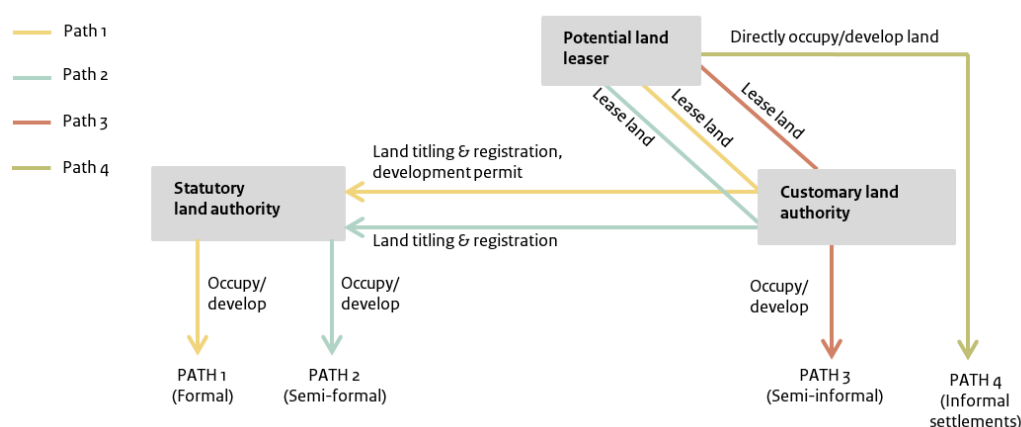
Institutional complexity and local land governance challenges are important drivers of the loss of GBI. Through discussions with actors representing academic, private, statutory, and customary institutions, the student theses identify gaps and trends in the dual land management system, spatial planning arrangements, and the water management system that challenge sustainable development.

3.2.1 Dual land administrative system

The dual land management system is foundational in implementing spatial planning. Section 2.3.4 explains the theoretical functioning of the system. In reality, however, land development occurs through semi-informal and informal processes too (Figure 10), the implications of which are numerous. Primarily, governing institutions lose control over how spatial development occurs. Moreover, swiftly developing built environments are challenging to monitor and the lack of data on key development characteristics may impact the effectiveness of responsive development strategies and policies (Amirinejad et al, 2018).

The student theses identify important ambiguities produced by the complexity of the dual land management system that contribute to (semi-)informal development. Fundamentally, the recognition of state *and* customary institutions as the ultimate owners of land broadens the scope of interpreting the different legal frameworks through which the declaration of rights and assignment of values over specific territories are established (Boamah and Amoako, 2020). Moreover, when customary and statutory land laws are constitutionally on par with each other, implementing statutory land regulations over land owned by customary actors becomes a challenge (Takyi, 2020; Calvelo, 2020).

Figure 10 Peri-urban land development – formal, semi-informal, and informal development processes



Source: Re-adapted from Boamah and Amoako (2020)

The complexity of institutional arrangements is a possible contributor to a lack of clarity among the public regarding the roles and responsibilities of different institutions. While the role of chiefs as land allocators is widely acknowledged, awareness of development regulations has generally been observed to be poor among communities. For example, in a survey conducted in AKS, leasers of customary land displayed uncertainty regarding development/building permits among other factors concerning institutional responsibility (Islam, 2020). State authorities in AKS also indicated that citizens are often unaware of the legal implications of constructing on riparian buffer zones (Nesi, 2021). Similar challenges

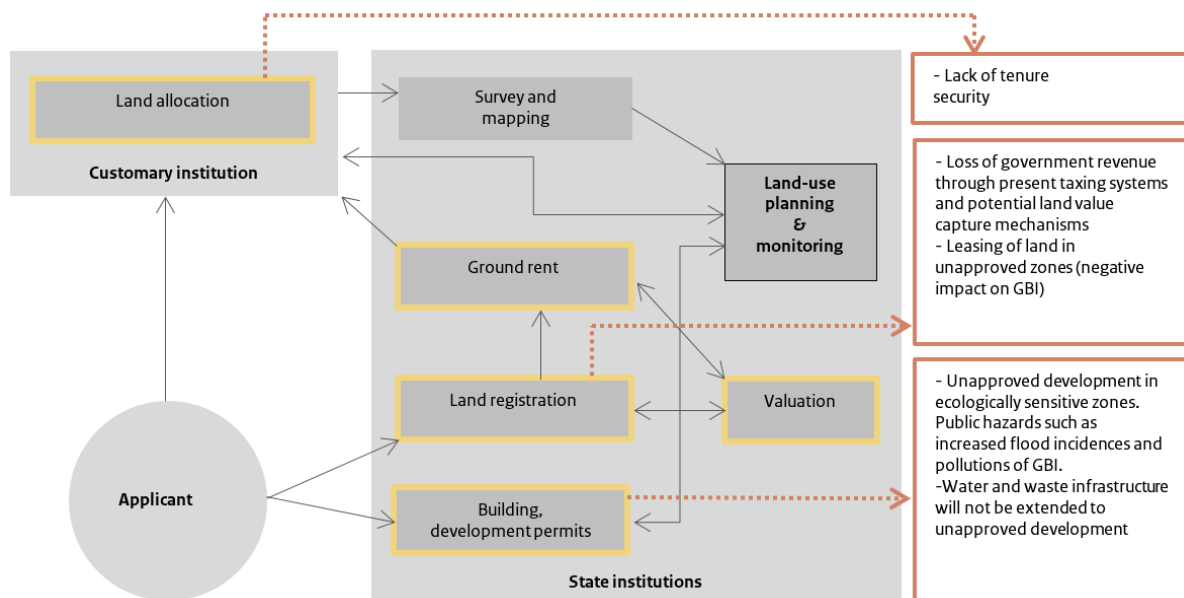
were observed in the outer ring too; a survey of eight neighbourhoods in the Offinso South district reveals that almost 60% of residential development lacks state permits (Boamah, 2013). Moreover, data from the student theses demonstrates that informal and semi-formal processes apply to commercial, agricultural, as well as residential development.

Several state actors and academics interviewed in the focus districts supported the need to actively build public legibility of land administration processes (Takyi, 2020). It is worth noting that land administration is challenged in rural settlements too by the lack of land transaction records and registrations (Biitir et al, 2017; Afriyie et al, 2014). However, in the peri-urban zone characterised by booming land markets, minimal regulatory control drives the growth of urban sprawl, uneven access to land, and the loss of GBI and agricultural land.

On the one hand, there is the issue of ‘encroachment’ driven partially by a lack of citizen awareness on state regulations, and on the other hand, there is a need for institutional cooperation to ensure ecologically sensitive areas are not leased out for destructive land-uses. However, it is worth noting here what Ubink (2008b) refers to as “a policy of non-interference”, due to an openly expressed unwillingness of top state representatives to interfere with customary institutions, arguing that customary rule allows democratic procedures through which communities can question and hold chiefs accountable for their actions. This is an example of how negligence of urgent development issues can occur in the presence of overlapping legal frameworks upheld by (semi-)independent and equally powerful institutions.

Figure 11 is a re-adaptation of Figure 7, demonstrating key outcomes of (semi-)informal development processes. Yellow boxes are mandatory operations that the land-lease applicant must participate in. Red boxes present the implications of non-compliance in participating in certain operations. The obstacles in ‘survey and mapping’, an operation which involves the participation of planning institutions and land allocators, are discussed in the following section.

Figure 11 Implications of non-compliance with land administration operations



Source: PBL

3.2.2 Spatial planning

Spatial planning and land-use planning, can help make living environments healthy and efficient by balancing competing uses of land (Boamah, 2013). However, urban growth patterns within the GKSR are characterised by inadequate housing, water insecurity, depleting green spaces, traffic congestion, and expanses of uncontrolled sprawl (Cobbinah et al, 2020). In addition to land governance challenges, peri-urban sprawl is driven by gaps in regulatory frameworks built around land-use planning, and a lack of integrated urban management (Masoumi et al, 2018).

Planning for rapid growth – Effective and timely land-use planning is outpaced by rapid urban agglomeration due to several factors. Challenges in land administration aside, local planning institutions lack the necessary financial and human resources to implement anticipatory land-use and infrastructure planning and provision (Afrane and Asamoah, 2016; Cobbinah and Amoako, 2012). Within the landscape, over 30% of districts/municipalities are not supported by town-planning officers (JICA, 2013). A general pattern of growth is observed to be as such: when there is increasing demand for land in an area, the respective local chief/landowner approaches the Town and Country Planning Department (TPCD) and the Survey Department to prepare a land-use plan for that area. When these departments are unable to perform these tasks, landowners tend to fall back on private surveyors who create a layout of plots which is unapproved by planning institutions. When unapproved layouts are allocated to home/commercial builders, development permits cannot be obtained (Afrane and Asamoah, 2016). Without government intervention, the sale/leasing of plots for low-density development is encouraged.

An evaluation of Kwabre East's (KE) land-use planning practices revealed that even at the sub-regional structure planning level, local institutions are unable to update structure plans to cater to contemporary needs, an exercise that is mandated to be conducted every five years. State and academic actors in KE pointed out that structure plans are occasionally altered to rezone public open spaces for residential/commercial uses through means of corruption motivated by the associated economic gain (Takyi, 2020).

Enforcement of land-use regulations – In areas where land-use and structure plans exist, enforcing land-use regulations, particularly those to protect urban green spaces, is often challenging. Regulations to manage urban green spaces are spread across various legislations including the Land Use and Spatial Planning Act (2016), the Local Governance Act (2016), Environmental Assessment Regulations (1994), and the Zoning Guidelines and Planning Standards (Takyi, 2020). An assessment of planning practices in KE revealed that regulations protecting green spaces tend to be relaxed in regions with high urban demand for land, compared to forest reserves in rural areas (Takyi, 2020), that are clearly demarcated and controlled directly by the Forestry Commission. Takyi's (2020) study also reveals that green spaces are not prioritised due to a high demand for land for emerging urban land-uses within KE.

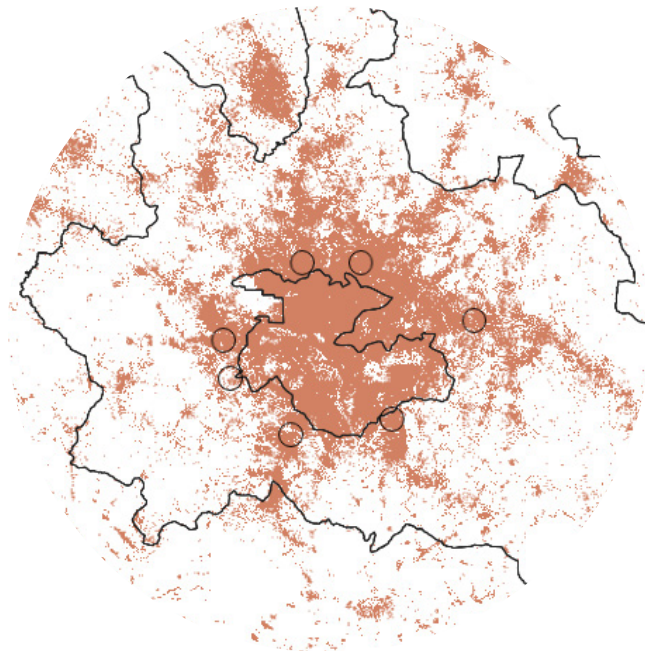
Despite the presence of regulations to address offences such as encroachment into designated green spaces with monetary fines and imprisonment, the prevalence of offences has been attributed to a lack of public awareness concerning land-use regulations and planning. Moreover, offenders are rarely held accountable due to tedious legal procedures, and in cases when they have been, political interferences to protect offenders have been observed. Finally, as regulations are dispersed across legislations, local government representatives expressed the need for a more coherent policy aimed exclusively at the preservation of urban green spaces to avoid regulatory gaps and overlaps (Takyi, 2020).

Impacts of metropolisation vs dispersed urbanisation – The broader spatial growth pattern of Kumasi is also an important factor in how planning institutions are challenged. Kumasi's monocentric and

ribbon development contributes to metropolisation as opposed to dispersed urban growth where multiple connected urban centres simultaneously grow at a comparable pace. Generally, dispersed patterns of urbanisation are considered to offer liveable environments and opportunities for equitable growth, whereas poverty reduction in large cities is more of a challenge (de Bruin and Dengerink, 2020). Importantly, dispersed urbanisation provides better connectivity between urban and rural areas that contribute positively to agricultural livelihoods, increased food security (de Bruin and Dengerink, 2020) and better access to natural landscapes for urban residents.

KMA's Medium Term Development Plan (2018-21) recognises the challenges of its highly centralised spatial growth, and discusses the potentials of a 'multiple nucleus urban structure'. The model identifies six suburban centres (Figure 12) within a 10-15 km radius from the city centre to be connected by an outer-ring road. However, as the identified suburban centres are located within areas that are already highly urbanised, the proposed model may encourage further radial growth and cause further loss of GBI within the GKSR.

Figure 1. Multi-nuclei urban structure



Source: KMA MTDP 2018-21

3.2.3 Water resource management

The Kumasi landscape is connected by rivers Offin, Oda, and Anum, tributaries of river Pra (Figure 13). With the adoption of the Integrated Water Resource Management (IWRM) approach, water management came to be organised on the basis of river basins. At the national and basin level, the Water Resources Commission (WRC) is the primary institution in control and management of surface and ground water resources. Quartered in Kumasi, the Pra-Offin basin office hosts the Upper Pra sub-Committee which represents many state and non-state stakeholders (Duncan et al, 2019) discussed further in section 3.5.

Impact of land-uses on water quality - The protection of water resources through spatial planning is one of the key objectives of the IWRM Pra River Basin plan. The plan identifies the Forestry Commission as the body responsible for improved land management in collaboration with local planning institutes, other environmental state bodies (such as MoFA and EPA), and NGOs (WRC, 2012). Additionally, the

Buffer Zone Policy recommends the establishment of protected zones around surface water resources through a management plan drafted by a team representing environmental professionals, local planning institutions, civil society, traditional authorities and other relevant stakeholders (MWRWH, 2013). Based on the management plan, local land-use maps demarcating the extent of protected areas and other measures are supposed to be prepared by the respective local governments.

However, the enforcement of buffer zones has been challenged in peri-urban districts, firstly, by land management processes discussed in section 3.2.1. Building encroachment into riverbeds is common sight, especially in densely built-up areas such as Asakore Mampong. The second challenge is the inadequacy of solid and sanitary waste management. Water quality reports from AM and AKS evidence a high rate of bacterial contamination in waterways, attributed to poor sanitation facilities in residential areas. Commercial development such as fuel stations and automobile mechanics located along wetlands are also a major contributor to river pollution (Nesi, 2021). Groundwater too has been found with low micro-biological quality in select low-income communities serviced by communal toilets without treatment facilities (Aboagye and Zume, 2019). Small-scale industries, including wood-processers and water packaging businesses, located along tributaries of the Oda river, use the river as a means of waste disposal. Many of these industries employ migrant workers who are accommodated in slums with poor sanitation facilities near the rivers (Ahmed and Dinye, 2012). In the outer ring, small-scale gold mining in south-western districts has caused heavy river and groundwater pollution due to prevalent use of mercury (Awatey, 2014).

Figure 13 Watersheds within the Kumasi landscape



Source: PBL

Regulation of water use - Public water services are provided by the Ghana Water Company Limited (GWCL) in urban areas and the Community Water and Sanitation Agency (CWSA) in small towns and rural areas. These agencies are challenged firstly by having to provide infrastructure at the same pace of peri-urban growth; secondly, the categorisation of rapidly growing peri-urban settlements as rural or urban challenges effective allocation of institutional responsibility. The limited presence of public utility services in peri-urban areas has paved way for informal water markets and other mechanisms of unmonitored water usage (Nesi, 2021).

In contrast to state recognition of customary ownership over land resources, the Water Resources Commission (WRC) Act (1996) declared state ownership over surface and ground water resources, requiring entities to obtain formal rights prior to extraction or utilisation of ground and surface water resources. In reality, state regulation over water utilisation is seldom observed in peri-urban districts. WRC's water registers between the years 2012-2019 demonstrate that water rights are usually obtained only by large-scale commercial establishments such as mining and agro-based companies. In the inner ring, where the majority of water users are individual households and small-scale commercial set-ups, regulating water usage is challenging.

In the focus districts, sprawling residential development is mainly supported by groundwater accessed through unregistered boreholes, particularly amidst middle and high-income communities. Water markets function mainly through the informal commercialisation of private boreholes, water tankers, and packaged drinking water distribution (Nesi, 2021). Table 3. presents the disparity in public water services between KMA and the inner ring of districts (GKSR excluding KMA). Discussions with state and academic water experts suggest that commercial and industrial water needs too are largely met by private boreholes. Agriculture, on the other hand, was found to be dependent on polluted wetlands for irrigation, partially due to the unaffordability of commercial and public sources (Nesi, 2021).

Table 3: Household drinking water sources

	KMA	GKSR	GKSR urban (excluding KMA)	GKSR rural
Pipe-borne water	67.1%	55.5%	23.9%	18.5%
Public standpipe/tap	7.9%	8.5%	10.5%	10.1%
Private borehole/tube well	12.1%	21.2%	37.3%	54.1%
Private protected well	6.3%	8.1%	21.2%	10.3%
Water market	5.4%	5.1%	5.9%	2.6%
Surface water resource	0.2%	0.7%	0.4%	3%
Rainwater harvesting	0.1%	0.1%	0.1%	0.2%
Other	0.8%	0.8%	0.7%	1.2%

Source: Acheampong, 2013 (Data from Ghana Statistical Services)

Ground and surface water resources interact and contribute significantly to the biological and nutritional composition of rivers and streams (Brunke and Gonser, 1997). On the one hand, water pollution, particularly of surface resources, is driven by the current status of land-use planning. On the other hand, limited regulation drives the exploitation of groundwater, which is harder to monitor than surface resources. With time, current patterns of development can threaten regional water security, further exacerbated by climate change.

3.2.4 Local government environmental planning

Several national institutions and agencies have been established to govern natural resources in their various forms. To investigate the role of local governments in guiding environmental planning, district/municipality Medium Term Development Plans (2014-2017 - MTDPs) were reviewed. MTDPs are used to set a 3-year development agenda including through a detailed action plan. They are drafted by local governments and are approved by the Regional Coordinating Council (RCC) who oversee intersectoral, and multi-scalar integration in planning.

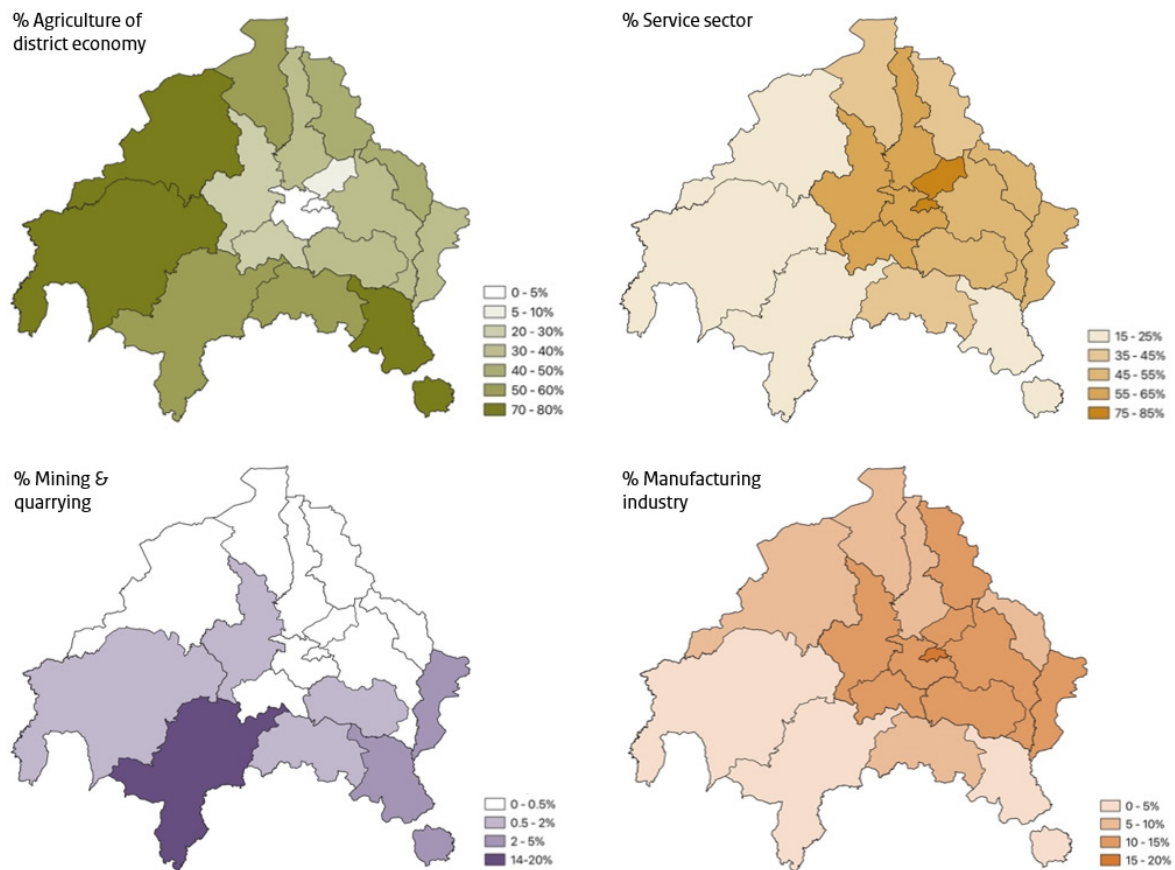
In KMA and the inner ring, environmental planning broadly focused on waste management services and tree-planting along rivers, sand mines, and within settlements. In the outer ring of districts, more actions were targeted directly at natural resource management with afforestation programmes on larger tracts of land, reclamation of abandoned mines, and regulating and improving small-scale mining practices. Agricultural development was supported in inner and outer rings by actions ranging from farmer education on responsible chemical farming, sustainable agro-forestry, business development, etc. Awareness programmes were also planned to increase community knowledge on natural disasters, climate change, and green economy (NDPC, 2019). (However, the implementation of environmental initiatives is challenged by current trends of local government finance, discussed further in section 3.3.1.)

Further, several districts' MTDPs presented an assessment of environmental impacts of key actions planned in the various development sectors through tools such as Strategic Environmental Assessment (SEA). While the attempt to mainstream sustainability in development planning is encouraging, mitigation measures (to offset the impact of potentially damaging actions) and environmental initiatives often seem to be proposed as stand-alone actions as opposed to being tied by a broader strategy. Moreover, the integration of environmental planning between neighbouring districts was also broadly absent in most MTDPs. However, the general local government interest toward increasing agricultural storage, market infrastructure, and feeder roads to better connect rural settlements could significantly improve rural-urban linkages (NDPC, 2019).

3.3 Influence of economic dynamics on GBI

The Kumasi landscape hosts a wide range of economic activities that vary distinctly between the GKS and the outer ring of districts. Figure 14 depicts the dominance of the primary economic sector in the outer ring of districts which produce timber, cocoa, staples, and commercial food crops. Gold mining and sand and stone quarrying is more prominent in some of the south-western districts.

Figure 14 Composition of district economic activities



Source: 2010 Census data (NDPC, 2019)

The GKSR, on the other hand, is dominated primarily by the tertiary sector consisting of services such as construction, hospitality, trade and retail, healthcare, education, etc. The secondary sector consisting mostly of small and medium sized manufacturing industries (textile, food & wood processing, etc.) is also an important contributor to GKSR's economy. Seen together, the maps present how the inner ring of districts experience a significant mix of primary, secondary, and tertiary economic activities.

While these various economic activities threaten GBI through pollution and extractive processes, the threat to GBI from urban spatial expansion occurs through more complex economic processes. At the urban fringe, land-use patterns are determined by the nature of land markets. A well-regulated land market can produce compact settlements, affordable housing, and considerable local government revenue. However, in the Kumasi landscape, peri-urbanisation is characterised by residential sprawl, unaffordable land prices, and local governance challenged by limited financial resources. This section presents current trends of local government finance, followed by an overview of the impact of land value dynamics, residential real estate, and housing characteristics on GBI and food systems.

3.3.1 Local government finance

The financial capacity of local governments in the Kumasi landscape is a central challenge to protecting green spaces. Local governments are often unable to meet their revenue targets, and rely considerably on financial transfers from the central government or other donors (NDPC, 2019; JICA, 2013). Due to their limited budgets, local governments are forced to prioritise the more urgent development needs with short-term actions. Therefore, despite the inclusion of actions towards natural resource management

and agricultural development in the 2014-2017 MTDPs, a review of the 2015 local government budgets reveals that environmental sectors are not prioritised (NDPC, 2019).

Impact of low revenue generation - The 2015 composite budgets of districts within the Kumasi landscape reveal that most of the budget is allocated for government administration, steps to increase revenue generation, education, health, and in some districts for public works such as water infrastructure (NDPC, 2019). Agricultural development was allocated an average of only 4% in the outer ring of districts, despite being a dominant economic sector and land-use. Natural resource management was allocated no funds in over 85% of districts/municipalities within the landscape (NDPC, 2019). Within the focus districts, state actors indicated that funds are not allocated exclusively to enforce land-use plans and zoning regulations. Further, local planning institutions often support the conversion of green spaces to land-uses that can generate more government revenue (Kaumba, 2020). In fact, even grave environmental impacts driven by small-scale goldmining are ignored by local authorities as they depend on revenue from such economic activities (Awatey, 2014).

Revenue from land value increments - In many African nations, land value capture mechanisms have been utilised to fund the preservation of GBI (Kaumba, 2020). The concept of land value capture is essentially for governments to gain from the increasing land values perpetuated by externalities (as opposed to an increase in value due to the landowner's investment) and that these gains be redistributed for public benefit (German and Bernstein, 2018). Currently in Ghana, land revenue is collected through property taxes and ground rents. However, tax on property does not effectively capture the increment in land values (Biitir, 2019), and ground rent can only be collected from registered land-leasers. Due to the prevalence of unregistered land in the peri-urban context, local governments do not benefit substantially from rapidly increasing peri-urban land values (Kaumba, 2020). However, 2014-2017 MTDPs reveal that local governments are working towards increasing land and property registrations to increase government revenue. While these efforts are encouraging, the challenge would be to allocate land revenue specifically for the preservation of GBI in a context where local governments are strained by a wide range of equally urgent priorities. Moreover, current trends of development prioritisation seem to imply that governing actors see the choice between GBI and other priorities as a (short-term) trade-off, instead of developing long-term win-win strategies towards climate and nature-inclusive development.

3.3.2 Increasing monetary value of peri-urban land

Peri-urbanisation is a direct result of rising metropolitan land values, prompting an increase in demand for peri-urban land. Peri-urban land-use change and competition over land for a variety of emerging uses trigger active real-estate markets and rising land values (Cobbinah and Amoako, 2012; Gaisie et al, 2020). Land value increments in the focus districts (KE and AM) between the years 2009 and 2019 illustrate how emerging urban land-uses greatly outweigh agricultural land-use (Kaumba, 2020).

Table 4. indicates that while industrial land-use is valued the highest, residential land values experience the greatest increment by over 900% in both districts within a 10-year span. The disparity between urban land-use and agriculture is evidenced by residential land costing over 25 times more than agricultural land leased over a five-year period (Kaumba, 2020).

Table 4. Land prices in Kwabre East (KE) and Asakore Mampong (AM)

Land-use	Kwabre East (KE)				Asakore Mampong (AM)			
	Price in 2009	Price in 2019	Overall increment	Annual increment	Price in 2009	Price in 2019	Overall increment	Annual increment
Residential	8,357	90,000	~978%	~98%	10,000	106,700	1057%	~106%
Commercial	15,000	130,000	~767%	~77%	-	-	-	-
Industrial	140,000	960,000	~586%	~59%	70,000	480,000	~586%	~59%
Agricultural	6,500	13,333	~105%	~10%	-	-	-	-

All prices are indicated in Ghana Cedis; 1 USD = 5.8 Ghana Cedi. Residential and commercial land prices are per 100 x 100 sq. ft in 2009, and 80 x 90 sq. Ft in 2019. Industrial and agricultural land prices are per acre of land. Annual and overall increment presented are per unit of land.

Source: Kaumba (2020)

The high demand for residential land and unaffordable land prices play a central role in the loss of GBI. State actors and academics interviewed in the focus districts explained that flood-prone zones are often informally leased out at substantially cheaper rates than the average land price for “desperate land-seekers”. Real-estate agents, academics, and state land valuation experts in AM and AKS reported that flood-prone areas and seasonal wetlands are offered at 16-35% of the average residential land price. Some actors also indicated that poor migrants tend to be disproportionately impacted as flood-prone land is often sold to settlers during the dry season (Nesi, 2021).

The high value offered by urban land-uses has led to the marginalisation of small-scale agriculture too. Unlike urban green spaces and waterways, agricultural land doesn’t benefit from any form of regulatory protection in peri-urban areas. Land for agriculture is generally not prioritised in land-use planning due to its limited contribution to government revenue and resistance from landowners who aim to benefit from higher land value increments (Kaumba, 2020; Britwum et al, 2014).

Farmers have coped with farmland fragmentation and land tenure insecurity, by turning to intensive farming practices along polluted waterways to grow profitable crops, temporarily available vacant plots, and institutional land (Afriyie et al, 2014; Kaumba, 2020; Nesi, 2021). While peri-urbanisation has broadly benefitted communities, the negative impacts include rising food prices, household food insecurity for portions of the farming community (Afriyie et al, 2014), the dispossession of small-scale farmers (disproportionately impacting women farmers (Britwum et al, 2014)), and public health threats posed by the use of untreated waste water for vegetable production.

3.3.3 Residential real estate and housing characteristics

Residential development is widely discussed as the leading contributor to urban sprawl within the GKS as evident through satellite imagery. Housing across the landscape display different characteristics in terms of development densities and access to domestic utilities. Acheampong (2013) identifies seven distinct categories of residential development within the GKS, each varying in density, type of infrastructure available, and the economic status of residents. These include high cost and low-density areas, middle class and medium density areas, tenement housing sector (high density and mostly found only within KMA), indigenous housing, slums, and newly developing peri-urban housing. Due to very low government investment in housing, public housing represents less than 2.8% of KMA’s housing stock (Acheampong, 2013).

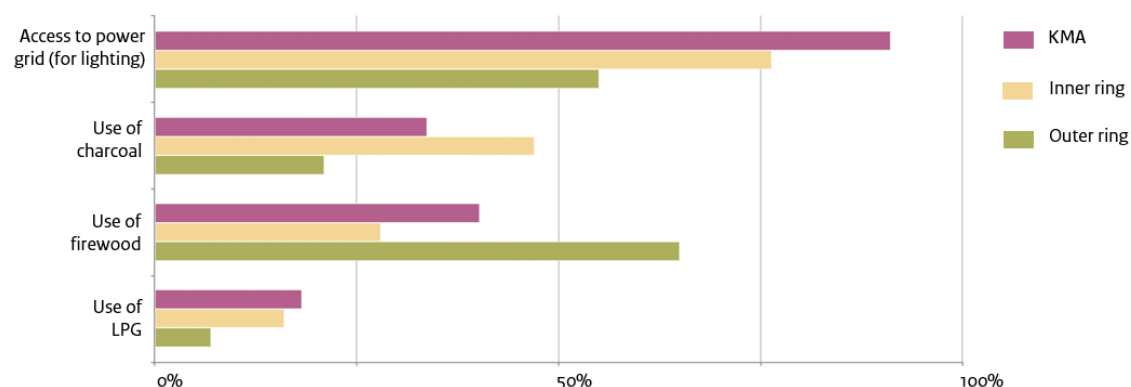
Growth of peri-urban residential sprawl - Peri-urban settlements typically display low and medium density growth consisting of detached and semi-detached houses. Existing traditional communities are

absorbed into peri-urban settlements. Leap-frog development and sprawling morphologies are driven by low public investment in housing and prevalent land speculation (Acheampong, 2013; Afrane and Asamoah, 2016). Ghanaian expatriates contribute to such development by acquiring peri-urban land without occupying it for years. Additionally, due to limited access to housing finance from public and private institutions, residential development is typically financed through household savings, leading to patterns of incremental construction (Acheampong, 2013; Afrane and Asamoah, 2016). Finally, private sector involvement in housing real estate is discouraged by wide-spread land litigations and macro-economic impacts on construction material costs; together they increase the risk in large-scale construction businesses (Acheampong, 2013). Together, these factors contribute to haphazard and low-density growth altering natural landscapes. The social impacts of such development are seen through the forced migrations of farmers and low land tenure security amidst long-term residents as wealthier settlers attempt to purchase residential land (Nesi, 2021; Islam, 2020; Amanor and Ubink, 2008).

Domestic utility services - Across the Kumasi landscape, settlements are underserved by essential utilities such as water, clean domestic fuel, and waste management. Section 3.2.3 highlights gaps in public water utility and the impacts of unregulated groundwater extraction. It also discusses the impact of poor waste management on surface water resources. On an average, household percentages serviced by solid waste collection in KMA according to 2010 census data, the inner ring, and outer ring are 17.2%, 4.8%, and 1.9% respectively. Communities therefore, resort to waste burning and indiscriminate dumping practices (NDPC, 2019). Liquid waste, on the other hand, is largely released into gutters or onto open ground, threatening the health of surface and groundwater resources. On an average, household percentages serviced by sewerage systems in KMA, the inner ring, and the outer ring are 5.3%, 2.2%, and 1.2%.

Additionally, household choice of wood-based fuels in Ghana is driven by the unaffordability of cleaner cooking fuels (Adam et al, 2013). Unsustainable patterns of charcoal production and fuelwood collection is a major contributor to forest degradation in Sub-Saharan Africa (FAO, 2020). In the case of the Kumasi landscape, the high demand for charcoal in particular contributes to the region’s growing ecological footprint, as charcoal is primarily sourced from the transitional ecological zone in Ghana. Figure 15 shows that despite the prevalence of electricity access, households depend greatly on charcoal and firewood as cooking fuels.

Figure 15 Domestic cooking fuel consumption across the Kumasi landscape



Sources: 2010 Census data, NDPC, 2019

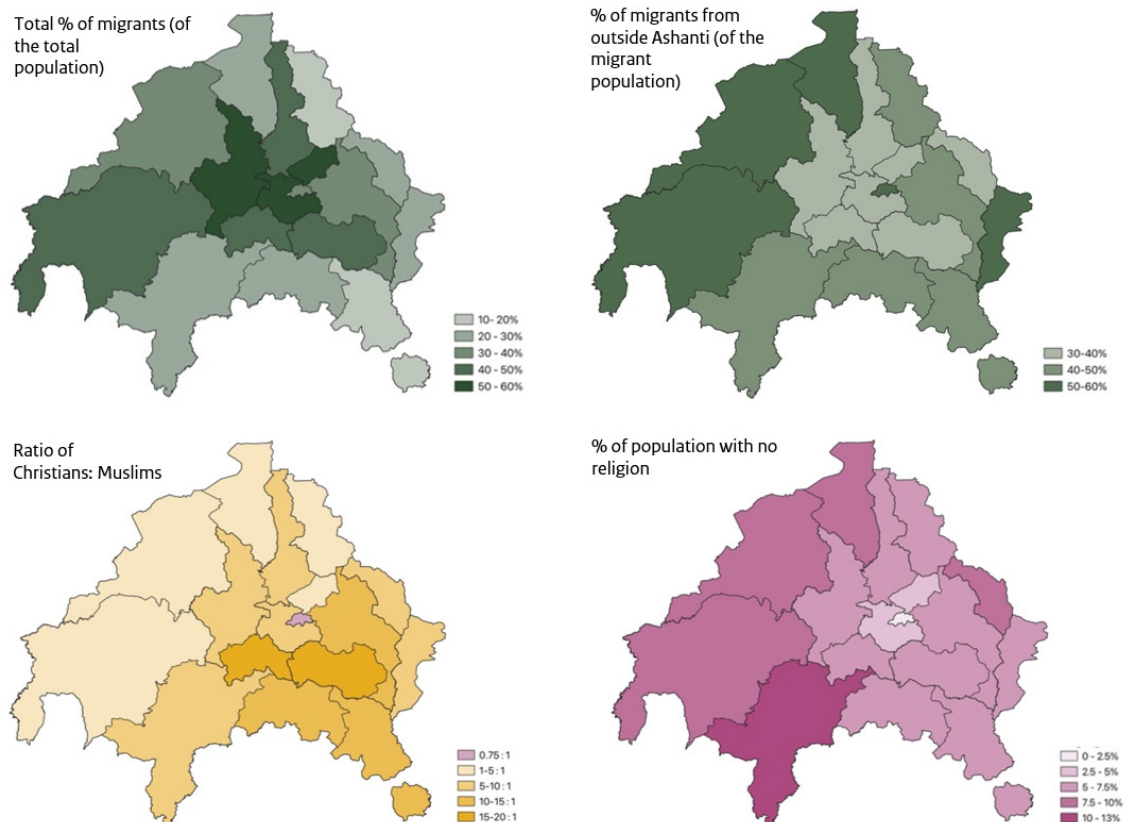
3.4 Impact of sociocultural dynamics on GBI

The Kumasi landscape is rich in sociocultural diversity with each ring of districts hosting a range of religious groups, ethnicities, and migrants from within and outside Ashanti (Fig 16). Migration patterns, both in urban and rural areas, are driven by employment opportunities in the various economic sectors as well as familial reasons such as marriage. Traditional attitudes and management of natural resources and indigenous land rights have also evolved drastically with sociodemographic and economic changes. This section discusses how customary processes have evolved with these changes.

Traditional land tenure systems are entrenched through centuries of communal history in Ghana. According to tradition, indigenous community members are allowed to farm and build on vacant community land as they possess customary freehold rights over land. This allows members to inherit land rights which can only be terminated through member consent, abandonment, or forfeiture (Ubink, 2008b). According to Ashanti convention, the ultimate title over land is held by the community and chiefs act as the custodians of customary land.

Structure of Asante land governance - The *Asantehene* (the Asante King) has a dual role; he is the supreme leader of the Asantes, and he is also the chief of Kumasi. Paramount Chiefs are next in the governance hierarchy. Figure 17 maps the location of Paramount Chiefs within the landscape. What is evident from the map is that the spatial distribution of customary authority is different than state administrative boundaries; some districts have numerous Paramount Chiefs while others have none. Districts with no Paramount Chiefs are controlled by a neighbouring Paramount Chief, or directly by the King through divisional and local chiefs.

Figure 16. Distribution of migrants and dominant religions across the landscape



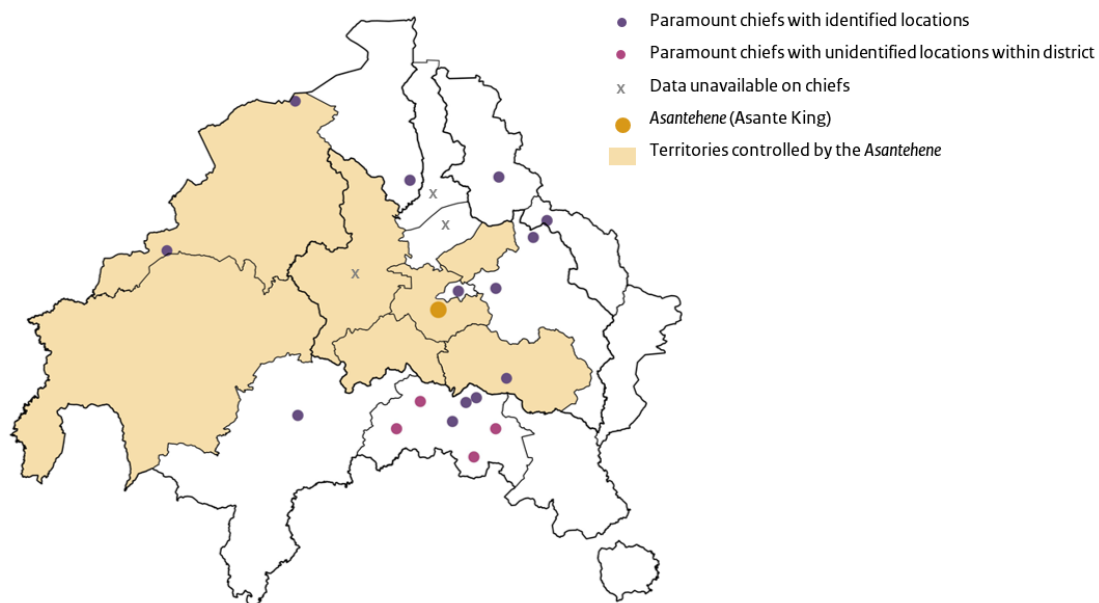
Source: 2010 Census data, NDPC, 2019

3.4.1 Customary processes

There are indications that customary boundaries are indeed demarcated; for example, lake Bosomtwe and surrounding land is controlled entirely by the Asamang Paramount Chief located in the neighbouring district of Bekwai (NDPC, 2019), and CREMA boundaries for forest management are often drawn based on customary boundaries (Asare et al, 2013). However, customary territories don't seem to be clearly documented and are often disputed too (Crook, 2008). The ambivalent nature of customary territories and the lack of clear data might prove to be a challenge in implementing formal spatial planning and institutional accountability.

Traditional conservation practices - The *Asantes* consider land sacred and their traditional knowledge has played a key role in biodiversity conservation in the region (Adom et al, 2016). The student theses investigated current customary practices that preserve GBI in the focus districts. Traditionally, numerous practices and beliefs were intertwined with the preservation of green spaces. Academics, state, and customary actors illustrated traditions through examples of taboos and myths. For example, community members were restricted from visiting rivers and forests on Tuesdays, felling of old trees was prohibited due to a belief in tree spirits, and pollution of rivers was believed to be an offense that would anger river gods (Osei-Agyemang, 2020). Certain practices had spatial implications too; forests set within river catchment zones were protected, and land-use/human activities along rivers were segregated as up-stream and down-stream activities (Nesi, 2021).

Figure 17. Location of Paramount Chieftaincies



Sources: District MTDPs, 2010 Census, and Millennium Cities Initiative (2013)

Impact of cultural changes on customary processes are observed at two levels in the focus districts. Firstly, the gradual disappearance of these spiritual belief systems built around conservation has been attributed to prevalent conversion to Christianity and Islam, in-migration of settlers, and the general rise of cosmopolitan culture brought about by urbanisation (Calvelo, 2020; Osei-Agyemang, 2020). 2010 Census data shows that even in less urbanised districts, traditionalists have been reduced to less than 2% of the population (NDPC, 2019). Green preservation has been seen to occur in customarily designated areas such as sacred groves, and green spaces along waterways in certain areas. Apart from this, no explicit customary laws controlling land-use changes that impact green spaces are found to be in practice

in KE and AM (Calvelo, 2020). Even traditional practices of extensive farming, such as the fallow system aimed at conserving soil fertility, is fast disappearing (Afriyie et al, 2014) due to leasing of community land to peri-urban settlers. A major challenge to documenting current customary laws is that they are verbally disseminated, which also impacts the transparency and accountability of customary decisions (Arko-Adjei, 2011; Calvelo, 2020).

Impact on the democratic structure of customary land management is also observed, though it varies greatly from community to community. At the community level, chiefs are supposed to be guided by a committee of community elders (Mahama et al, 2009). In some settlements, Plot Allocation Committees have been set up for stronger community involvement and profit sharing from customary land allocation (Ubink, 2008b). In Jachie (where exists a sacred grove as indicated in Figure 5), for example, when farmlands were converted to residential layouts, a portion of it was sold to community members at affordable prices. Profit made from selling to settlers at market prices was used to develop educational infrastructure for the community (Ubink, 2008b).

In other cases, community involvement in the formulation of land laws and decisions has diminished considerably and they have been deprived, without due compensation, of their rights over community land (Ubink, 2008b; Calvelo, 2020). Community-chief relationships have changed to an extent that communities are often unaware of land transactions occurring within their land and are also unclear of their traditional rights to be involved in protecting community land (Calvelo, 2020; Islam, 2020).

Dispute resolution - Disputes between communities and chiefs in peri-urban Kumasi are typically attempted to be resolved with the involvement of other chiefs, or by the *Asantehene*. In the focus districts, disputes have occasionally been between members of different customary families (Calvelo, 2020). The complexity of the customary structure may prove to be an issue for citizens, and possibly even more so for migrants; for example, over 75% of urban residents in Ashanti are unclear about dispute resolution mechanisms, whereas in rural areas, up to 25% of citizens are unclear on the matter (GSS, 2019).

Perception of water ownership - In many African nations, the acceptance or awareness of state ownership over water resources is seldom observed locally (Meinzen-Dick and Nkonya, 2005). An investigation of state and customary actors' attitudes towards water resource ownership in AM and AKS demonstrated that there is a strong cultural association between land and water rights. This association is also seen through customary actors recognising water resources as an integral part of green spaces, and not as separate resources (Calvelo, 2020). Chiefs and communities are widely acknowledged as the rightful owners of surface water resources; several actors reasoned that water resources belongs to those that own land. Groundwater, on the other hand, is perceived less as a common pool resource, as concluded from a general perception that groundwater belongs to individual entities that possess rights over the respective plot of land (Nesi, 2021). Interestingly, customary laws on the use of groundwater seem to have remained ambiguous (Agyenim and Gupta, 2010). While water policy in Ghana remains largely top down, state institutions may benefit by working closer with customary actors and consider cultural perceptions and values of water resources to increase regulatory enforcement.

3.4.2 Sociocultural value attributed to GBI

Though customary practices aimed at green space preservation have dwindled, past beliefs and customs continue to influence how citizens, state, and customary actors recognize the importance of GBI. The IHS student theses investigated how community members and customary chiefs define and value green spaces. Aesthetics, utility, and ecological functions were the three attributes that were explored in understanding how GBI are valued. Customary actors were found to value GBI for their role in local

livelihoods, disaster risk reduction, and contribution to traditional medicinal practices. They acknowledged the value of peri-urban agriculture as an important contributor to regional food security. Value of green spaces was also attributed to the impact of green spaces on mental well-being. Forested land affiliated with religious beliefs continue to exist in peri-urban pockets; an example is Buoho Grotto, a Catholic pilgrimage site. They are maintained by customary actors and community elders, often having to stay vigilant of encroachers (Calvelo, 2020; Osei-Agyemang, 2020).

Surveys in AKS demonstrated how GBI are valued by communities. Generally, in addition to natural elements such as rivers and sacred groves, public spaces with trees such as children's parks, cemeteries, and trees planted along streets, were also valued (Osei-Agyemang, 2020). Interestingly, settlers displayed a greater interest in increasing green spaces than indigenes who were surveyed. Indigenous respondents clarified that their preference for increased built development stems from their association of urbanisation with greater economic opportunities (Islam, 2020). On the other hand, peri-urban settlers were found to associate green spaces with aesthetic and intrinsic values as demonstrated by their desire for cleaner living environments and their use of words such as "serenity". They also valued green spaces as important social gathering sites. With respect to their knowledge of the ecological functions of GBI, several respondents were unaware of integral functions such as flood control and micro-climate regulation was limited (Osei-Agyemang, 2020).

3.5 Existing actor collaborations to preserve GBI

Despite complex institutional and economic dynamics and significantly diverse sociocultural communities within the Kumasi landscape, many collaborative initiatives aimed at sustainable land management have been fostered. Such collaborations include bottom-up small-scale initiatives as well as larger institutional arrangements, such as CREMA and the Pra-Offin River Basin Board, encouraging cooperation at a larger scale.

Initiatives at the urban fringe - At the urban fringe, where the economic pressures on land are high, environmental initiatives were found to have smaller geographical focus areas and specific targets. The student theses identified partnerships between state and customary institutions to implement development and building permit systems. State and customary actors have been known to work with citizen volunteer groups and religious organisations working on environmental conservation and afforestation initiatives. Local governments have collaborated with customary institutions to protect urban green spaces and plant trees in public spaces such as school campuses and along roads (Calvelo, 2020; Takyi, 2020).

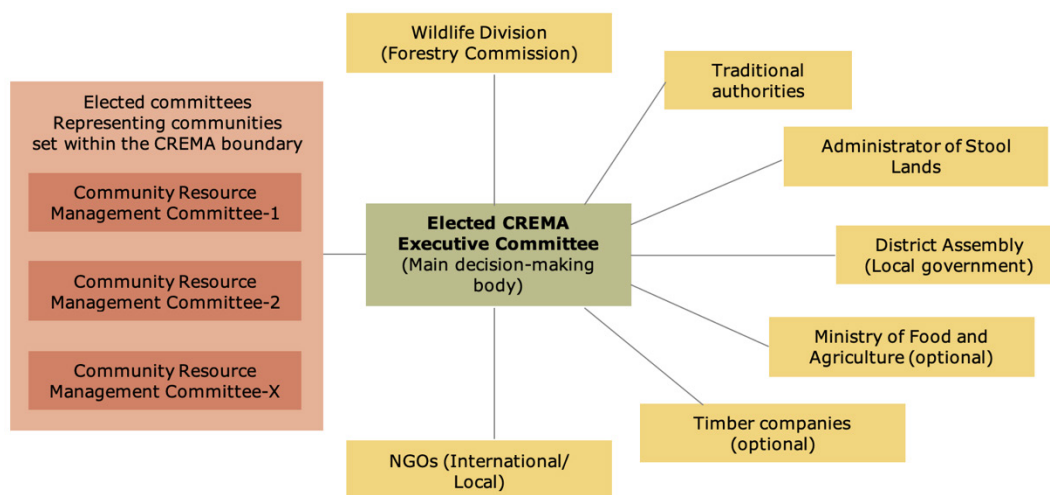
Large-scale tree planting initiatives – Several types of large-scale tree-planting initiatives have been aimed at ecosystem restoration. The National Forest Plantation Development Programme (NFPDP) implemented several model plantations through community resource management systems to encourage timber and food production. An example is the Modified Taungya System which is a legally binding land lease between the Forestry Commission and farmers who are established as co-owners of plantations and share the benefits of tree revenues, while farmers also profit entirely from agricultural production (Acheampong et al, 2016). In Ashanti, 32 such benefit-sharing agreements were established as of 2008 (FC, 2008). National greening programmes have also been used to encourage tree-planting initiatives along with citizens, NGOs and other civil society organisations (FC, 2008; Aljazeera, 2021).

Initiatives in conservation zones and in rural areas - In less urbanised areas, initiatives have the possibility of being spread across larger tracts of land and across communities, possibly due to the relative

uniformity of economic and actor dynamics (compared to urbanising areas). For example, Nyantakyi-Frimpong et al (2019) discuss a sustainable agroforestry partnership between a European organisation and a registered cocoa-farming cooperative (mentioned anonymously) with a membership of 65,000 farmers spread across five cocoa growing regions including Ashanti. Land restoration programmes have been initiated even in mining-plagued districts in collaboration with international donors, NGOs, and local chiefs (Tropenbos, 2021).

CREMA is an interesting example of state-initiated collaboration that is focused on community biodiversity management and is being implemented within the landscape in select conservation zones. The model is governed by local institutions and the CREMA constitution which is developed jointly by involved communities and local governments (Figure 18). Each CREMA constitution is a legal document that lays out the objectives of the project, governance structure, and regulations that govern access to resources, role of other state institutions, and benefit sharing arrangements (Agyare et al, 2015; Asare et al, 2013).

Figure 18 Operational structure of CREMA



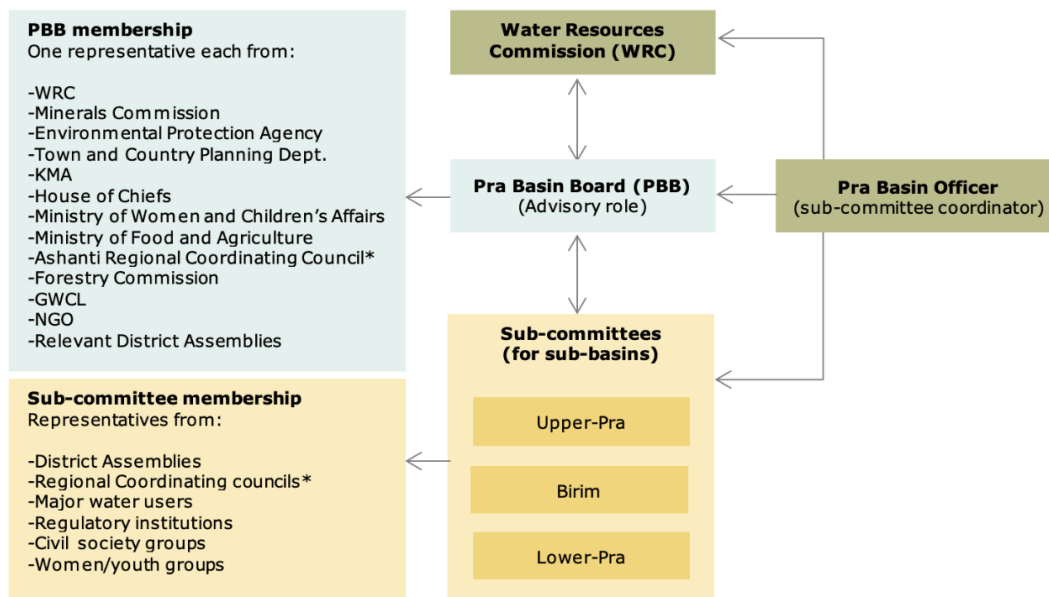
Sources: Adapted based on information from Asare et al (2013) and Foli et al (2018)

A recent report by Agyare et al (2020) reviews the outcomes of CREMA through eight case studies located outside the Kumasi landscape. Though an inspiring initiative, a substantial loss of forest cover has been observed in the case studies over the last decade. Drivers of deforestation include expanding cultivation of tree and food crops and illegal logging and mining. However, it is worth mentioning that CREMA is still an evolving concept and despite several logistical challenges, the presence of this unique institutional framework is an opportunity to introduce integrated landscape management strategies.

Water management initiatives - The greatest challenge with managing water resources is the dynamic nature of the resource. Given the hydrological complexity of the Kumasi landscape, water management requires a more complex strategy to involve a wider range of actors. The presence of river basin institutions is therefore a unique opportunity for actors spread across sub-basins and up-stream and down-stream actors to interact and collaborate.

Quartered in Kumasi, the Pra-Offin basin office hosts the Upper Pra sub-Committee which is represented by relevant state actors and other stakeholders as presented in Figure 19. The Basin Boards have initiated several stakeholder workshops in Ashanti to evaluate policy impacts within the basin, discuss challenges, prioritise water needs, establish objectives for future development, and allocate responsibilities between stakeholders to implement actions (Duncan et al, 2019).

Figure 19 Operational structure of river basin management



Source: Re-adapted from the Pra River Basin IWRM Plan (WRC, 2012)

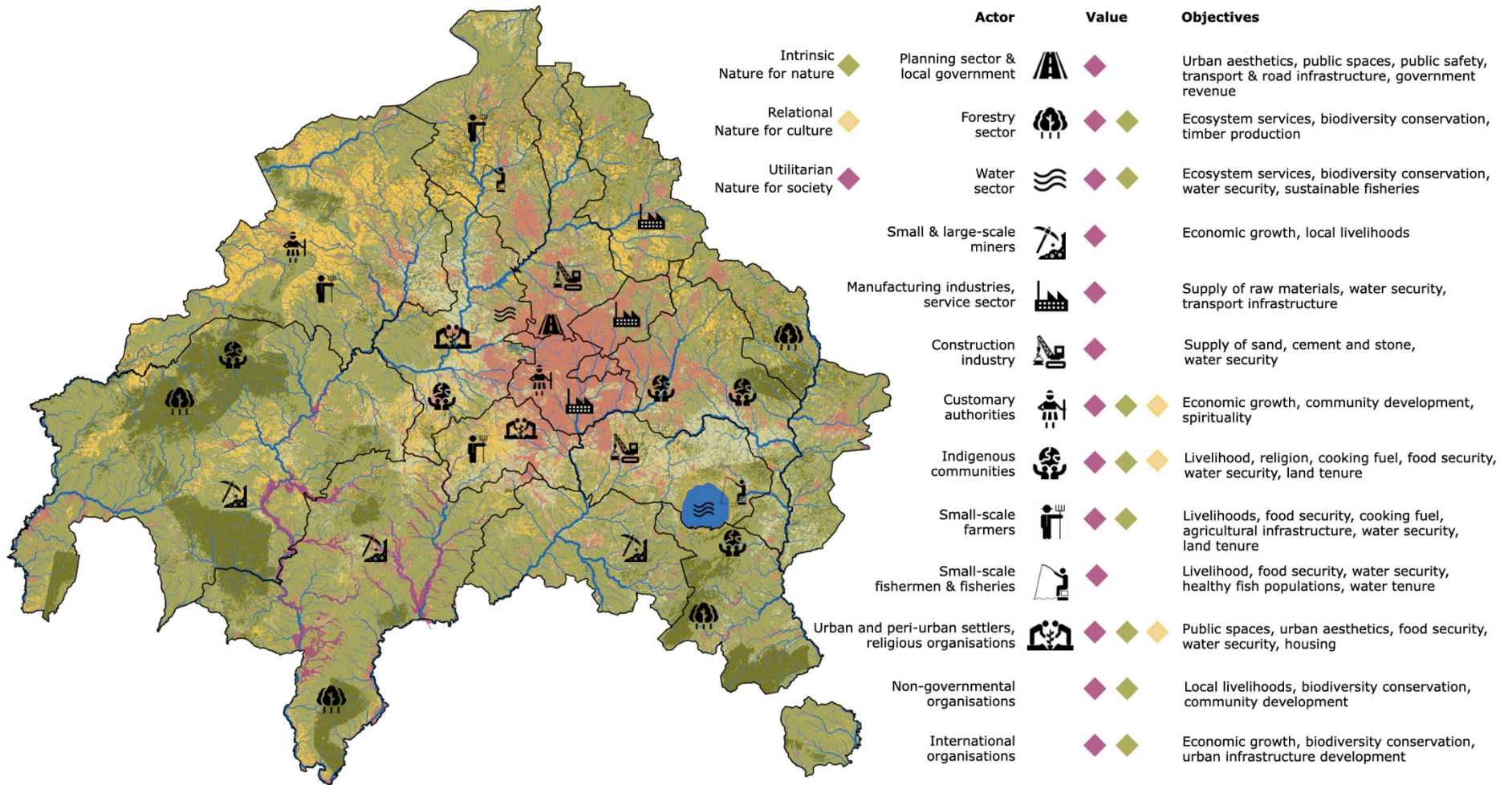
3.6 Finding shared objectives and nature values among actors in the landscape

The Kumasi landscape is being shaped by numerous intersecting societal processes; and chapter 3 highlights key trends in institutional, economic, and sociocultural dynamics. Rapid urban agglomeration within the GKSr is altering existing green spaces and river systems through unsustainable land-use development patterns and pollution, whereas in the outer ring of districts landscapes are altered by agriculture, timber production, and mining. The rings also differ socio-demographically. Although religious and ethnic diversity exists across the landscape, within the GKSr the sheer range of socio-economic categories of communities and the variety of economic activities presents a more complex network of actors than in the outer ring.

Figure 20 captures some of the actors that play a prominent role in shaping landscape dynamics, and their objectives and values that drive the preservation and/or loss of GBI. The presentation of actor values is based on the IPBES Pluralistic Nature Futures Framework which categories human values for nature as 'nature for nature' (intrinsic values such as protecting species diversity, habitats, etc.), 'nature for culture' (relational values that are defined by spiritual and non-material values), and 'nature for society' (utilitarian values associated with human benefits such as ecosystem services and natural capital) (Pereira et al, 2020).

Although the rings vary in socioeconomic characteristics, Figure 20 illustrates how several actors across the landscape share common objectives that could be met by fostering healthier ecosystems, food linkages, and urban-rural connectivity. State and non-state actors could also mutually benefit from deeper public awareness on rights with respect to natural resources, institutional arrangements, and responsibilities to enhance collaboration. To achieve these common goals, key challenges should be acknowledged, and existing opportunities must be harnessed.

Figure 20 Actor objectives and values attributed to green and blue infrastructures



Sources: PBL, icons from Freepik

4 Challenges and opportunities

Current trends of peri-urban growth are threat to environmental sustainability, and foster inequalities with regard to access to housing, food, water, and liveable environments. In the future, these growth patterns could have long term impacts on regional climate resilience, food and water security, and the loss of biodiversity, with the impacts being borne disproportionately by economically disadvantaged communities. This chapter presents some of the key challenges and opportunities with regard to sustainable land management.

4.1 Challenges

Legal pluralism has led to regulatory voids in managing land and water resources; the complexity of institutional arrangements is a hindrance to the comprehensibility of land administration. Citizens are observed to be alienated in customary and well as statutory land management processes, despite community participation being mandatory in both frameworks. Moreover, a lack of effective cooperation between customary and state institutions contributes to unregulated development and urban sprawl.

Current planning trends - The high demand for peri-urban land has driven the spontaneous loss of agricultural land and green spaces. Rapid growth challenges local institutions with limited human and financial resources to deliver effective planning strategies before development occurs. Regulations that protect green spaces, which are broadly top-down (ex. buffer zone policy), are seldom enforced due to the scale and speed of development and ambiguities that stem from the dual land management system.

Regional coordination – Despite the presence of a river basin board, a Regional Coordinating Council, and the establishment of the Greater-Kumasi Sub-Region (GKSR) as a governing unit, local government Medium-Term Development Plans (2014-2017) are not utilised to plan collaborative strategies to govern connecting natural resources amidst neighbouring districts. A lack of data-sharing and communication platforms within government institutions as well as with non-state stakeholders is challenging the implementation of regional level governance.

Implementation and monitoring of existing state initiatives - Despite the efforts that have been invested in developing exceptional collaborations, implementation has suffered due to logistical gaps including in data sharing, effective communication networks, slow delivery of allocated funds to implementing agencies, and benefit-sharing agreements between small-holders (Duncan et al, 2019; Asare et al, 2013; Acheampong et al, 2016). Baruah et al (2016) also highlight the challenge in communicating how ecological functions of natural resources link to livelihood sustainability amidst CREMA members.

Local finance is unable to provide collective public amenities to guide integrated development. Existing land/property taxing mechanisms and unregistered land development, found to be prevalent in fast-urbanising areas, challenge effective revenue generation and investment in essential infrastructure such as water and sanitation. Additionally, involvement of the private sector in protecting GBI and providing water and sanitation services in peri-urban districts is presently limited. Hence, to generate revenue, local governments are found to prioritise urban land-uses over farmlands and green spaces.

Territorial ambiguities - The customary administrative structure is rather complex, and the distribution of territories between authorities is different than state administrative boundaries. The lack of clear data on

customary boundaries could challenge the effective allocation of institutional responsibilities in collaborative land management initiatives. It is possible that institutional/territorial ambiguities are greater in urban settlements than in rural settlements due to presence of multiple institutions active within the GKS. For instance, urban Ashanti experiences a much higher rate (~60%) of chieftaincy conflicts than in rural Ashanti (29.5%) (GSS, 2019). Additionally, knowledge of conflict resolution mechanisms are also much higher in rural Ashanti than in urban Ashanti (GSS, 2019).

Loss of customary practices and religious beliefs evolved around the ecological importance of green spaces are disappearing due to cultural changes and economic pressures on land brought about by urbanisation. These changes have also negatively impacted participatory decision-making in customary land management practices. The impact is the marginalisation of indigenous farming communities faced with land tenure and food insecurity.

Water resources are exploited through the conversion of riparian land primarily for residential purposes. Wetlands are sold at very low prices to people in dire need of land for housing. In highly urbanised areas wetlands are also converted for commercial and industrial uses, and in rural districts they are exploited for gold mining. These land-uses also contribute to heavy pollution of ground and surface resources with unsafe levels of chemical and microbial contamination. Additionally, river systems are threatened by an unregulated exploitation of groundwater in peri-urban districts with inadequate water services.

Impact on/of food systems - The position of food production amidst land-use dynamics varies greatly between urbanising and rural contexts. In rural areas, increased cultivation threatens conservation efforts (Agyare et al, 2020). At the urban fringe, the quality and quantity of food production is threatened by the marginalisation of agriculture to vacant plots and polluted waterways. Food supply linkages are also challenged by inadequate transport, storage, and market facilities causing wastage of produce (Gyamfi, 2020). These factors have consequently led to a lack of equity in accessing healthy and affordable produce.

Vulnerable groups – Urbanisation offers developmental opportunities that are unevenly distributed across socio-economic groups. Indigenous as well as migrant farmers face the brunt of peri-urban land-use change due to low land tenure security. The marginalisation of farming to polluted waterways also exposes them to high health risks. Additionally, female farmers are particularly vulnerable due to limited income, access to credit, and lower literacy than their male counterparts. They are limited in their capacity to secure their access to land or transition to alternative livelihoods (Mensah and Yankson, 2013). With respect to access to land for housing, low-income migrants are either tricked into or resort to living in flood-prone areas. While local government MTDPs target HIV patients, women and children (in general) to support them in development, it is important to also recognise the more specific vulnerabilities produced by peri-urbanisation trends such as food insecurity, food production health risks, uneven access to safe water and sanitation, and unsafe housing.

4.2 Opportunities

Collaborative initiatives aimed at green space preservation exist in different forms and scales across the landscape, including large-scale community-led resource management programmes found mainly in rural areas. Institutional set-ups such as CREMA and the Pra River Basin are legally supported frameworks that can sustain actor collaborations in the long run. Such initiatives have also been used to introduce sustainable and climate-resilient agricultural production in the Ashanti region, such as the 'Ghana Cocoa and Forest Initiatives' and 'Environmentally Sustainable Production Practices in Cocoa Landscapes'. In

peri-urban areas, initiatives are of a smaller scale, but are also a collaboration between the state, customary actors, religious organisations, and communities, and are driven by existing socio-cultural values towards green spaces. However, these efforts need to be formally acknowledged and be guided by a broader strategy towards landscape restoration to have considerable environmental impacts.

Role of customary actors - The presence of influential and well-intentioned customary actors can be optimised to help implement initiatives that state apparatus cannot handle independently. There are chiefs that have even taken the initiative to digitise and organise customary land records – an important step towards transparent land administration. Customary actors, indigenous communities, as well as settlers have displayed commitment and willingness to contribute time and labour for greening initiatives (Islam, 2020).

Community value for green spaces - In addition to existing indigenous awareness and values associated with ecosystems, settlers in peri-urban communities have also displayed a strong interest in green public spaces for social and mental well-being of communities. Such community values have been demonstrated through the active participation of citizens in tree-planting programmes such as the recently launched ‘Green Ghana’ programme to plant 5 million trees nationally. The involvement and value systems of communities play an important role in demanding further ecosystem conservation efforts and institutional accountability in managing green spaces.

The spatial planning framework offers opportunities for public and stakeholder participation. It also presents tools to integrate local level spatial planning with long-term national and regional development plans. The various levels of spatial planning offer legal provisions aimed at protecting green and blue infrastructures. The presence of Regional Coordinating Councils and their responsibility to coordinate local planning presents an opportunity to achieve intersectoral strategies through local spatial planning.

Presence of international donors and organisations - The government of Ghana has partnered with many government and non-government international organisations to promote and fund conservation efforts. They could contribute significantly in closing gaps in existing initiatives and share knowledge regarding logistical challenges in implementation to inform future environmental initiatives.

Water resource management - Existing work led by the Community Water and Sanitation Agency (CWSA) towards decentralised systems of potable water provision could lead to cheaper and faster provision and regulation of water; this could reduce the currently observed over-exploitation of groundwater by individual entities and reduce pressure on public reservoirs. The presence of River Basin Boards can be harnessed to implement cross-sectoral efforts to implement spatial planning and waste management solutions to protect the region’s river systems.

5 Recommendations

The loss of green spaces to peri-urban sprawl is not unique to the Kumasi landscape; Nkwae (2006) argues that the presence of customary land tenure systems does not offer radically different challenges when compared to other land administrative systems. Moreover, the customary system has managed to conserve ecosystems across Ghana for centuries, but it is challenged by many socio-economic developments imposed by a globalising economy and a population growing/changing in numbers, wealth, and culture. Essentially, strategies to preserve green spaces need to offer alternative and equitable economic development pathways.

The Landscape Approach aims to design equitable solutions oriented around ‘people, profit, and planet’ with an emphasis on the position of smallholders and actor collaborations (Van der Horn and Meijer, 2015). The aim of the Kumasi landscape research project is to explore possible strategies and scenarios aimed at more regional climate and nature-inclusive development. This section presents scholarly recommendations towards the landscape’s sustainable development, followed by a list of considerations to be made in furthering the Kumasi landscape project based on the discussions of this report.

5.1 Scholarly recommendations for green preservation

Literature on the status of green spaces in the Kumasi landscape is abundant, and very often, scholarly recommendations revolve around systemic changes such as the establishment of an efficient land information system, stricter enforcement of regulations, increase the scope for decentralised governance, etc. While these long-term systemic changes are necessary, short-term adaptive strategies with long-term goals are required to urgently address the rapid loss of biodiversity. Scholarly recommendations presented here are those that could fit within the spectrum of realistic interventions that could be supported by the existing institutional framework.

Need to integrate traditional practices with GBI conservation through education of state actors (Asante et al, 2017; Sarfo-Mensah et al, 2010); Traditional knowledge systems are often ignored in modern natural resource management practices, even though traditional practices are inexpensive and incorporate mechanisms of voluntary compliance. Incorporating such characteristics to GBI conservation practices could prove to be advantageous. However, it is worth noting that indigenous practices have also evolved due to cultural and economic changes, and strategies will need to consider the contemporary needs and beliefs of indigenous communities.

Equitable benefit sharing - In collaborative initiatives such as the Community Resource Management Areas (CREMA), special attention should be given to strengthening livelihood options for the most vulnerable actors to reduce conflict. Interventions need to address long term facilities such as access to credit and markets to sustain conservation efforts (Agyare, 2020).

Integration of wetland management with urban planning at local level (Amoateng, 2016) designed around stakeholder consultation, awareness campaigns, and participative relocation/resettlement strategies.

Improving landscape planning and governance capacities - Van Oosten et al (2021) categorise landscape governance capabilities as those to overcome substantive and procedural challenges which include, but are not restricted to, land-use planning, finance, balancing competing interests, knowledge of landscape dynamics, facilitating multi-stakeholder processes, personal commitment, leadership, and dealing with political dynamics. They also emphasise the need for an approach that is not restricted to professional capacity building, but that which encourages learning and behavioural change among societal actors at large. In the specific context of current trends of environmental governance in Ghana, Cobbinah and Poku-Boansi, 2018(a) observe that terms such as ‘urban resilience’ and ‘green cities’ are often introduced by international development organisations. They recommend that state planners could benefit from capacity-building to understand what these terms mean in their regional context and how best to implement local environmental planning with these broader goals in place.

Strategies that are pro-poor and address spatial equity - Cobbinah, 2017 observes that planning practices currently benefit the wealthier classes disproportionately. Lack of access to affordable housing, for example, is a major driver of settlement development in riparian lands. The author specifies that no new laws/regulations are required, but pro-poor reforms are necessary in the planning discourse.

Bottom-up urban design interventions - Kumasi is a part of the Millennium Cities Initiatives. The proposal to re-green Kumasi emphasises (amongst others) participative strategies to revitalise river buffer zones, manage flood zones, implement in-situ sanitary waste-management, and rainwater harvesting (Arias et al, 2012; p72-91). These workable examples of site-level interventions tied by a broader strategy.

Risk assessment & information system - Cobbinah and Poku-Boansi, 2018(b);

In a survey conducted of planners from across Ghana, the most common suggestions made by them to improve planning practices was to increase stakeholder participation, incorporate risk assessment and risk information systems in planning. They recognised that the loss of green and blue infrastructure was contributing to the loss of regional resilience, but that planning and policy preparation do not incorporate risk factors.

5.2 Recommendations for the next steps in the Kumasi landscape research

When there are a broad range of development trends contributing to the loss of GBI, strategies to implement change can take numerous paths too. The recommendations presented here provide insights on considerations to be made in furthering stakeholder cooperation to preserve GBI in the Kumasi landscape.

Variety of green spaces and actors in urbanised and rural landscapes will influence the nature of actor collaboration. Top-down measures in urban contexts are harder to implement due to the complexity of actor networks and the sheer diversity of actor objectives. Therefore, interventions maybe restricted in terms of their spatial scale, but can be upscaled in numbers through broader planning policies/strategies. For example, initiatives such as tree planting and in-situ decentralised sewage treatment are realistic interventions, but need to be implemented as a part of a broader spatial strategy in order to drive significant positive impacts at the regional level.

In rural areas, actor networks are comparatively more uniform and more organised through cooperatives and existing customary structures. However, community-led natural resource management strategies,

such as CREMA, must consider the position of socially marginalised people (Allen, 2003). Moreover, the long-term success of such projects is greatly centred around community organisation such as efficiency of communication within actor networks and community leadership (Agyare et al, 2020).

Lessons from local interventions should also aim to inform a broader regional strategy in order to spontaneously improve implementation. For this, actors could be involved in designing an effective communication networks and databases to share knowledge and communicate at the regional scale.

Existing institutional arrangements to work with stakeholders - Existing actor networks such as the Pra River Basin Board and CREMA can be harnessed by development agencies to communicate with stakeholders and introduce landscape management initiatives. Data from these institutions regarding logistical challenges and past errors can be used to develop more effective landscape management strategies.

Regional coordination - Although the establishment of the GKSR as a sub-regional governing unit for spatial planning is a starting point, it is worth noting that the ecological footprint of the KMA's urban agglomeration goes far beyond the GKSR. A study conducted as far back as 2001 established that the economic and agro-ecological impacts of KMA on surrounding landscape is observed as far as 40km from the city centre (Adam, 2001). The impact now can only be greater. Therefore, governing institutions need to be made aware of the spatial extent of urban-rural linkages, and include urban green initiatives as well as community-led rural resource management initiatives such as CREMA as a part broader regional management framework.

A landscape perspective to food systems - As with GBI, food systems are integral to urban-rural linkages and connect stakeholders from across the landscape. Current trends of peri-urbanisation are driving urban food insecurity, production of food crops irrigated with untreated wastewater, farmer land tenure insecurity, and food wastage due to poor transport and market infrastructure. In the outer-ring, food production drives forest degradation. Landscape management, therefore, must consider how food can be produced sustainably, contribute to healthy diets, and sustain rural and peri-urban livelihoods. The regional planning perspective considers the urban ecological footprint, and incorporates rural-urban market infrastructure to improve food supply linkages, and creates space for urban and peri-urban agriculture (Allen, 2003).

Scope for bottom-up technical interventions - Many systemic changes will be necessary in the long run, but bottom-up design interventions could help to shape these changes that will take long periods of time to be implemented at larger scales. Although, limitations of larger technical interventions (such as the implementation of additional green belts) will need to be considered by taking into account the current challenges of planning, regulatory enforcement, and land administration in the landscape.

Innovative financial arrangements - Limited local government revenue is a primary challenge in enforcing existing regulations. Innovative financial arrangements such as Payments for Ecosystem Services (PES) need to be implemented with increased private sector participation. In the case of regional resource management (such as river basins), the introduction of urban land value capture mechanisms to preserve rural landscapes can be explored. Financial arrangements should also target specific challenges observed in existing initiatives; for example, creating funds exclusively to implement zoning regulations, and subsidies for sustainable agricultural practices in forest reserves (Agyare et al, 2020).

Knowledge of ecosystem functions - The alignment of actor objectives is central to the Landscape Approach. However, to successfully balance their competing uses, keen attention needs to be given to

how different ecosystems in the landscape function. Local indigenous knowledge is built over generations of empirical observations, includes classification systems, and offers an intimate understanding of numerous natural processes (Appiah-Opoku, 1999). Such knowledge can inform sustainable ecosystem management strategies that can combine ecosystem regeneration with productive human activities.

6 Appendices

6.1 IHS Student theses

Thesis 1: *Revealing the role of urban planning practices on spatial depletion of green spaces*

Author: Edward Takyi (2020)

Case study: Kwabre East

Takyi (2020) contributes to literature on peri-urban land-use dynamics by delving into the details of how urban planning is implemented and how it addresses the preservation of peri-urban green spaces in Kwabre East. The research examines urban policies and regulations that aim to manage green spaces. It also investigates how structure plans prioritise built development over green spaces and the specific hurdles faced by planners in prioritising green spaces in land-use planning.

Thesis 2: *Understanding the link between customary land governance and land-use changes of green spaces*

Author: Janssen Andrew S. Calvelo (2020)

Case study: Asakore Mampong and Kwabre East

Literature on customary land tenure systems often leans towards understanding the social and economic outcomes of peri-urban land-use changes driven by customary land management (Calvelo, 2020). This study investigates, more specifically, how customary land governance contributes to the conversion of peri-urban green spaces for residential and commercial land-uses. The study examines the perception of green spaces by customary actors, customary laws in practice that impact green spaces, and how green spaces are impacted by specific governance processes and customary institutions.

Thesis 3: *Land value capture for the preservation of green landscapes*

Author: Alice Kaumba (2020)

Case study: Asakore Mampong and Kwabre East

Literature on land capture generally focuses more on financing transport and housing infrastructure. In Africa, land-based revenue is often used to finance land-use planning and zoning regulations. This study contributes to literature by examining the relationship between land value capture and green space finance in the Ghanaian context (Kaumba, 2020). More specifically, the study investigates, firstly, the impact of land-use change on peri-urban land values. Secondly, it explores if and how the increments are captured by government to finance the preservation of green spaces, and explains existing hurdles in implementing land value capture mechanisms in peri-urban districts.

Thesis 4: *Exploring Access to Water as a Driver of Land-use Dynamics*

Author: Muhil V. Nesi (2021)

Case study: Asakore Mampong and Afigya Kwabre South

Literature on the land-water nexus in the peri-urban context in the Ghanaian context is focused on the impact of land-use dynamics on water resources. Conversely, this study explores how surface and ground water resources impact land-use dynamics, and investigates the impact of legal pluralism in water laws on the land-water nexus. More specifically, the study investigates the particular sources of water different

land-uses are dependent on, and explores how changes in land values and land cover have occurred in relation to the presence of surface water resources.

These 5: Understanding community willingness to invest in land-use through their property rights and obligations

Author: Fahmida Islam

Case study: Three communities within Afigya Kwabre South

Literature on land governance and land-use planning in Ghana focuses abundantly on the dynamics between customary and state institutions. This study explores the community's point of view and role in peri-urban development. It investigates how citizens perceive their rights over property in a legally pluralistic environment. Further, it investigates what citizens perceive as a balance between green spaces and built environments. Finally, it explains if citizens are willing to invest time, money, or labour in achieving what they believe to be a 'balanced' environment.

Thesis 6: Sociocultural factors and value of green areas

Author: Vida Osei-Agyemang

Case study: Afigya Kwabre South

Literature on green spaces in peri-urban Kumasi is widely focused on governance perspectives. This study contributes to literature by investigating how communities perceive and value green spaces and what socio-cultural and environmental factors influence their values.

6.2 Names of districts in the landscape⁹



1. Kumasi Metropolitan Area
2. Asakore Mampong
3. Kwabre East
4. Ejusu Juaben
5. Bosomtwe District
6. Atwima Kwanwoma
7. Atwima Nwabiagya
8. Afigya Kwabre South
9. Afigya Kwabre North
10. Sekyere South
11. Sekyere East
12. Asante Akim Central Municipality
13. Bosome Freho
14. Bekwai Municipality
15. Amansie West
16. Atwima Mponua
17. Ahafo Ano South

⁹ Afigya Kwabre South and Afigya Kwabre North are newly established districts from the previous district of Afigya Kwabre. Therefore, several data sets presented in the report provide information from the previous administrative area of Afigya Kwabre.

7 References

7.1 Literature

- Abdulai, R. T., & Ndekugri, I. E. (2007). Customary landholding institutions and housing development in urban centres of Ghana: Case studies of Kumasi and Wa. *Habitat International*, 31(2), 257-267.
- Aboagye, D., & Zume, J. T. (2019). Assessing groundwater quality in peri-urban localities of Kumasi, Ghana. *African Geographical Review*, 38(4), 390-405.
- Acheampong, R. A. (2013). Situational analysis of housing in the Greater Kumasi Sub-Region, Ghana. Study Prepared for the JICA Study Team as Part of the Comprehensive Urban Development Plan for Greater Kumasi Project.
- Acheampong, E., Insaidoo, T. F., & Ros-Tonen, M. A. (2016). Management of Ghana's modified Taunya system: Challenges and strategies for improvement. *Agroforestry Systems*, 90(4), 659-674.
- Acheampong, R. A., Agyemang, F. S., & Abdul-Fatawu, M. (2017). Quantifying the spatio-temporal patterns of settlement growth in a metropolitan region of Ghana. *GeoJournal*, 82(4), 823-840.
- Adam, F. W., Brew-Hammond, A., & Essandoh, E. O. (2013). Relationships between energy use and income levels, for households in Ghana. *European Scientific Journal*, 9(16)
- Adam, M. (2001). Definition and boundaries of the peri-urban interface: Patterns in the patchwork . In P. Drechsel, & D. Kunze (Eds.), *Waste composting for urban and peri-urban agriculture: Closing the rural-urban nutrient cycle in Sub-Saharan Africa* (pp. 193-208). Oxon, UK: Food & Agriculture Org.
- Adom, D., Kquofi, S., & Asante, E. A. (2016). The high impacts of Asante indigenous knowledge in biodiversity conservation issues in Ghana: The case of the Abono and Essumeja townships in Ashanti region. *British Journal of Environmental Sciences*, 4(3), 63-78.
- Afrane, S., & Asamoah, P. (2016). Housing situation in Kumasi.
- Afriyie, K., Abass, K., & Adomako, J. A. A. (2014). Urbanisation of the rural landscape: Assessing the effects in peri-urban Kumasi. *International Journal of Urban Sustainable Development*, 6(1), 1-19.
- Agyare, A. K., Yakubu, M., & Kumordzi, B. (2020). National review of community resource management areas (CREMA).
- Agyare, A., Murray, G., Dearden, P., & Rollins, R. (2015). Conservation in context: Variability in desired and perceived outcomes of community based natural resources governance in Ghana. *Society & Natural Resources*, 28(9), 975-994.
- Agyenim, J. B., & Gupta, J. (2010). The evolution of Ghana's water law and policy. *Review of European Community & International Environmental Law*, 19(3), 339-350.
- Ahmed, A., & Dinye, R. D. (2012). Impact of land use activities on Subin and Aboabo rivers in Kumasi metropolis. *International Journal of Water Resources and Environmental Engineering*, 4(7), 241-251.
- Akinyoade, A., Klaver, W., Soeters, S., & Foeken, D. (2014). *Digging deeper: Inside Africa's agricultural, food and nutrition dynamics*. Leiden: Brill.
- Aljazeera. (2021). 'Action time': Ghanaians plant 5m trees to fight forest depletion. Accessed via <https://www.aljazeera.com/news/2021/6/11/ghana-plants-5-million-trees-to-battle-forest-depletion>

- Allen, A. (2003). Environmental planning and management of the peri-urban interface: Perspectives on an emerging field. *Environment and Urbanization*, 15(1), 135-148.
- Allen, A., da Silva, N., & Corubolo, E. (1999). Environmental problems and opportunities of the peri-urban interface and their impact upon the poor. London: Development Planning Unit, UCL.
- Amanor, K., Ubink, J. (2008). Contesting Land and Custom in Ghana: Introduction. In J. Ubink, & K. Amanor (Eds.), *Contesting land and custom in Ghana* (pp. 155-182). Leiden: Leiden University Press.
- Amirinejad, G., Donehue, P., & Baker, D. (2018). Ambiguity at the peri-urban interface in Australia. *Land use Policy*, 78, 472-480.
- Amoako, C., & Adom-Asamoah, G. (2019). From the seat of a traditional kingdom to a garden city: The socio-spatial politics of managing green areas in Kumasi, Ghana. *African Geographical Review*, 38(4), 310-325.
- Amoateng, P. (2016). The changing spatial extent of rivers and floodplains and its implications for flooding: The case of Kumasi, Ghana
- Amoateng, P., Cobbinah, P. B., & Owusu-Adade, K. (2013). Managing physical development in peri-urban areas of Kumasi, Ghana: A case of Abuakwa. *Journal of Urban and Environmental Engineering*, 7(1), 96-109.
- Andersen, K. E. (2011). Communal tenure and the governance of common property resources in Asia: Lessons from experiences in selected countries. (Land Tenure Working Paper, no. 20). Food and Agriculture Organization of the United Nations.
- Appiah-Opoku, S. (1999). Indigenous economic institutions and ecological knowledge: A Ghanaian case study. *Environmentalist*, 19(3), 217-227.
- Arko-Adjei, A. (2011). Adapting land administration to the institutional framework of customary tenure: The case of peri-urban Ghana. Amsterdam: IOS Press.
- Asante, E. A., Ababio, S., & Boadu, K. B. (2017). The use of indigenous cultural practices by the Ashantis for the conservation of forests in Ghana. *SAGE Open*, 7(1), 2158244016687611.
- Asare, R. A., Kyei, A., & Mason, J. J. (2013). The community resource management area mechanism: A strategy to manage African forest resources for REDD. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 368(1625), 20120311.
- Asibey, M. O., Agyeman, K. O., Amponsah, O., & Ansah, T. (2019). Patterns of land use, crop and forest cover change in the Ashanti region, Ghana. *Journal of Sustainable Forestry*, 39(1), 35-60.
- Awatey, S. (2014). Awareness of residents in small-scale mining communities on the perceived environmental impact of small-scale mining: A case of Amansie west district in Ashanti region of Ghana. *Journal of Environment and Earth Science*, 4(10), 161-169.
- Baruah, M. (2017). Facipulation and elite formation: Community resource management in southwestern Ghana. *Conservation and Society*, 15(4), 371-383.
- Baruah, M., Bobtoya, S., Mbile, P., & Walters, G. (2016). Governance of restoration and institutions: Working with Ghana's community resource management areas. *World Development Perspectives*, 3, 38-41.
- Benedict, M. A., & McMahon, E. T. (2002). Green infrastructure: Smart conservation for the 21st century. *Renewable Resources Journal*, 20(3), 12-17.
- Biitir, S. B., Nara, B. B., & Ameyaw, S. (2017). Integrating decentralised land administration systems with traditional land governance institutions in Ghana: Policy and praxis. *Land use Policy*, 68, 402-414.
- Biitir, S. B. (2019). Designing land value capture tools in the context of complex tenurial and deficient land use regulatory regimes in Accra, Ghana. Lincoln Institute of Land Policy.

- Boadi, S., Nsor, C. A., Yakubu, D. H., Acquah, E., & Antobre, O. O. (2017). Conventional and indigenous biodiversity conservation approach: A comparative study of Jachie sacred grove and Nkrabea forest reserve. *International Journal of Forestry Research*, 2017, 8.
- Boamah, E. F., & Amoako, C. (2020). Planning by (mis) rule of laws: The idiom and dilemma of planning within Ghana's dual legal land systems. *Environment and Planning C: Politics and Space*, 38(1), 97-115.
- Boamah, N. A. (2013). Land use controls and residential land values in the Offinso South municipality, Ghana. *Land use Policy*, 33, 111-117.
- Bossart, J. L., & Antwi, J. B. (2016). Limited erosion of genetic and species diversity from small forest patches: Sacred forest groves in an Afrotropical biodiversity hotspot have high conservation value for butterflies. *Biological Conservation*, 198, 122-134.
- Britwum, A. O., Tsikata, D., Akorsu, A. D., & Ako, M. A. (2014). Gender and land tenure in Ghana: A synthesis of the literature. Legon, Ghana: ISSER, Institute of Statistical, Social & Economic Research, University of Ghana.
- Brunke, M., & Gonser, T. (1997). The ecological significance of exchange processes between rivers and groundwater. *Freshwater Biology*, 37(1), 1-33.
- Bulkeley, H., Kok, M., & Xie, L. (2021). Realising the urban opportunity: Cities and post-2020 biodiversity governance. The Hague: PBL Netherlands Environmental Assessment Agency.
- Calvelo, J. A. S. (2020). Understanding the link between customary land governance and land-use changes of green spaces in peri-urban Kumasi, Ghana.
- Chapoto, A., Houssou, N., Asante-Addo, C., & Mabiso (2018). A. Can smallholder farmers grow? perspectives from the rise of indigenous small-scale farmers in Ghana. 30th International Conference of Agricultural Economists; Vancouver.
- Cobbinah, P. B., & Amoako, C. (2012a). Urban sprawl and the loss of peri-urban land in Kumasi, Ghana. *International Journal of Social and Human Sciences*, 6(388), e397.
- Cobbinah, P. B., Gaisie, E., Oppong-Yeboah, N. Y., & Anim, D. O. (2020). Kumasi: Towards a sustainable and resilient cityscape. *Cities*, 97, 102567.
- Cobbinah, P. B., Gaisie, E., & Owusu-Amponsah, L. (2015). Peri-urban morphology and indigenous livelihoods in Ghana. *Habitat International*, 50, 120-129.
- Cobbinah, P. B., & Poku-Boansi, M. (2018). Towards resilient cities in Ghana: Insights and strategies. *Futures*, 101, 55-66.
- Crook, R.C. (2008). Customary justice institutions and local alternative dispute resolution: What kind of protection can they offer to customary landholders? In J. Ubink, & K. Amanor (Eds.), *Contesting land and custom in Ghana* (pp. 155-182). Leiden: Leiden University Press.
- Darku, P. K. (2016). The new scope: Forest policy, indigenous involvement and welfare considerations: The case of Kyirayaso in the Ashanti region of Ghana.
- de Bruin, S. & Dengerink, J. (2020). The impact of urbanisation on food systems in west and east Africa. The Hague: PBL Netherlands Environmental Assessment Agency.
- Drechsel, P., Graefe, S., & Fink, M. (2007). Rural-urban food, nutrient and virtual water flows in selected west African cities, (No. 115). IWMI.
- Duncan, A. E., de Vries, N., & Nyarko, K. B. (2019). The effectiveness of water resources management in Pra basin. *Water Policy*, 21(4), 787-805.
- Foli, S., Ros-Tonen, M. A., Reed, J., & Sunderland, T. (2018). Natural resource management schemes as entry points for integrated landscape approaches: Evidence from Ghana and Burkina Faso. *Environmental Management*, 62(1), 82-97.

- Food and Agriculture Organisation. (2020). Sustainable charcoal production for food security and forest landscape restoration. Skukuza-Mpumalanga, South Africa:
- Forest Peoples Programme. (2020). Local biodiversity outlooks 2: The contributions of indigenous peoples and local communities to the implementation of the strategic plan for biodiversity 2011–2020 and to renewing nature and cultures. A complement to the fifth edition of Global Biodiversity Outlook. Moreton-in-Marsh, England: Forest Peoples Programme.
- Forestry Commission of Ghana. (2008). National forest plantation development programme - annual report.
- Germán, L., & Bernstein, A. E. (2018). Land value capture: Tools to finance our urban future. USA: Lincoln Institute of Land Policy.
- Ghana Statistical Services. (2019). Ghana living standards survey. GSS.
- Gyamfi, A. (2020). Food supply chains: A case study of fresh fruits and vegetable logistics and its impact on food loss in Kumasi, Ghana.
- Islam, F. (2020). Understanding community willingness to invest in land-use through their property rights and obligations.
- Japan International Cooperation Agency, (JICA). (2013). The study on the comprehensive urban development plan for greater Kumasi.
- Kaumba, A. (2020). Land value capture for preservation of green landscapes: Case of peri-urban Kumasi, Ghana.
- Mahama, C. A., & Baffour, O. A. (2009). Management of stool land revenue in Ghana: A study of the Nkawie and Toase stools of the Atwima Nwabiagya district of the Ashanti region. *Journal of Science and Technology (Ghana)*, 29(1).
- Masoumi, H. E., Hosseini, M., & Gouda, A. A. (2018). Drivers of urban sprawl in two large middle eastern countries: Literature on Iran and Egypt. *Human Geographies*, 12(1), 55-79.
- Meijer, J., Giesen, P., Shames, S., Simons, H., Kamstra, J., Bosu, D., & Johnson, J. (2018). Towards a living landscape: Using modelling and scenarios in the Atewa-Densu landscape in Ghana. A case study on landscape strategies to achieve sustainable development goals. The Hague: PBL Netherlands Environmental Assessment Agency.
- van der Horn, S. and Meijer, J.R. (2015). The landscape approach . The Hague: PBL Netherlands Environmental Assessment Agency.
- Meinzen-Dick, R., & Nkonya, L. (2005). Understanding legal pluralism in water rights: Lessons from Africa and Asia. African Water Laws Workshop: Plural Legislative Frameworks for Rural Water Management in Africa.
- Mensah, C. A. (2014). Destruction of urban green spaces: A problem beyond urbanization in Kumasi city (Ghana). *American Journal of Environmental Protection*, 3(1), 1-9.
- Mensah, S. O., & Yankson, D. A. (2013). The role of agriculture in the economic empowerment of women in the Ejisu Juaben municipality in the Ashanti region of Ghana. *Journal of Environment and Earth Science*, 3(11).
- Millennium Cities Initiative. (2013). Presentation on stool land administration in Kumasi. Accessed via <http://mci.ei.columbia.edu/files/2013/10/stool-land.pdf>
- Ministry of Environment, Science, Technology, and Innovation (MESTI). (2002). National biodiversity strategy for Ghana. MESTI.
- Ministry of Environment, Science, Technology, and Innovation (MESTI). (2016). National biodiversity strategy and action plan. Accra, Ghana: MESTI.

- Ministry of Environment, Science, Technology, and Innovation (MESTI). (2018). Ghana's sixth national report to the United Nations Convention on Biological Diversity (draft). MESTI.
- Ministry of Water Resources, Works, and Housing. (2013). Riparian buffer zone policy for managing fresh water bodies in Ghana.
- Nesi, M.V (2021). Exploring access to water as a driver of land-use dynamics in peri-urban Kumasi, Ghana.
- Nyantakyi-Frimpong, H., Matouš, P., & Isaac, M. E. (2019). Smallholder farmers' social networks and resource-conserving agriculture in Ghana. *Ecology and Society*, 24(1).
- Oduro, C. Y., Ocloo, K., & Peprah, C. (2014). Analyzing growth patterns of greater Kumasi Metropolitan Area using GIS and multiple regression techniques. *Journal of Sustainable Development*, 7(5), 13.
- Osei-Agyemang, V. (2020). Sociocultural factors and value of green areas: A case study of Afigya Kwabre South district, Kumasi, Ghana.
- Pereira, L. M., Davies, K. K., den Belder, E., Ferrier, S., Karlsson-Vinkhuyzen, S., Kim, H., . . . Pereira, H. M. (2020). Developing multiscale and integrative nature–people scenarios using the nature futures framework. *People and Nature*, 2(4), 1172-1195.
- Perini, K., & Sabbion, P. (2017). *Urban sustainability and river restoration*. West Sussex: Wiley Online Library.
- Poku-Boansi, M., & Cobbinah, P. B. (2018). Are we planning for resilient cities in Ghana? an analysis of policy and planners' perspectives. *Cities*, 72, 252-260.
- Sarfo-Mensah, P., Oduro, W., Antoh Fredua, E., & Amisah, S. (2010). Traditional representations of the natural environment and biodiversity conservation: Sacred groves in Ghana. FEEM Working Paper.
- Silva, José Maria Cardoso da, & Wheeler, E. (2017). Ecosystems as infrastructure. *Perspectives in Ecology and Conservation*, 15(1), 32-35. doi:<https://doi.org/10.1016/j.pecon.2016.11.005>
- Takyi, E. (2020). Revealing the role of urban planning practices on spatial depletion of green spaces in peri-urban Kumasi, Ghana.
- Town and Country Planning Department, (TPCD). (2011a). The new spatial planning model guidelines. The Ministry of Environment, Science, and Technology.
- Town and Country Planning Department, (TPCD). (2011b). Zoning guidelines and planning standard. Ministry of Environment, Science, and Technology.
- Ubink, J. M. (2008a). *In the land of the chiefs: Customary law, land conflicts, and the role of the state in peri-urban Ghana*. Leiden: Leiden University Press.
- Ubink, J. (2008b). Struggles for land in peri-urban Kumasi and their effect on popular perceptions of chiefs and chieftaincy. In J. Ubink, & K. Amanor (Eds.), *Contesting land and custom in Ghana* (pp. 155-182). Leiden: Leiden University Press.
- van Oosten, C., Runhaar, H., & Arts, B. (2021). Capable to govern landscape restoration? exploring landscape governance capabilities, based on literature and stakeholder perceptions. *Land use Policy*, 104, 104020.
- Water Resources Commission. (2012). *Pra river basin - integrated water resources management plan*. Accra, Ghana.
- Yin, R. K. (2018). *Case study research: Design and methods*. Thousand Oaks, CA: Sage.

7.2 Websites used for information

- Clearing house mechanism of Ghana. (2006): https://gh.chm-cbd.net/cooperation/tech_coop
- Community Water and Sanitation Agency (2020): <https://www.cwsa.gov.gh/>

Fisheries commission. (2021): <https://www.mofad.gov.gh/agencies/fisheries-commission/fisheries-commission-at-a-glance/>

The Forestry Commission of Ghana: <https://www.oldwebsite.fcghana.org/>

Friends of the Earth Ghana: <https://www.foei.org/member-groups/africa-2/ghana>

Ghana Cocoa Board (COCOBOD). (2021): <https://cocobod.gh/>

Ghana Department of Parks and Gardens. (2018): <http://parksandgardens.gov.gh/>

Ghana Irrigation Development Authority. (2021): <http://www.mofa.gov.gh/site/directorates/sub-vented-organization-soes/irrigation-development-authority>

Ghana Water Company Ltd.: <https://www.gwcl.com.gh>

Ghana Wildlife Society. (2020): <https://www.ghanawildlifesociety.org/>

Conservation Alliance Ghana. (2020): <https://conservealliance.org/history-and-vision/>

Land-Use and Spatial Planning Authority of Ghana: <http://www.luspa.gov.gh/>

Ministry of Employment and Labour Relations. (2021): <https://melr.gov.gh/department-of-co-operatives/>

Ministry of Food and Agriculture of Ghana: <http://mofa.gov.gh/site/>

National Development Planning Commission. (2019): <https://www.ndpc.gov.gh/>

Nature Conservation Research Center. (2016): <http://natureconservationresearchcentre.org/>

The rainforest alliance, Ghana. (2021): <https://www.rainforest-alliance.org/tags/ghana>

Town and Planning Department of Ghana (2021): <http://tcpghana.gov.gh/>

Tropenbos. (2021). Traditional leaders appeal for reclamation bond for small-scale miners: <http://www.tropenbosghana.org/news/traditional+leaders+appeal+for+reclamation+bond+for+small-scale+miners>

Water Resources Commission. (2021): <https://www.wrc-gh.org>

WWF - worldwide fund for nature, Ghana. (2017): https://wwf.panda.org/wwf_offices/ghana/