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Urban planning and climate change in Ghana

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ABSTRACT

Urban planning is commonly blamed for its failure to exert a positive influence on managing climate change impacts in urban Africa; yet little is known about planning agencies' perspectives on climate change-urban planning conundrum, and corresponding policy responses. It is in response to this gap, this paper explores agency perspectives and policy responses on the possibility and procedure for harnessing urban planning as a tool for managing climate change impacts in a Ghanaian city of Kumasi. Using a review of three relevant urban planning and climate change policies of Ghana, and interviews with six urban planning and climate-related agencies in Kumasi, findings indicate a demonstration of an unclear nature of policies, and a lack of focus on climate change issues in urban planning. Evidence of weak agency framework and coordination challenges (e.g., logistics, enforcement of laws) were reported, a situation that has contributed to the city's inability to manage 'normal' climate change impacts (e.g., flash floods). The paper concludes with proposals for incorporating climate change concerns into urban planning in Ghana.

1. Introduction

Urban planning programmes in many African cities face numerous challenges in providing life-saving responses to residents who need them, in terms of managing the impacts climate change imposes (see Darkwah, Cobbinah, & Anokye, 2018). With rising urban populations coupled with unresponsive urban planning regimes (Cobbinah, Poku-Boansi, & Peprah, 2017), urban Africa is faced with ongoing and expected impacts of climate change (Costello et al., 2009; Intergovernmental Panel on Climate Change (IPCC), 2007). The nature and frequency of extreme weather events, such as warming temperatures and rising sea-levels, floods and droughts are expected to increase in intensity globally (Khan, 2012), with severe impacts on the survival of urban areas (Cobbinah et al., 2017; Canadian Institute of Actuaries, 2015). For example, disasters from extreme weather events in recent years have caused death and displacement of people (see Aulakh, 2013; Stern, 2007; The Planning and Climate Change Coalition, 2012). The foregoing shows that the impacts of climate change encompass a spread of potential environmental, spatial, social and economic impacts.

Research (e.g., Macarthy, 2012; IPCC, 2007) indicates both local and international commitments towards managing climate change impacts. Within these local and global commitments, urban planning is considered critical to managing such impacts (Cobbinah & Darkwah, 2017; Korah, Cobbinah, Nunbogu, & Gyogluu, 2017a). Commonly, urban planning responses to climate change involve two approaches: adaptation and mitigation. Whereas mitigation relates to reduction in greenhouse gas emissions,

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adaptation focuses on planning for adjustment to a new climate change induced situation. In this sense, it is understandable that many (e.g., Yuen & Kong, 2009; United Nations, 2016) consider integration of climate change issues into urban planning as necessary for achieving the Sustainable Development Goals, particularly goal 11, target 1.5 "building the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters". Similarly, goal 13 considers taking "urgent action to combat climate change and its impacts" (World Health Organisation (WHO), 2013; OECD, 2014).

While incorporating climate change into urban planning is reported to be an important pathway in managing risks, the African realism suggests otherwise. For example, majority of urban areas in Africa are characterised by weak and dysfunctional urban planning regimes (Cobbinah, Erdiaw-Kwasie, & Amoateng, 2015; Darkwah et al., 2018). In Ghana for instance, scholarly opinion (e.g., Adarkwa, 2012; Darkwah, 2016) indicates that weak urban planning regimes are producing and unleashing unguided urban growth across major cities. Relatedly, previous research (Cobbinah et al., 2017; Quagraine, 2011) emphasise how the colliding force of climate change and unplanned urbanisation is threatening urban survival in Africa. Yet, little is known about how urban planning in the context of policy and practice is responding to the threats of climate change in Africa (e.g., Adger, Huq, Brown, Conway, & Hulme, 2003; Darkwah et al., 2018). For instance, Darkwah et al. (2018) assessed the vulnerability of urban communities to climate change and the strategies to develop their adaptation resilience. Similarly, Adger et al. (2003) examined the risks of climate change in urban areas of developing countries and their adaptation responses in the framework of urban planning. Although some studies have been conducted on urban planning and climate change in developed countries (Blakely, 2007, pp. 1–25; Bulkeley et al., 2011), it remains to be demonstrated whether urban planning can be considered as a potential pathway for managing these climate impacts in urban Africa.

It is within the foregoing context that this paper inquires: if urban planning in Africa can be harnessed as a tool to manage the impacts of climate change. Using Ghana as a case region, the paper provides responses to this question by (i) reviewing Ghana's urban planning and climate change policies, and their foci on and effectiveness in managing climate change impacts; (ii) assessing agency perspectives on the role of urban planning in managing climate change impacts; and (iii) exploring ways of integrating climate change into urban planning. This study assumes that managing climate change impacts via urban planning regimes can deliver more sustainable, and adaptable outcomes compared to unguided and individual efforts (see Darkwah et al., 2018). Consideration for urban planning requirements, stakeholder coordination, and government commitment to improving the capacity of urban planning agencies have the potential to produce successful climate change impact management and further provoke local communities' commitment towards achieving the sustainable development goals.

2. Conceptual briefings

Climate change has intensified over the past three decades, with adverse effects on the world's poorest regions (Cobbinah & Anane, 2016; Parmesan & Yohe, 2003; Stott, Stone, & Allen, 2004). Managing climate change impacts is a global concern that requires local action, and that the ability of governments and city authorities to initiate and implement interventions remains a potential pathway toward minimising climate change impacts. A systems perspective philosophy (Huutoniemi & Williamo, 2014; Komiyama & Takeuchi, 2011) provides insights from key national urban planning and climate change frameworks, as well as city authorities' perception of the centrality of urban planning in dealing with urban development and management issues including climate change. Relevant to this study is Easton's political systems theory (1953), which when applied can help avoid many risks, crises, and difficulties. The basic unit of the political systems theory is 'interaction' which emanates from the members of the system's behaviour when playing their roles (Easton, 1953, p. 320; 1965). The theory is anchored on four major premises of pro-environmental behaviour; (i) system (made of interactions of those persons who take part in public life, and are related to making and implementing public policies); (ii) environment (comprising extra- and intra-societal environments. The extra-societal environment involves international political systems, alliances; and, international social systems, as cultural, socio structural, economic, demographic, and other systems. Intra-societal systems include ecological, biological, personality-oriented, social, cultural, socio-structural, and demographic systems operating within the political system); (iii) response (responding to its environment in coping with crises, stresses, and other difficulties); and (iv) feedback (a continuity by linking and obtaining information, reacting, and knowing the effects further to improve upon systems behaviour and responses) (Easton, 1953, p. 320; 1965). These are relevant for ensuring a holistic and comprehensive functioning of the 'system', i.e. addressing climate change based on interactions and perspectives of relevant organisations or groups.

This study draws insights from the political systems theory which has its fundamental elements anchored on the pro-environmental behaviour model (Kollmuss & Agyeman, 2002). This model sets a context for analysing perspectives of agencies on different urban planning and climate change issues, implementation strategies, and measurement of outcomes. Generally, by inference, the theory states that the relevant stakeholders at various levels of urban planning will make conscious attempts toward environmental sustainability in response to climate change and other urban development challenges (Ng, Lwin, & Pang, 2017). In this study, the theory considers city authorities as influencing stakeholders, acknowledging that the government can play either a catalytic or a restrictive role in enabling pro-environmental behaviour of communities. Cobbinah (2017) consider urban planning as process of stakeholder dialogue, particularly amongst actors such as urban residents, landowners, developers, investors and politicians, whose responsibilities and motives shape the urban environment in response to development pressure. Consistent with the systems theory, urban planning, according to Adams (2012) cited in Cobbinah and Darkwah (2017), is government's tool of engaging various stakeholders in the development process. This form of government intervention is emphasised by Pankaja and Nagendra (2015) as the basis for the formation of an improved urban environment by effectively regulating the development process.

The systems theory advocates for urban planning regimes that emphasise less on scientific determination of most appropriate technical solution, and consider social responses and community aspirations as essential elements for solution implementation (see Korah et al., 2017a; Yuen & Kong, 2009). Based on the foregoing, this study focuses on agency perspectives and policy responses to urban planning and climate change, specifically, infrastructure provision and political factors in the Ghanaian context. Infrastructure provision is one of the fundamental conditions of the theory. The absence or inadequacy of such a provision may deter people from complying with safe urban environmental practices to minimise risks such as developing on stream banks and flood prone areas (Chen & Tung, 2010).

Similarly, international political forces have relations to the theory which draw from the legal framework that enforces or encourages certain urban behaviours (Ng et al., 2017). For example, the United Nations Framework Convention on Climate Change (UNFCCC) requirement for participating countries is to set up regulations to minimise their GHGs. Such legal instruments are observed to have significant influence on shaping the behaviour of urban residents who would otherwise not find the effort worthwhile (Chen & Tung, 2010). In this paper, the researchers selected relevant policies and/or legislations to represent the political factor posited in the theory. The research uses data which show the policy construct. Examples of such category include access to land for development or building, clean air, finance, enforcement, green spaces and biodiversity; which have direct associations with climate change impacts and urban planning. It is in the foregoing context that this study is undertaken.

3. Materials and methods

3.1. Study setting

Literature on the history of urban planning in Ghana abounds (e.g., Adarkwa, 2012; Cobbinah & Ninminga-Beka, 2016; Fuseini & Kemp; 2015; Gocking, 2005; Quarcoopome, 1993). Generally, the literature shows that planning initiatives have focused on improving wellbeing of people (Cobbinah & Darkwah, 2017; Korah, Cobbinah, & Nunbogu, 2017b). Unfortunately, there is a lack of consideration and recognition of urban planning as a tool for managing climate change issues, despite the awakening global debates. Until 2012, when Ghana's first urban policy was developed, planning responses from pre-independence to post-independence showed limited commitment to climate change issues, as they mainly sought to provide basic social services and expand economic opportunities. Given that Ghana's National Urban Policy is “to promote climate change adaptation and mitigation mechanisms” (Government of Ghana (GoG), 2012), several policies were developed to help achieve the objective of addressing climate change risks. These are the National Climate Change Policy (2012) and National Climate Change Adaptation Strategy (2010–2020), which formed the basis of this study.

National agencies, such as the National Disaster Management Organisation (NADMO), have been setup to help minimise the adverse impacts of climate change. Established by Act 517 (1996), NADMO is mandated to provide disaster response and recovery assistance. Most importantly, NADMO has the primary responsibility of leading and co-ordinating national disaster response efforts by other stakeholders. Hence, the agency is responsible for: pre-disaster phase (prevention, mitigation), disaster or emergency phase (response), and post disaster phase (recovery) (GoG, 2010). Additionally, the new NADMO law, Act 2016 (Act 927), is expected to give NADMO a paradigm shift from reactive to proactive disaster risk management.

Issues of climate change and poor urban planning are ubiquitous and similar in Ghanaian cities (see Adarkwa, 2011; Amoako & Cobbinah, 2011; Fuseini & Kemp, 2015; Yeboah & Obeng-Odoom, 2010); as a result, this study focused on one city, Kumasi, due to time and logistical constraints. Kumasi was selected for this study based on: (i) its rapid urban population growth; (ii) evidence of climate change impacts with respect to warming temperatures and variable precipitations (Abanyie, 2011; Darkwah, 2016); (iii) its weak urban planning agencies which have consistently failed to ensure improved urban development (Amoateng, Cobbinah, & Owusu-Adade, 2013; Cobbinah & Korah, 2016; Darkwah, 2016); (iv) strong traditional authorities dominance in land administration and management, and (v) available relevant information on the city which provides background data for the study.

Kumasi remains Ghana's second largest city. Urbanising at a rate of 5.4% per annum between 2000 and 2010 when the last population and housing census was conducted, the city of Kumasi has a population of 2,035,064, which is about 8% of the national population (Ghana Statistical Service, 2014). Located in the transitional forest zone of Ghana (Amoako & Cobbinah, 2011), Kumasi has an undulating topography with elevations ranging between 250 m and 350 m above sea level (Kumasi Metropolitan Assembly (KMA), 2014). The city is characterised by two rainfall patterns; 214.3 mm in June and 165.2 mm in September each year with an average temperature of about 21.5 °C and 30 °C minimum and maximum respectively (Adarkwa, 2011). Available climate data for Kumasi from the Ghana Meteorological Service (GMS) show an increase in temperature and rainfall pattern, with differences in temperature of about 0.2 °C above the mean over the last decade indicating an increase of about 0.4 °C (Darkwah, 2016).

3.2. Research method

A review of three key urban planning and climate change policies in Ghana was undertaken. These were the National Urban Policy Framework and Action plan (2012), Ghana National Climate Change Policy (2012) and National Climate Change Adaptation Strategy (2010–2020). Additionally, a review of annual and action plans of government agencies on urban planning and climate change in Ghana from: the Town and Country Planning Department (TCPD), the Development Planning and Physical Planning Units of the Kumasi Metropolitan Assembly (KMA), National Disaster Management Organisation (NADMO), and Environmental Protection Agency (EPA) was undertaken. This formed the basis for establishing initiatives for incorporating climate change into urban planning, particularly in Kumasi.

Using semi-structured interviews, six urban planning and climate agencies in Kumasi were purposively selected and engaged in discussions on urban planning responses to climate change. These agencies included: The Development Planning and Physical Planning Units of KMA responsible for the physical and socio-economic development of Kumasi; the TCPD responsible for the spatial planning of Kumasi; EPA responsible for environmental development and management in Kumasi; NADMO; and the GMS station in Kumasi for providing data on climate pattern. Three officials each were interviewed from these agencies, comprising; the Director or Head, Assistant Director and another official with relevant knowledge on the subject. A total of eighteen (18) officials were interviewed. This sample size, although may be a limitation, was considered to be adequate for this type of study given the data difficulties, lack of reliable sampling frame, and the respondents' extensive experience, interest and understanding of climate change and urban planning issues. Data were collected on (i) understanding of urban development and climate change in Kumasi; (ii) perception and role of the agencies in managing climate change impacts; and (iii) the ways of integrating climate change into urban planning. The semi-structured interviews provided adequate flexibility in approaching different agencies, and at the same time addressing various aspects of the research issue (Cobbinah & Aboagye, 2017).

Content analysis was used to analyse interview transcripts and secondary data through an inductive and deductive coding process (Rubin & Rubin, 2005). This process was facilitated by the use of the NVIVO 10 software package for coding the data and developing categories. While codes were inductively developed from the research participants' perspectives on issues such as usefulness of urban planning to climate change, categories such as integrating climate change into urban planning were deductively created based on the findings from the literature and the research objectives. However, relationships were established by reconciling and refining codes and categories into more conceptual categories based on common relationships to avoid inconsistencies in the results. This process increased the understanding of the various data sets, as the research participants' perspectives on urban planning and climate change were reflected in the final categories.

4. Results and discussion

4.1. Agency perception on climate change and its impacts in Kumasi

Sarpong and Anyidoho (2012) argue that climate change is largely ‘a foreign concept’ with a global outlook, and in many cases, may affect management efforts. Localising climate change concerns would be a major step towards attaining set international targets, such as the SDGs. Agency responses on knowledge about climate change, its causes and effects demonstrate reasonable understanding of the phenomenon. Although responses on the perception of climate change (indicators) varied among the agency respondents, the major themes extensively discussed were rainfall (flood) and drought. The NADMO official explained climate change as the variation in rainfall pattern and temperature. The GMS official considered climate change as a change in the weather pattern over a period of time: The TCPD and GMS officials described climate change respectively as:

“climate change is when we experience heavy torrential rains than before and prolonged drought than anticipated.”

“Climate change is a change in the statistical distribution of weather patterns when that change lasts for an extended period of time usually decades to millions of years. However, human activities such as burning and cutting down forest are influencing it.”

The above quote is consistent with previous studies (Aulakh, 2013; Khan, 2012; IPCC, 2007) viewing climate change as a change in weather patterns which takes a longer period of time, about 50 years. Environmentally unfriendly human activities were reported as a contributory factor to climate change. For example, the NADMO official attributed the clearing of urban forests and felling of trees by urban residents as local contributors; while the EPA official mentioned increased emission from vehicles and industries as critical. This finding lends credence to Costello et al. (2009) and the Canadian Institute of Actuaries (2015) who argue that human activities and lifestyle contribute to increased greenhouse gases in the atmosphere; a major cause of climate change.

On the impacts of climate change, interview findings show that flooding and warming temperatures have become frequent in Kumasi in the last few decades. An official of KMA attributed poor institutional response to urban development and residents' attitudes in terms of building of houses in wetlands as the primary contributor to frequent and severity of flood events in the city:

“The increase in severe floods in Kumasi is caused by some residents in Kumasi nonchalant attitude of building in waterways due to limited capacity of the planning agencies, and increase population growth.”

Similarly, the NADMO official linked the flood situation to poor solid waste management practices. Some scholars (e.g., Amoako & Cobbinah, 2011; Darkwah, 2016) have explained that the complex interactions of riparian zones of rivers destruction, occupation on stream banks, and disposal of domestic wastes into streams and drains underlie perennial flooding in Kumasi. In fact, there is evidence of several urban developments evolving autonomously with considerable adverse implications on the city (see Korah et al., 2017b). Expectedly, interview results point to a warming temperature in Kumasi over the past two decades, due to a large extent, encroachment and destruction of green spaces.

4.2. Analysis of national urban planning and climate change policies

4.2.1. National Urban Policy Framework and Action plan (2012)

Ghana developed its first ever comprehensive National Urban Policy (NUP) in March 2012 through the Ministry of Local Government and Rural Development (MLGRD). The policy and action plan signify a comprehensive intervention within the urban

Table 1
Policy objectives and initiatives of Ghana's national urban policy framework.

Policy objective	Initiative for implementation
1. To facilitate balanced re-distribution of the urban population.	• Create new growth points as counter-magnets to fast-growing cities such as Accra and Kumasi. • Promote accelerated growth of small and medium-sized towns, including district and regional capitals.
2. To promote a spatially integrated hierarchy of urban centers.	• Undertake a study and establish a hierarchy of urban centers for defined functions and levels of services. • Minimise the travel time between service centers of all sizes and their hinterlands.
3. To promote the urban economic development	• Promote local economic development (LED). • Improve urban services and infrastructure to support economic development and advance industrial investments and production.
4. To improve the environmental quality of urban life.	• Develop and manage infrastructure systems with the appropriate technology needed to provide basic hygienic conditions in towns and cities. • Provide adequate equipment and operational funds to support waste management activities.
5. To ensure effective planning and management of urban growth and sprawl, especially of the primate cities and other large urban centers.	• Ensure that investments and development will consistently and increasingly be directed towards targeted counter-magnet growth areas.
6. To ensure efficient urban infrastructure and service delivery.	• Assess infrastructure needs of urban areas and mobilize resources to support infrastructural development.
7. To improve access to adequate and affordable low-income housing.	• Provide a congenial environment for private sector delivery of affordable housing.
8. To promote urban safety and security.	• Incorporate specific security and disaster prevention and management mechanisms in urban planning and management. • Intensify education on individual and community responsibility and initiative in urban safety and security.
9. To strengthen urban governance.	• Involve relevant state and non-state agencies and institutions in the governance of cities and towns.
10. To promote climate change adaptation and mitigation mechanisms.	• Intensify public information and awareness campaigns on energy conservation, climate change, and mitigation strategies. • Encourage progressive reduction of hazardous substances by industry. • Promote settlement structure plans designed to achieve a high level of amenity as well as the prevention of effluent and refuse pollution.
11. To strengthen applied research in urban and regional development.	• Strengthen the capacity of research institutions and other bodies concerned with urban and regional development.
12. To expand sources of funding for urban development and strengthen urban financial management.	• Find new ways of mobilising finance for investments and urban development.

Source: The National Urban Policy Framework, 2012

setting to promote sustainable development (GoG, 2012; MLGRD, 2012). Issues such as: weak urban planning measures resulting in uncontrolled and haphazard urban developments, deteriorating environmental urban quality, climate change challenges, insufficient infrastructure, intense human activities on the urban landscape, among others; motivated the preparation of the NUP. As indicated in Table 1, the NUP is expected to achieve the overarching goal of:

> "Promoting a sustainable, spatially integrated and orderly development of urban settlements with adequate housing, infrastructure and services, efficient institutions, and a sound living and working environment for all people to support the rapid socioeconomic development of Ghana".

Assessment of policy objectives as well as interviews show that the objectives remain uncertain and unclear as to whether the initiatives could be supported by practical efforts (specifically, logistics, human resource capacity and funds) for successful implementation. Interviews with the EPA officials however revealed the absence of institutional arrangement to ensure the effective implementation of the policy to address urban planning and management challenges:

> ' … the issue of the absence of institutional mechanisms to encourage other government departments to follow the implementation of the NUP should be critically addressed so as to effectively implement the policy and attain its goal … "

The policy appears to be committed towards incorporating climate change issues into urban planning. Specifically, objective 10 (see Table 1) of the policy seeks to promote "climate change adaptation and mitigation mechanisms". Three key initiatives have been outlined to achieve this objective, namely: (i) intensify public information and awareness campaigns on energy conservation, climate change, and mitigation strategies; (ii) encourage progressive reduction of hazardous substances by industry; and (iii) promote settlement structure plans designed to achieve a high level of amenity as well as the prevention of effluent and refuse pollution.

Interview findings show variation in responses on practical steps towards implementing the policy to manage climate change impacts. Whereas EPA and NADMO officials considered the policy focus on climate change adaptation and mitigation as a "*step in the right direction*", officials of the TCPD and Development Planning Unit of KMA, expressed concerns about the absence of clear pattern

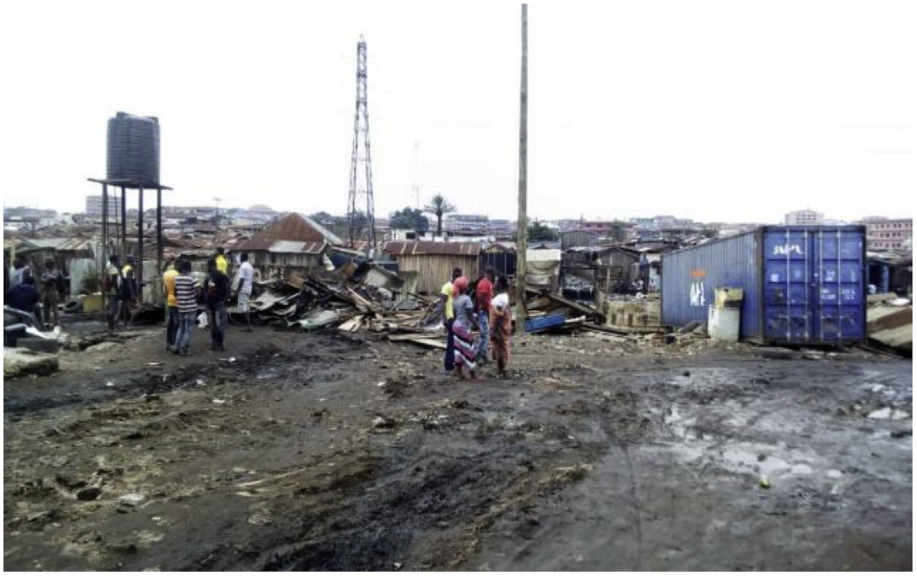

Fig. 1. Demolished (illegal) structures in waterways by city authorities in Kumasi.

of mobilising financial and capital resources to implement the initiatives. The TCPD official mentioned that:

> " …. . although the policy initiatives are laudable and seem effective in connecting urban planning to climate change, there are no clear indication of financial resource mobilization mechanisms which has contributed to the poor implementation of the policy".

Similarly, the Development Planning Unit of KMA official reported evidence of non-compliance with planning laws by developers and residents, a situation that has exacerbated exposure to and weakened adaptive capacity of the city to climate change risks (see Figs. 1 and 2):

> " … many residents in Kumasi are ignoring building laws, and settling in unauthorized areas without development permit … These attitudes pose enormous challenges on us in managing the urban landscape and addressing the risks associated with climate change impacts – floods, drought, etc."

Darkwah (2016) and Owusu-Ansah (2015) have reported increasing cases of encroachment on areas liable to floods in Kumasi, with adverse outcomes such as destruction of properties and loss of lives. This situation of non-adherence to planning regulations limits urban planning capacity to create a climate resilient environment. Although this finding is a representative of concerns expressed and perception of respondents, the TCPD official considered inadequate funds, limited technological advancement and expertise, and personnel as primary challenges contributing to the poor implementation of the climate change component of the NUP in

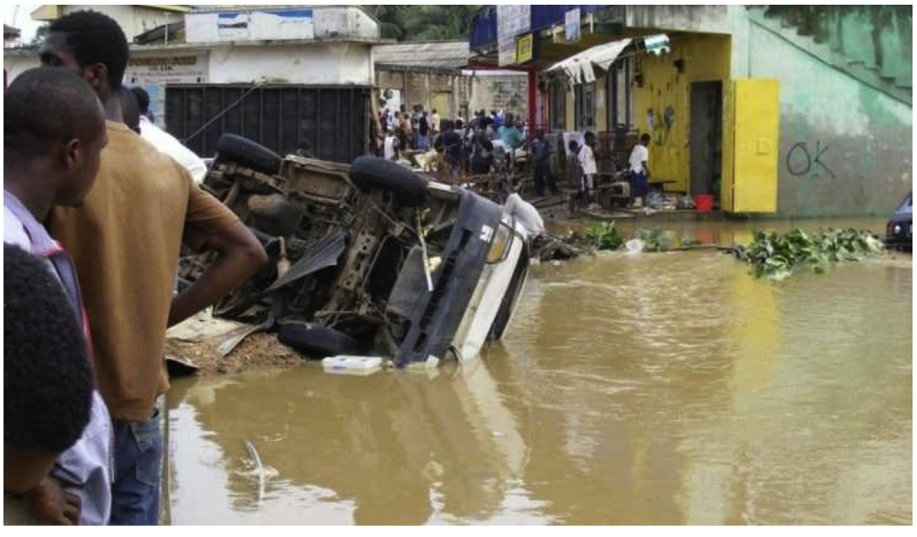

Fig. 2. Flooded area due to buildings in waterways in Kumasi.

Table 2
Policy themes and strategic focus areas of National Climate Change Policy.

Policy Themes		Strategic Focus Areas
1	Agriculture and Food Security	• Develop climate-resilient agriculture and food systems
2	Disaster Preparedness and Response	• Build Climate Resilient Infrastructure • Increase Resilience of Vulnerable Communities to Climate-Related Risks
3	Natural Resource Management	• Increase Carbon Sinks • Improve Management and Resilience of Terrestrial and Aquatic Ecosystems
4	Equitable Social Development	• Addressing Impacts of Climate Change on Human Health • Minimise Impacts of Climate Change on Access to Water and Sanitation • Addressing Gender Issues in Climate Change • Addressing Climate Change and Migration
5	Energy, Industrial, and Infrastructural Development	• Minimise Greenhouse Gas Emissions

Source: Adapted from National Climate Change Policy, 2012.

Kumasi.

Officials of the TCPD and EPA indicated commitment to address some of these challenges with the available limited resources. The TCPD official asserted that:

> " … specifically, we have taken conscious efforts to engage traditional leaders (chiefs) in the city to follow the legal procedure in leasing lands to developers, by offering services and technical expertise on demarcating lands, ensuring that physical developments do not take place in flood prone areas and buildings meet the requirements of city authorities to improve risk management and enhance response to disasters, should they occur all in line with meeting the specific climate change objective of the NUP … "

The foregoing indicates that the implementation of the NUP has not had any significant and meaningful urban planning outcomes in relation to climate change in Kumasi yet.

4.2.2. National Climate Change Policy (NCCP)

The National Climate Change Policy (NCCP, 2012) is Ghana's integrated response to the challenges of climate change within its socio-economic context. The policy, prepared and designed in 2012 within the framework of national sustainable development priorities, sought to mainstream climate change into policies and sectoral activities to achieve sustained growth. The policy has five themes with respective strategic focus areas (see Table 2).

Interview with the NADMO and KMA officials revealed that the focus areas of the policy are effective in directly managing climate change issues in the city. Analysis of the NCCP shows that the various policy actions and programmes are consistent with the global call to addressing climate change impacts, specifically, the SDGs (United Nations, 2016), and are critical in addressing climate change issues in Kumasi. An instance is the focus area of building climate change-resilient infrastructure with policy actions such as the use of Information Communication Technology in monitoring climate events and providing an early warning system.

From an urban planning perspective, the TCPD officials indicated that some specific policy actions needed consideration in order to employ urban planning as a tool to manage climate change impacts. The official of TCPD mentioned that:

> " … policy actions of revising design standards, building codes and spatial planning to include climate change parameters are some of the ways urban planning has been integrated into climate change to help understand how appropriate infrastructure can reduce vulnerability and risk to climate-related events."

There was a consensus among the officials that the implementation of the policy has largely been unsuccessful due to financial resource constraints and inadequate technical knowledge on climate change issues, due to weak institutional capacity in climate change-related matters. These constraints are reported to be persistent and adversely affecting most urban planning agencies in their quest to implement urban planning schemes (Yeboah & Obeng-Odoom, 2010). Considering these challenges, the involvement of private sector agencies (identifying relevant agencies, emphasising roles and accountabilities, and designing institutional and collaborative mechanisms) to the fight against climate change was considered relevant in ensuring effective implementation of the climate change policy. The NADMO official indicated that:

> "Institutions should be able to partner with private firms with knowledge and skills in climate change issues in terms of financial and technical assistance in implementing this policy to achieve the full vision of the policy. Each stakeholder should, clearly set out how it plans to uphold the policy fundamentals in a statement of policy making."

Just like the NUP, the NCCP appears to have implementable and targeted objectives, where it indicates the needed infrastructure to be provided as well as the necessary political factors to be considered, which are consistent with the theoretical framework of this paper. It is clear from the review and the interviews that implementation is the major barrier to urban planning responses to climate change concerns in Kumasi.

4.2.3. National Climate Change Adaptation Strategy (NCCAS)

Analysis of the NCCAS with the goal "*to enhance Ghana's current and future development to climate change impacts by strengthening its adaptive capacity and building resilience of the society and ecosystems*" shows that it is Ghana's targeted planning approach to a more

effective and less costly way of responding to climate change impacts. An important infrastructure provision approach is that the NCCAS establishes a consistent, innovative, comprehensive and a targeted approach to increase climate resilience and decrease the vulnerability of the population. Similarly, the key political factor considered by the NCCAS is promoting grassroot development and achieving its intended outcome through implementation and enforcement of related activities by both the public and private sectors.

Analysis of the NCCAS shows that the formulated objectives: (i) societal awareness and preparedness for future climate change; and (ii) enhancing the mainstreaming of climate change into national development to reduce climate change risks; are all directed toward achieving climate change resilience in Ghana. However, the objectives of the NCCAS were not explicitly stated in the context of clearly establishing the relationship between urban planning and climate change. On this, the TCPD official commented that:

"The strategies of the NCCAS seems practical for implementation. It however does not indicate any clear cut suggestion for financial resources mobilization for its implementation."

Nonetheless, some specific objectives express this connection. Significant among them include: identifying gaps in existing land-use regulations, review of policies to deal with land management issues and enforcement of land use regulations for sustainable development. These are directed towards improving urban planning to reduce climate change impacts. Analysis of the NCCAS, supported by interviews indicate that the goal, objectives, and strategies seek to embrace urban planning as a crucial tool to manage climate change impacts in cities, as they emphasise addressing the impacts of climate change and promoting adaptation. However, interview results show that implementation of the policy's strategies has similarly become increasingly impossible due to logistical constraints, inadequate funds, and limited technical support. The officials of NADMO and EPA respectively asserted that:

"Our agency lacks the needed equipment, vehicles, raincoats and warehouse to do many of the assignments. In this case, it is understandable that our efforts are ineffective in implementing the climate change policy strategy" …. . NADMO Official

"*We are facing challenges in implementing the climate policy because the funds for implementation are not adequately enough and also not made available on time.*" …. . *EPA Official*

Although there appears to be conscious attempts to recognise the role of urban planning in managing climate change, successful implementation of the policy to achieve intended outcomes is far from reach, due to several institutional challenges. These challenges confirm the claim of Yeboah and Obeng-Odoom (2010, p.94) that:

"… the planners and the planning agencies themselves work within severe constraints, ranging from issues in land ownership and supply, through poor funding and inadequate human resources, to a weak legislative framework. They are correct in saying that: 'We are not the only ones to blame'.

4.3. Managing climate change via urban planning in Kumasi: agency perspectives

Urban planning plays a major role in managing climate change impacts (Macarthy, 2012). Interview findings show that planning actions and inactions in Kumasi have largely influenced the nature and extent of climate change impacts. The KMA official indicated that:

" …. . How we plan our cities influences the impact of climate change because poorly planned cities are very much susceptible to the impact of climate change than properly planned cities."

Further interviews with the TCPD and EPA officials show that the role of urban planning in managing climate change is significant and critical in improving land use planning to reduce the impact of climate change:

" … Properly demarcating of lands will prevent people from occupying wetlands in Kumasi." EPA Official

On the issue of urban planning as a tool to manage climate change impacts, the TCPD emphasised attention to the environmental dimension of urban planning where efforts should be directed towards preparing cities to prevent, manage and withstand associated risks, while the KMA officials emphasised compliance of planning laws:

"Climate design and standards together with open space and green areas are important to ensure a sustainable neighbourhood". TCPD official

" …. It is expected that enforcing compliance with urban planning laws will prevent and deter people from occupying wetlands and prevent the depletion of green spaces thereby helping to minimize the impact of climate change in the form of flooding and warming temperature". KMA Official

Interview findings suggest two key ways to effective use of urban planning to manage climate change impacts: collaboration among agencies and priority setting; and addressing management challenges. It is worth acknowledging however that collaboration is fundamental if urban planning is to be effective in managing climate change impacts in Kumasi. Yuen and Kong (2009) expressed similar opinion that collaboration across planning, enforcement and compliance regimes has the potential to strengthen integration of environmental concerns into broad development agenda. Interview data show that collaborations amongst the planning institutions in Kumasi primarily focused on issues of climate change hazards such as flood disasters, landslides and relocation of vulnerable communities. This finding confirms the assertion that urban planning's role in managing climate change concerns determining new and existing development that builds community resilience to issues such as flood risk (Ng et al., 2017; Pankaja & Nagendra, 2015).

The EPA collaborates with NADMO on disaster risk management by training and education of residents on causes and adverse effects of climate change as well as providing relief items to disaster victims, and TCPD by serving as technical expertise on their committees to decide and plan on settlement layouts so as to minimise occurrence of hazards and build resilience:

"EPA serves as technical advisors on the committee for urban planning to provide technical expertise on issues relating to the environment such as providing green spaces in settlement layouts" … EPA Official

The TCPD collaborates with the EPA on issues on protecting urban green spaces from encroachers; NADMO on issues of flood management to prevent flood disasters in Kumasi; and the Water Resources Commission to prevent people from building in waterways. Similarly, interview with NADMO shows that the agency collaborates with the TCPD in the removal of structures in waterways to minimise occurrence of floods and associated risks:

"NADMO collaborates with the TCPD because they are in charge of planning our cities, so when we are embarking on the demolition of houses in waterways we consult them whether the structures are supposed to be there or not" … NADMO Official

It was further revealed that each of these agencies complemented the efforts of the other by playing their respective mandated roles. These collaborations, as part of urban planning systems, were to promote and build upon mitigation and adaptation measures. The GMS specifically collaborates with NADMO to provide daily weather forecast to facilitate early warning signals. These early warning systems are considered effective in reducing exposure to risks, and the losses incurred. NADMO with the help of foreign donors has developed a software called the Community Resilience through Early Warning (CREW) to notify communities about early warning climate disasters. Early warning systems are useful in managing the long-term adverse effects of climate change including changing rainfall patterns, reduction in agricultural production and food security, worsening water security and decreasing fish resources (Asante & Amuakwa-Mensah, 2015). However, the implementation of the software is faced with the challenge of weak technical staff to operate the software. The findings further show a weak institutional framework. For instance, there is evidence of horizontal coordination for improved inter-sectoral policy implementation. Again, there is no functional separation between policy formulation, regulation, asset management and service provision, which are pre-requisites for improving the effectiveness of the urban planning in managing climate change.

The institutional capacity challenges to manage climate change impacts comprised inadequate human resources, and inadequate logistics contributing to poor quality of works. To the KMA officials, inadequate funding and lack of knowledge and skills considerably impede efforts to collaborate, integrate climate change into urban planning, and implement plans. The officials confirmed that inadequate skills in climate change issues had constrained the integration of climate change into KMA's day-to-day planning practices such as preparation and implementation of development plans. Officials of TCPD and NADMO shared similar experiences:

"we lack the skills and knowledge in the application of climate change issues in urban planning hence our inability to integrate climate change issues into urban planning to value its usefulness in our activities." TCPD official

"The reason for the low technical skills and capacities in integrating climate change into urban planning is because the current urban planning programmes run in universities do not have adequate coverage of climate change in their curricula." NADMO official

It is clear from the foregoing that the response to climate change impacts needs to be pursued from coordinated policy actions that seek to integrate adaptation and mitigation into planning practice. This is expected to safeguard developmental gains from the impacts of climate change and build a climate resilient city (GoG, 2015).

5. Concluding remarks

Urban planning and management remain a central focus towards achieving the Sustainable Development Goals, particularly Goals 11 and 13. Urban planning has the fundamental aim of creating places that are environmentally sustainable, socially inclusive and economically vibrant (Cobbinah et al., 2017; Korah et al., 2017b). It remains a relevant tool for managing climate change impacts; hence the need to incorporate climate change issues in local policies and plans. Regrettably, despite the many policies, plans and programmes aimed at managing climate change impacts, findings from this study show marginal success. Implementation challenges such as inadequate funds, poor enforcement of planning laws, logistics and weak institutional capacity have constrained the integration of climate change into urban plans as well as the implementation of both local plans and national policies. In all of the above, urban planning in the city has failed to become future-oriented, and has instead remained reactionary, with respect to managing climate change. Although several studies frequently blame 'urban planners' or the 'urban planning agencies' for these deficiencies, this paper has shown that urban planning agencies work within severe constraints (e.g., complex land ownership system, and inadequate human resources).

This study calls for a participatory approach and clear institutionally-defined roles towards policy implementation. Integrating climate change into urban planning should be done through a consensus-building and negotiation approach. This approach is relevant because of the ever-increasing range of actors; hence the need to enhance functional clarity and identify gaps in functional capacity. There is also the call to strengthen and incorporate the needs of wide range of actors, making use of multi-stakeholder consultation and participatory approaches to ensure their effective engagement in setting priorities and implementing plans. Furthermore, priority should be placed on the institutional framework (clearly-defined roles, expectations, coordination and relationship among them as well as checks and balances to minimise and avoid overlaps in duplication of efforts).

To overcome the crisis in human resources, the study proposes training and engagement of more professional urban planning personnel who have the requisite knowledge for managing climate change impacts. Capacity building programmes and workshops should be organised by agencies such as TCPD, EPA, KMA, and NADMO for their officials to equip them with the needed skills and tools. More so, this study suggests conscious attempt to facilitate enforcement and compliance with planning laws and building standards. On another note, the provision of sustainable funding for urban planning practice remains critical. One way to resolve this problem is to increase opportunities for private sector participation in socioeconomic infrastructure development and implementation arrangement.

Conflicts of interest

None.

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