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RESEARCH ARTICLE

Urban green space planning in the Kumasi Metropolis, Ghana: a prioritization conundrum and its co-benefits solution

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Abstract

Urban green spaces (UGS) are often promoted as a pathway to achieving urban sustainability. In relation to climate change impacts, they offer both mitigating and adaptive pathways for cities. Yet, increasing UGS is set against other development needs that confront cities of the Global South. This can result in a prioritization conundrum in urban planning processes. Using data from a questionnaire administered to 400 residents of the Kumasi Metropolis, Ghana, this paper examines residents' awareness and priorities of UGS for conflicting rationalities and explains how this can engender a prioritization conundrum. The study finds conflicts in residents' rationalities of UGS, manifesting as residents' low prioritization of UGS despite their experiences of climate change impacts and awareness of UGS benefits including its role in tackling climate change impacts. Here, the prioritization conundrum concerns how to account for residents' awareness and priorities in urban planning and plan for goals that residents do not consider a priority. Such a conundrum can derail efforts to use UGS to tackle climate change impacts. Hence, to navigate the prioritization conundrum, this paper emphasizes co-benefits to adduce two implications. First, effective mainstreaming of UGS co-benefits into urban planning is imperative, which can be achieved by harmonizing residents' priorities with climate change goals during plan preparation for the Kumasi Metropolis and actively engaging residents in UGS planning. Secondly, traversing the prioritization conundrum is dependent on the capacity to effectively mainstream UGS co-benefits in urban planning—without which planning for UGS to tackle climate change impacts can be hindered.

Keywords Urban green spaces · Conflicting rationalities · Prioritization conundrum · Co-benefits · Kumasi

1 Introduction

Concerns about climate change impacts have become germane to the urban sustainability discourse (Intergovernmental Panel on Climate Change [IPCC] 2022, p. 13). Climate change impacts, for instance, threaten the survival of humanity with urban areas at higher risk of its harsh consequences while also undermining efforts to promote prosperity and reduce poverty—particularly in Africa, South America, and Asia due to their low capacities to deal with current and projected impacts (IPCC 2022, p. 9).

Scholars and practitioners alike have recommended urban green spaces (UGS) as a potent opportunity to deal with climate change impacts in urban areas (Cohen-Shacham et al. 2016, p. 13–15; Kabisch et al. 2017, p. 3; Matthews et al. 2015, p. 156).[1] In one such recommendation, Goal 11-Target 7 of the Sustainable Development Goals (SDG) places emphasis on "safe, inclusive and accessible green and public spaces" (United Nations General Assembly 2015, p. 22). These recommendations are grounded in the pursuit of urban sustainability (Kabisch et al. 2017, p. 4), the rights of residents to a clean and healthy environment (United Nations, 2022), and the potential of UGS to offer simultaneous and multiple benefits—often referred to as co-benefits (Albert et al. 2021, p. 1448; Almenar et al. 2021, p. 2; Alves et al. 2022, p. 987).

Unfortunately, the prioritization of UGS amidst other compelling development needs often means that they receive

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[1] Different scholars define UGS differently (*see* Boulton et al. 2018; Nilsson et al. 2012; Richardson et al. 2013; Swanwick et al. 2003), but this study defines UGS as all publicly and privately owned vegetated lands in urban areas.

less attention (Cohen-Shacham et al. 2019, p. 24; Kabisch et al. 2016, pp. 7–8; Matthews et al. 2015, p. 160), particularly in Global South cities where development problems abound (Cilliers et al. 2021, p. 91; Diko and Hollstein 2021, pp. 14–15). This raises a prioritization conundrum—herein defined as the challenge where UGS are less prioritized, in relation to other development needs, despite a general recognition of their benefits such as in helping residents and their communities mitigate and adapt to climate change impacts. A prioritization conundrum can result from divergent interests, perceptions, and/or awareness of an actor or divergent interests, perceptions, and/or awareness among multiple actors, particularly between urban planners and residents (de Stage and Watson, 2018, p. 3; Ngwenya and Cirolia, 2021, p. 692; Watson, 2003, p. 395). This divergence is what Watson (2003, p. 395) terms "conflicting rationalities." Focusing on residents as an actor in urban planning, conflicting rationalities concerns not only divergence in interests and perceptions but also how to account for residents' awareness and priorities in urban planning and plan for goals that residents do not consider a priority—i.e., a prioritization conundrum.

In Global South urban scholarship, the idea of conflicting rationalities has gained some traction since its emergence and emphasizes the important role of residents' interests and priorities in urban planning processes. It has been applied in studies on energy access via digitization (Guma et al., 2022) and housing provision (Debele and Negussie Massey, 2013; Ngwenya and Cirolia, 2021; de Stage and Watson, 2018, Watson, 2003). Yet, its application in UGS planning is seemingly absent. Additionally, these studies have primarily focused on the divergence between actors—such as residents and urban planners—with less emphasis on the potential conflicts in an actor's rationalities of a particular issue. In this paper, residents' UGS awareness and priorities are conceived as their rationalities of the amenity and are then examined to identify whether there is any conflict.

This paper contributes to emerging studies on conflicting rationalities demonstrating that conflicts in rationalities are not only between actors but can also be within an actor (Ngwenya and Cirolia 2021, pp. 698–701). In contributing to this scholarship, this study asks: How do residents' awareness and prioritization of UGS present a prioritization conundrum? How can this prioritization conundrum be addressed through mainstreaming co-benefits into UGS planning? Using results from a questionnaire administered to 400 residents of the Kumasi Metropolis in Ghana, the study offers insights on how UGS can be positioned as a necessary urban amenity crucial for tackling climate change impacts amidst residents' other development needs. In Ghana (World Bank and Ministry of Food and Agriculture 2020) and the Kumasi Metropolis, these insights are important as residents are already experiencing climate change impacts such as increased intensity and duration of rainfall, rising temperatures (Mensah et al. 2020; Dodoo and Ayarkwa 2019; Nero et al. 2017) and flooding, alongside declines in UGS (Abass et al. 2020, 2022; Abass 2020) and socio-economic development challenges.

2 Co-benefits and the prioritization conundrum from conflicting rationalities

Arguments for co-benefits indicate that in tackling climate change impacts, there are benefits that may accrue by harmonizing climate goals with community needs thereby attaining multiple and simultaneous development goals (Albert et al. 2021, p. 1448). Given the challenges of funding UGS (Kabisch et al. 2016, p. 39; Boulton, et al., 2020, p. 7; Boulton et al., 2018, p. 91), co-benefits can facilitate the efficient use of scarce resources to achieve both climate change and socio-economic development goals by implementing climate strategies such as UGS amidst other compelling development priorities. Indeed, studies reveal that UGS co-benefits relate to social, environmental, and economic aspects of community improvements. UGS provide spaces for recreation and leisure that improve residents' health (Alcock et al. 2014; Annerstedt et al. 2012), abate energy demand and cost (Alcazar et al., 2016; Jim and Tsang 2011), regulate urban heat, improve air quality, sequester carbon dioxide, reduce pollution (Anderson and Gough 2022; Emmanuel and Loconsole 2015; Speak et al. 2012), promote sustainable water management (Hynes et al. 2022; van Wesenbeeck et al. 2022), and support a sustainable economy (Loiseau et al. 2016; Maes and Jacobs 2017), as well as build social capital and community sense of place (Hunter and Luck 2015; McMillen et al. 2016; Peters et al 2010). For this reason, making co-benefits, a "desired impact" gives impetus to its mainstreaming in UGS planning (Albert et al. 2021, p. 1456).

Nonetheless, accounting for co-benefits in UGS planning is often difficult due to conflicting development goals among varied urban actors as well as the complexity of governance and urban planning systems (Pagano et al. 2019, pp. 544–545)—comprising different actors, interests, and levels of decision making that are embedded within the physical, institutional, economic, cultural, and social aspects of cities (Hughes 2017, p. 363). Conflicting rationalities emerge from the interactions of these aspects as prioritizing UGS to tackle climate change may diverge from actors' interests and development goals relating to education, transportation, land use, economic development, or housing. For instance, conflicting rationalities can manifest as divergent interests among local government departments due to fragmentation, poor collaboration, and coordination of functions and responsibilities (Kirkpatrick et al. 2013, pp. 128–129). Another manifestation of conflicting rationalities is evident in the

dissonance between short-term development goals of some development interventions and long-term goals and planning cycles of climate interventions like UGS (Hughes 2017, pp. 371–372; Kabisch et al. 2016, p. 7). Here, the short-term nature of electoral cycles puts pressure on elected officials to focus more on short-term infrastructure investments with immediate and seeming direct economic returns rather than those of UGS which are often indirect and with impacts in the long term (Kabisch et al. 2016, p. 7). The result is that urban planners and policymakers, although recognizing the importance of UGS, often do not prioritize this amenity and the needed financial resources for their provision compared to other compelling development needs such as housing, transportation, and economic development (Mikulec et al. 2013, p. 82). Another form of conflicting rationalities relates to the dissonance between perceptions, aspirations, and interests of an actor—such as residents—around a particular issue or initiative like UGS. Here, conflicts in rationalities are not between different actors but within an actor's own rationalities (Fischer et al., 2017, p. 2000; Ngwenya and Cirolia, 2021, pp. 698–701). Hence, the conflicts of rationalities between actors as well as the conflicts of rationalities of an actor on UGS can engender a situation where UGS are not prioritized to tackle climate change impacts—in other words, a prioritization conundrum. For residents, the prioritization conundrum can manifest as the challenge where residents experiencing climate change impacts may have a low priority for UGS despite their general recognition of the amenity's roles in tackling climate change impacts.

In Africa, these conflicting rationalities are compounded by the fact that residents do not view climate actions as urgently crucial (Obradovich and Zimmerman 2016, p. 292). This can engender a situation where climate-related interventions such as UGS receive low attention and prioritization from residents and decision-makers (Diko and Palazzo 2019, pp. 368–369; Diko and Hollstein 2021, p. 14), and consequently, are not mainstreamed in urban planning processes.

Indeed, the saliency of navigating the UGS prioritization conundrum lies in the ability to ensure that UGS alternatives are appropriately identified for implementation (Cohen-Shacham et al. 2019, p. 7; Croeser et al. 2021, p. 2; Frantzeskaki 2019, p. 108). In this way, the risks of outright failures can be avoided as navigating the prioritization conundrum can help to refine UGS goals to effectively account for residents' socio-economic development priorities in UGS planning and to deliver its co-benefits (Cohen-Shacham et al. 2019, p. 23; Cohen-Shacham et al., 2016, p. 6; Croeser et al. 2021, p. 3). Additionally, UGS will be deployed as nature-driven and "problem-solving" initiatives seeking to address residents' needs and not merely meeting expectations from other stakeholders such as urban planners or development finance agents (La Rosa et al. 2021, p. 331). Fittingly, calls to tackle climate change impacts also call attention to the priorities of residents (IPCC 2022, p. 160). Hence, understanding conflicts in residents' rationalities of UGS will help to provide an understanding of the nature of the UGS prioritization conundrum to help address residents' socio-economic development priorities and climate change goals effectively and simultaneously.

3 The setting of the research

3.1 Research design

This research used a case study design as it allows for the examination and understanding of a phenomenon or an issue in a specific real-life context (Yin 2009, p. 18). It focuses on how residents' awareness and prioritization of UGS (i.e., their UGS rationalities) may be conflicted, presenting a prioritization conundrum in urban planning. It also focuses on how co-benefits offer a way to address the prioritization conundrum. The study area was the Kumasi Metropolis (Fig. 1),[2] the capital of the Ashanti Region of Ghana and the second largest urban area in terms of population at the time of the study with 1,730,249 inhabitants, according to the Ghana Statistical Service (2014). It was at a time considered the garden city of West Africa due to its natural greenery and British planning heritage of garden city planning. However, rapid urbanization and low attention to UGS planning have resulted in significant declines in UGS (Abass et al. 2019, p. 909; Abass 2020, pp. 1375–1377), rendering this accolade questionable (Diko and Palazzo 2019, p. 369). For this reason, the Ghana Statistical Service is right to call for "conscientious conservation plans" to manage existing UGS and to plan for future ones (Ghana Statistical Service 2014, p. 2).

3.2 Data collection

The data collection comprised a survey of residents aged 18 years and older living in the various sub-metropolitan areas of the Metropolis. Using a survey allowed residents to be asked specific sets of questions via a questionnaire and facilitated the aggregation of the responses (Ruane 2005, pp. 130–134). These questions were informed by a broader understanding of the UGS literature and the research questions of the study. The data from this study are part of a broader research project with a questionnaire that comprised both structured and semi-structured questions organized across 12 themes. This paper reports on data relating to the

[2] This research considers the Kumasi Metropolis as it was officially demarcated before November 2017 when new local government jurisdictions were defined and redefined.

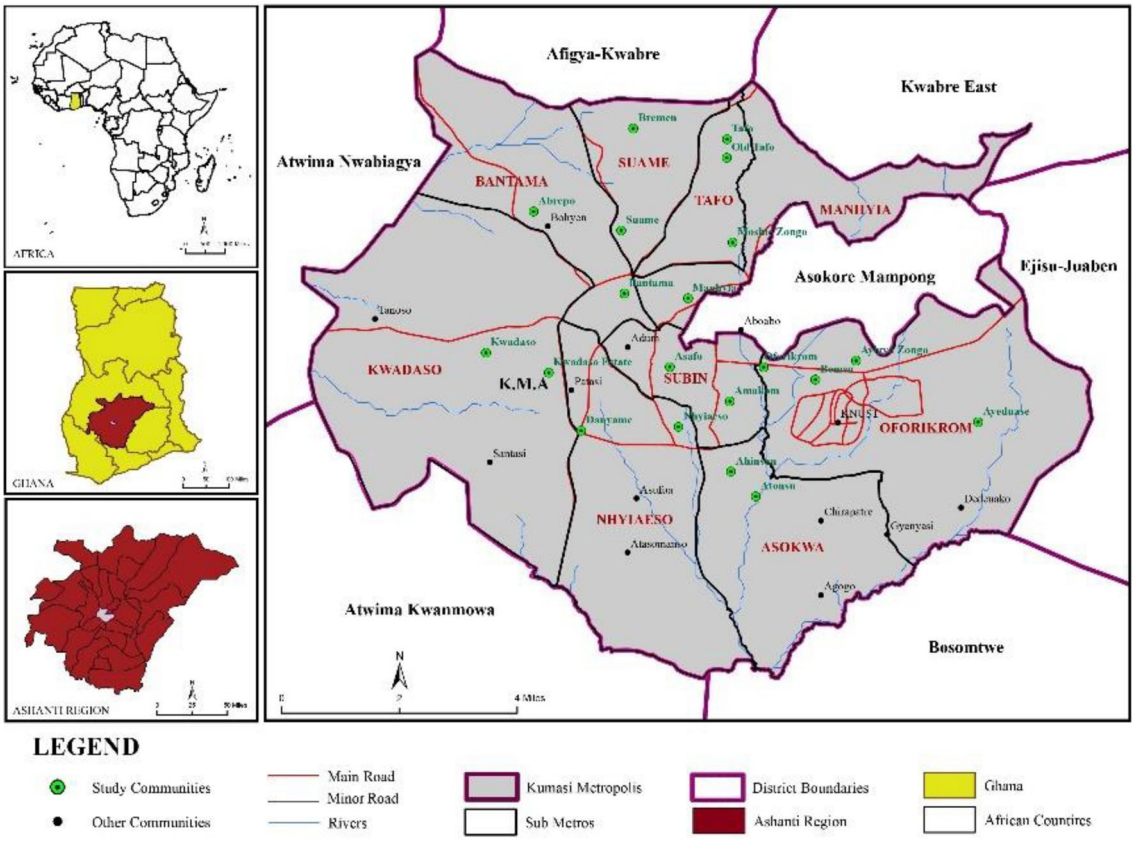

Fig. 1 Map of the Kumasi Metropolis, the study area. *Source*: Maps created by Author. *These maps do not consider changes in regions and districts after 2017

themes of climate change awareness, awareness of UGS benefits, needs of urban residents, residents' prioritization of UGS, and demographics. Residents' awareness data on UGS benefits and prioritization were acquired using Likert scales. Likert scales were employed because they allow researchers to collect data on the direction and strength of the feelings of respondents concerning a specific issue (Boone and Boone 2012; Jamieson 2004). Data on residents' needs were collected using an open-ended question. Table 1 provides a description of the questions from the questionnaire reported in this study.

Overall, 400 residents of the Kumasi Metropolis aged 18 years and above were part of this research project (Table 2). The Slovin's formula: $n = N/[1 + N(\alpha)^2]$, where n = sample size; N = sample frame (total adult population of study area);[3] α = margin of error (Tejada and Punzalan 2012, p. 129) guided sample size determination estimates. The population of the various sub-metros informed proportional stratification estimations to determine the number of questionnaires administered in each of the sub-metros of the Kumasi Metropolis, which at the time were: Asokwa, Bantama, Kwadaso, Manhyia, Nhyiaeso, Oforikrom, Suame, Subin and Tafo (Ghana Statistical Service 2014, p. 4). The stratification was possible because the sub-metros can be classified into uniform and continuous areas using the types of houses, densities of residents, existing facilities and available services, and the challenges residents encounter—particularly when it comes to housing (Acheampong 2013, pp. 22–26).

The questionnaire was tested between December 10, 2017, and January 15, 2018, and the feedback was used to adjust the interpretation of questions and the time to contact residents in the Kumasi Metropolis. The pretesting ensured that the right questions were asked in the right way (Ruane 2005, p. 141). Following the pretesting, 400 questionnaires were administered between March 12, 2018, and July 10, 2018, during the weekdays and weekends. This was done by the author and a research assistant. Individual participants were selected based on a non-probability sampling technique

[3] Those 15 + years were initially used as a proxy for those 18 + years during the sample size determination. However, persons 18 + years of age were selected for interviews since the focus was on adults, and the legal age for adults in Ghana is 18 + years. This did not change the sample size estimates as evident from Table 1 where the results are not different from the 18 + years estimates.

Table 1 Description and characteristics of the questions from the questionnaire

Question	Type	Options
Awareness of UGS benefits		
UGS can provide aesthetic, recreational, leisure, etc., benefits	Likert Scale	Agree Strongly/Agree/Neither agree nor disagree/Disagree/ Disagree Strongly
UGS can help to improve microclimatic conditions such as rising temperatures	Likert Scale	Agree Strongly/Agree/Neither agree nor disagree/Disagree/ Disagree Strongly
UGS can regulate air quality	Likert Scale	Agree Strongly/Agree/Neither agree nor disagree/Disagree/ Disagree Strongly
UGS can absorb run-off water, filters water, and reduce flooding	Likert Scale	Agree Strongly/Agree/Neither agree nor disagree/Disagree/ Disagree Strongly
UGS can provide opportunities for food productions	Likert Scale	Agree Strongly/Agree/Neither agree nor disagree/Disagree/ Disagree Strongly
UGS can strengthen community image and sense of place	Likert Scale	Agree Strongly/Agree/Neither agree nor disagree/Disagree/ Disagree Strongly
UGS can promote health and wellness	Likert Scale	Agree Strongly/Agree/Neither agree nor disagree/Disagree/ Disagree Strongly
UGS can foster Human Development	Likert Scale	Agree Strongly/Agree/Neither agree nor disagree/Disagree/ Disagree Strongly
UGS can facilitate community problem solving	Likert Scale	Agree Strongly/Agree/Neither agree nor disagree/Disagree/ Disagree Strongly
UGS can support economic activities such as jobs and business creation	Likert Scale	Agree Strongly/Agree/Neither agree nor disagree/Disagree/ Disagree Strongly
Strengthen safety and security (protection from crime)	Likert Scale	Agree Strongly/Agree/Neither agree nor disagree/Disagree/ Disagree Strongly
Residents' Awareness of Changes in Climate and Effects[i]		
Have you noticed any changes in rainfall patterns in the past years?	Multiple-choice	No/Yes, increasing/Yes, increasing a lot/Yes, decreasing/Yes, decreasing a lot/Yes, changes in the dry season
Have you noticed any changes in temperature in the past years?	Multiple-choice	No/Yes, increasing/Yes, increasing a lot/Yes, decreasing/Yes, decreasing a lot/Yes, changes in the dry season
Have you noticed any changes in flooding in the past years?	Multiple-choice	No/Yes, increasing/Yes, increasing a lot/Yes, decreasing/Yes, decreasing a lot/Yes, changes in the dry season
Residents Development Needs[ii]		
Please list the more important development needs that you want the KMA to tackle for you in the: (a) Short Term (Next 1 year); (b) Medium Term (Next 5 years); (c) Long Term (Next 10 years)	Open-Ended	NA
Residents' Prioritization of UGS		
Based on the options you have identified above, how high of a priority do you feel KMA officials should place on providing and maintaining the conditions of urban greenspaces and recreation facilities in the Metropolis?	Likert Scale	Very high priority/High priority /Medium priority/Low priority/Very low priority/No priority

For the analysis: [i]Recoded as Yes/No in the analysis; [ii]These are reframed as first to third development needs accordingly

using convenience and snowball sampling and willingness to participate in the research. This helped in overcoming the limitation of a lack of an address database that would have allowed for a simple random sampling—but resulted in a lower proportion of females (42%) than males (58%) compared to the Metropolis, which was 52.2% and 47.8%, respectively.

Subsequently, the data collected were cleaned, collated, and analyzed using the Statistical Package for Social Scientists (SPSS) version 22. This was used to generate frequency tables and charts to present the results of the data. Since the study was not seeking to examine causation or association between variables, frequencies (percentages of responses in each category) were used to present the results (Ruane 2005, pp. 179–186; Sullivan and Artino Jr. 2013, pp. 541–542). The open-ended questions that focused on the development needs of residents were coded for analysis using keywords and then, aligned with related development needs from the 2014–2017 medium term development plan (MTDP) of the Kumasi Metropolis. Such keyword identification and connection with themes or concepts align with general standards in coding qualitative data (Saldaña 2013, pp. 3–15).

Table 2 Distribution of Questionnaires administered across Sub-metros. *Sources*: #Acheampong (2013); *Ghana Statistical Service (2012)

Sub-metros	#Characteristics	Population* (15 years +)	%	*Population (18 years +)	%	Sample	%
Asokwa	High cost and low density	92,551	8.04	83,640	8.04	32	8.00
Bantama	Residential areas	172,996	15.03	155,515	14.95	60	15.00
Kwadaso	Rental housing sector	164,665	14.30	148,090	14.24	57	14.25
Manhyia	Government built sector	104,285	9.06	94,524	9.09	36	9.00
Nhyiaeso	Indigenous housing sector	91,027	7.91	82,448	7.93	32	8.00
Oforikrom	High cost, low housing density	205,416	17.84	186,627	17.94	72	18.00
Old Tafo	Mixed-income area	94,845	8.24	85,222	8.19	33	8.25
Suame	Substandard housing with slums	104,626	9.09	94,147	9.05	36	9.00
Subin	Substandard housing with slums	120,961	10.51	109,899	10.57	42	10.50
Total		1,151,372	100.00	1,040,112	100.00	400	100.00

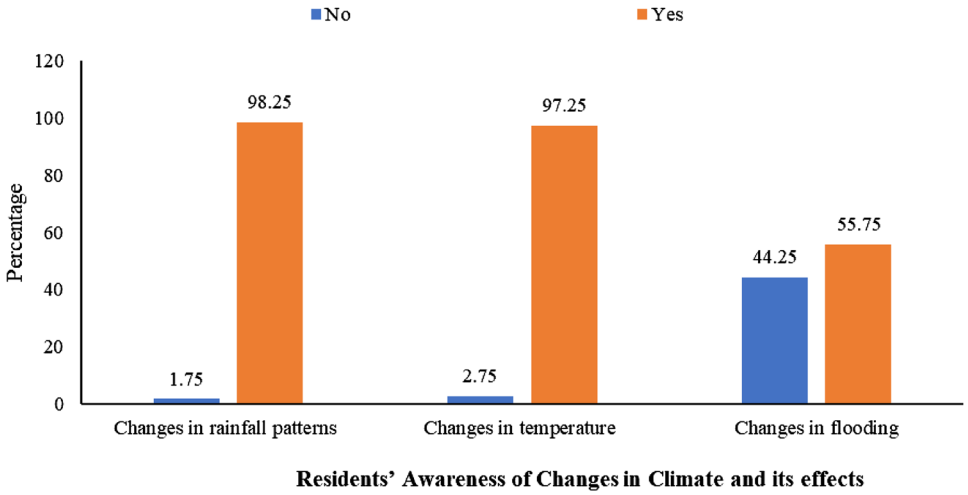

Fig. 2 Residents' Awareness of Changes in Climate in the past years. *Source*: Field Survey, 2018

Development needs that residents reported were subsequently given a code and collated into a frequency table in SPSS in line with standard approaches (Rourke and Anderson 2004). Overall, the analysis sought to identify conflicts in residents' rationalities of UGS and how the conflict can contribute to a prioritization conundrum in using UGS to tackle climate change impacts. This is followed by an examination of some ways to deploy co-benefits to address the UGS prioritization conundrum.

4 Residents' rationalities of UGS and climate change in the Kumasi metropolis

4.1 Awareness of climate change issues

In this research, the benefits of UGS are positioned within the context of tackling climate change impacts and attaining other development needs. Residents in the Kumasi Metropolis were asked questions to test their awareness of the variabilities in the climate relating to rainfall and temperature as well as the predominant climate change impact of flooding in the Metropolis as observed in their lives. Residents were not informed that these could be related to climate change. About 98.25% of respondents indicated that they have observed changes in rainfall patterns in the past years and 97.25% of respondents also indicated observing changes in temperature throughout their life (Fig. 2).

Indeed, such responses give credence to the variability of the climate patterns in the Kumasi Metropolis. In other words, residents were aware of changes in climatic elements in the Metropolis as well as its impacts in terms of flooding. Although over 90% of residents indicated observing changes in rainfall and temperature patterns, only 55.25% of all respondents have heard of the term climate change (Table 3).

Table 3 Residents' Awareness of the term "Climate Change". *Source*: Field Survey, 2018

	No		Yes		Total	
	Frequency	%	Frequency	%	Frequency	%
Sex						
Female	82	48.81	86	51.19	168	100
Male	97	41.81	135	58.19	232	100
Total	179	44.75	221	55.25	400	100
Age						
18–25 years	24	55.81	19	44.19	43	100
26–35 years	66	39.05	103	60.95	169	100
36–45 years	65	51.18	62	48.82	127	100
46–55 years	15	37.50	25	62.50	40	100
56–65 years	8	50.00	8	50.00	16	100
66 years above	1	20.00	4	80.00	5	100
Total	179	44.75	221	55.25	400	100
Highest educational qualification						
No education	6	60.00	4	40.00	10	100
Primary	23	76.67	7	23.33	30	100
Junior High School	89	71.77	35	28.23	124	100
Senior High School	49	35.51	89	64.49	138	100
Tertiary	14	14.29	84	85.71	98	100
Total	179	44.75	221	55.25	400	100

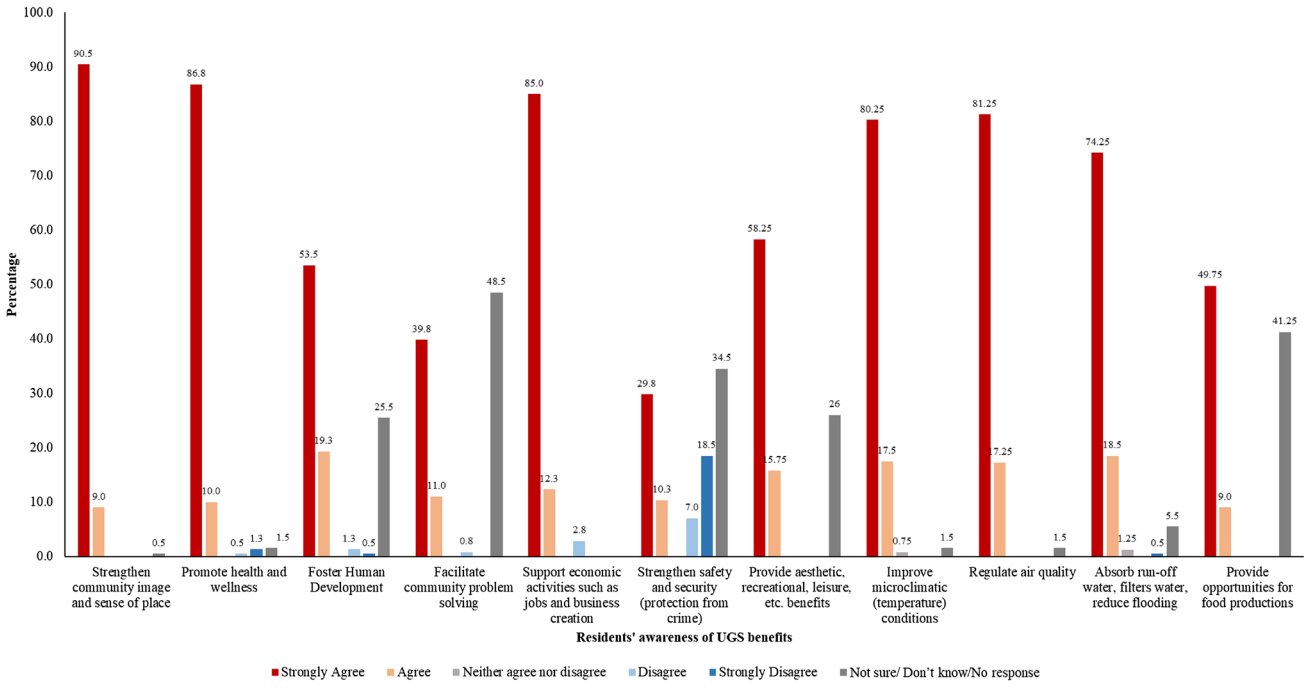

Fig. 3 Residents' Awareness of UGS Benefits. *Source*: Field Survey, 2018

4.2 Residents' awareness of UGS benefits

Residents were also aware of UGS benefits as more than 50% of residents indicated their awareness across all measures. Indeed, 74% of residents understand that UGS provide aesthetic, recreational, leisure, etc., benefits, 97.5% believe that UGS can help to improve microclimatic conditions like rising temperature, 98.5% agree that they can regulate air quality, and 92.25% concur that UGS can absorb and filter run-off water and reduce flooding (Fig. 3). Similarly,

residents were aware of the socio-economic benefits of UGS such as its ability to strengthen community image and sense of place, promote health and wellness, foster human development through education, and support economic activities such as jobs and business creation (Fig. 3). This goes to show that residents were aware of the multiple benefits of UGS beyond its ability to help tackle climate change impacts. Indeed, these results are relevant for understanding whether residents' awareness of the benefits of UGS can translate into a desire to prioritize initiatives that seek to improve the quality and increase the quantity of UGS in the Kumasi Metropolis. Such awareness thus provides an understanding of residents' rationalities of UGS benefits.

4.3 Residents' prioritization of UGS

Respondents were asked to provide their top three development needs to help understand the importance of UGS in relation to other development needs. In the first option of development needs, some residents wanted jobs and business development (31%) with some residents asking for the construction of more roads, maintenance of existing roads, and reduction in traffic congestion (26.5%). In the second option, more residents wanted improvements in transportation (12%) and sanitation and waste management (11.75%), while for the third option, 38% of respondents wanted to see improvements in transportation. Only 3.75% of respondents wanted recreational centers for their first development needs and 1.25% and 1.75% for their second and third development needs, respectively. Recreational centers are emphasized here in that it is the closest to a type of UGS in the Metropolis among the identified residents' needs (Table 4).

When these observations are juxtaposed with results on residents' prioritization of UGS, most indicated that UGS is a low priority. From the study, 7.0% of respondents viewed UGS as a very low priority, 52.5% as a low priority, and 25.75% of respondents viewed it as a medium priority (Fig. 4). Less than 15% viewed UGS as a high priority suggesting that other development needs supersede residents' desire for UGS in the Kumasi Metropolis.

Table 4 Development needs of respondents. *Source*: Field Survey, 2018

Development needs	Frequency	Percent
First development needs		
Provide Community/Recreational center	15	3.75
Energy and security	19	4.75
Drainage and flood management	34	8.50
Provide social amenities	42	10.50
Sanitation and waste management	47	11.75
Improve transportation	106	26.50
Job creation and business development	124	31.00
Not sure/Don't know/No response	13	3.25
Total	400	100.00
Second Development Needs		
Provide Community/Recreational center	5	1.25
Energy and security	11	2.75
Drainage and flood management	5	1.25
Provide social amenities	34	8.50
Sanitation and waste management	47	11.75
Improve transportation	48	12.00
Job creation and business development	18	4.50
Well planned communities and noise reduction	11	2.75
Not sure/Don't know/No response	221	55.25
Total	400	100.00
Third development needs		
Provide Community/Recreational center	7	1.75
Reduce crime	5	1.25
Drainage and flood management	1	0.25
Provide social amenities	11	2.75
Sanitation and waste management	5	1.25
Improve transportation	20	5.00
Job creation and business development	2	0.50
Well planned communities	1	0.25
Not sure/Don't know/No response	348	87.00
Total	400	100.00

5 Discussion and implications

5.1 A prioritization conundrum emerging from residents' rationalities of UGS

Most of the respondents of the Kumasi Metropolis were aware of the changes in the climate and its impacts as well as aware of the benefits of UGS including its role in tackling climate change impacts. For areas like the Kumasi Metropolis in the Ashanti Region, residents' awareness of changes in the climate, for instance, confirms ongoing and projected thermal discomfort associated with rising temperatures in the Metropolis (Doodo and Ayarkwa 2019, pp. 14–15). One reason for rising temperatures in the Metropolis, as observed by Mensah et al. (2020, p. 10), is the significant decline in UGS, which has contributed to increases in the mean land surface temperature of the Metropolis by 4.16 °C. Indeed, different studies in Ghana show that residents have observed changes in the climate, particularly in terms of rising temperature, increased intensity and duration of rainfall, and variations in seasons (Adams et al. 2022; Asare-Nuamah and Botchway 2019; Kemausuor et al. 2011). For urban areas in Ghana, this provides some impetus to plan for UGS to tackle climate change impacts, especially in the Kumasi Metropolis

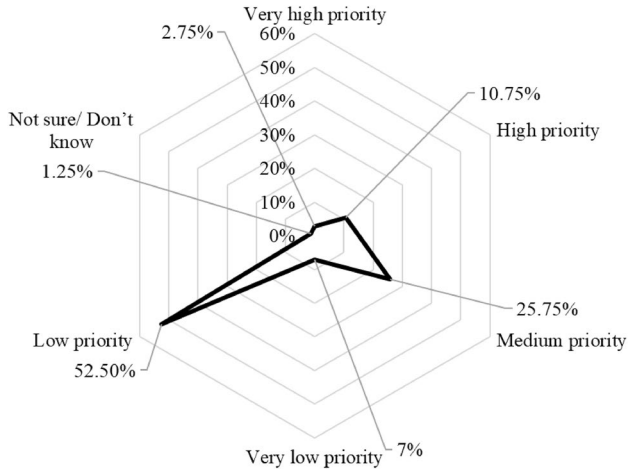

Fig. 4 Residents' Prioritization of UGS. *Source*: Field Survey, 2018

where studies confirm the contribution of UGS to mitigating climate change impacts (Nero et al. 2017, p. 76).

Yet, despite residents' awareness of the benefits of UGS in tackling climate change impacts by reducing temperatures, absorbing run-off water as well as contributing to air purification, residents have a low priority for the amenity. Development needs such as drainage and flood management, education, health, sanitation, waste management, job creation, and business development are viewed as more compelling development needs relative to UGS. This suggests a conflict in residents' rationalities of UGS. Indeed, residents' rationalities of UGS by means of their awareness of its benefits and prioritization of the amenity represent a conflicting rationality. On the one hand, residents are experiencing changes in the climate and are aware of the benefits of UGS including its role in tackling climate change impact. On the other hand, residents have a low priority for UGS despite their awareness of its multiple benefits. This seeming conflict in residents' rationalities can engender a prioritization conundrum for UGS planning in the Metropolis, akin to that which is often associated with environmental goals and actions (Kabisch et al. 2016, p. 6). For instance, for urban planning where residents' inputs are a critical aspect of inclusive and sustainable planning (IPCC 2022, p. 160; Rosen and Painter, 2019), the fundamental question concerns how to account for residents' awareness and priorities in urban planning and plan for goals that residents do not consider a priority? The impetus rests on making connections between the benefits of UGS and climate change. Thus, in planning for UGS to tackle climate change impacts, there is a need to consider how socio-economic and environmental goals can be attained simultaneously, especially in contexts where environmental goals are not residents' priority.

5.2 Navigating a prioritization conundrum of UGS via co-benefits

One way to navigate the conundrum where socio-economic and environmental goals can be attained simultaneously, especially in contexts where UGS goals are not residents' priority will require effective mainstreaming of the amenity's benefits in planning via the lens of co-benefits. Such mainstreaming is necessary since residents view other development needs as more compelling than UGS provision and maintenance. Without mainstreaming of UGS co-benefits, planning for UGS to tackle climate change impacts may not receive the full attention of residents given that they have a low priority for the amenity. For UGS planning, co-benefits provide an avenue to embed UGS goals in development interventions that aim to address residents'

Fig. 5 A Bare Playground of School Premises in the Kumasi Metropolis. *Source*: Photo taken by Author in 2018

other development needs. Here, the benefits of UGS can be achieved from the implementation of interventions to address residents' other development needs such as the planning and design of schools, transportation and drainage systems, and market centers, among others to include spaces for UGS. For instance, many residential properties and institutional spaces such as primary and junior high school premises in the Kumasi Metropolis are without greenery—mostly bare land area (Fig. 5). For sidewalks and road medians, many of the vegetation areas are mostly visible on the design models (or master plans) and often do not materialize after road construction. When they do, they are poorly managed and are quickly depleted. These spaces are critical opportunities to improve the quality of and increase the availability of UGS in the Metropolis amidst an increased scarcity of land due to rapid urbanization. In this way, UGS can provide multiple benefits for residents of the Metropolis and specifically used to tackle climate change impacts. In addition, land use regulations should also facilitate and encourage UGS in residential developments by requiring or incentivizing residents to develop UGS on their properties.

For cities like the Kumasi Metropolis where development needs are fundamentally focused on economic goals and social amenities like hospitals, schools, drainage, and transportation systems (Diko and Palazzo 2019, p. 365; Diko and Hollstein 2021, p. 14), residents' low prioritization of UGS emphasizes the need to highlight the tangible and visible benefits of UGS to residents both now and in the future and how they can be implemented without compromising efforts to meeting their more compelling development needs. This thus requires that nature-driven initiatives like UGS are problem-solving in character in that their success is measured by the amenity's capacity to address residents' needs to their satisfaction, and "not if the policy ideas, scientific principles, or proposed management guidelines they are commissioned to demonstrate are efficacious" (La Rosa et al. 2021, p. 331). An entry point is to see residents' awareness of the multiple benefits of UGS as vital to making connections between socio-economic and UGS goals in urban planning processes. In this way, residents' rationalities of UGS can become a tangible element of urban planning processes by helping to examine residents' rationalities of UGS for conflicts that can hinder the prioritization of UGS to tackle climate change impacts as well as identify opportunities for mainstreaming UGS co-benefits in urban planning.

Unfortunately, many mitigation and adaptation strategies in the various MTDPs of the Metropolis over the years have not sought to attain co-benefits (Diko 2018, p. 149). Mitigation interventions such as UGS provision have lacked innovation and have been narrowly formulated without recourse to other development needs—a challenge attributed to capacity constraints among urban planners in the Metropolis (Diko, 2018, p. 149; Diko and Palazzo, 2019, pp. 366–367). Thus, mainstreaming UGS co-benefits in urban planning are dependent on the capacity to understand where synergies and tradeoffs exist for using the amenity to tackle climate change impacts and meet residents' socio-economic needs (Cohen et al. 2021; Diko 2018, p. 149; Frantzeskaki 2019, p. 108). Additionally, providing an in-depth understanding of how UGS co-benefits are accounted for is also imperative to demonstrate its success in tackling climate change impacts and meeting residents' socio-economic needs as well as demonstrate the efficient use of scarce resources (Cohen-Shacham et al. 2019, p. 24). It is for this reason that effective mainstreaming and capacity building are among the crucial principles for successfully implementing and scaling up UGS (Frantzeskaki 2019, p. 109).

In Global South cities, the mainstreaming of residents' socio-economic needs into UGS planning and vice versa can be undertaken during the preparation of urban development plans—and in the case of the Kumasi Metropolis, the preparation of MTDPs. These MTDPs are urban development plans that delineate goals, objectives, and actions to be implemented in a 4-year period (Diko 2018, p. 141; Mensah et al. 2021, p. 473). The "harmonization of community needs and aspirations" stage during the preparation of MTDPs (National Development Planning Commission 2013, pp. 11–12) offers an opportunity to deploy co-benefits to harmonize UGS goals with socio-economic goals for the Metropolis. Additionally, co-benefits necessitate effective resident engagement (Raymond et al., 2017, p. 22; Giordano et al. 2020) in efforts to navigate the UGS prioritization conundrum. Such engagement will provide avenues for residents' socio-economic needs and UGS goals to be harmonized. Consequently, it is imperative to transcend the poor participation of residents in UGS planning processes in the Kumasi Metropolis (Adjei Mensah et al. 2017) by actively engaging residents to understand their rationalities of UGS and account for these rationalities in urban planning. This will not only ensure harmonization of UGS and socio-economic needs but also enable residents to build trust in urban planning authorities in ensuring that they can tackle climate change impacts via UGS provision without sacrificing their socio-economic needs. Indeed, accounting for residents' rationalities—i.e., awareness and prioritization—of UGS will also enhance the urban planning process by making it more inclusive. This will in turn help engender sustainable and effective outcomes in meeting residents' socio-economic needs and climate change goals (IPCC, 2022, p. 28). Furthermore, mainstreaming UGS co-benefits draw attention to the need to transcend path dependency in urban planning

(Diko 2018, p. 149; Matthews et al. 2015, p. 158). First, this implies not simply focusing on traditional planning goals such as transportation and economic development but also realizing the need to achieve sustainability goals that include recommendations to tackle climate change impacts via UGS provision. Secondly, it implies transcending traditional ways of improving the greenery of the Metropolis to include new ways to provide and maintain UGS to attain co-benefits.

6 Conclusion

The scholarship on conflicting rationalities, especially in Global South cities, that encapsulates the divergent positions of residents, and state actors has scantly addressed the potential conflicts within actor rationalities. Using residents' awareness and prioritization of UGS, this paper has demonstrated that conflict of rationalities exists within residents' rationalities of the amenity that can engender a prioritization conundrum. Here, residents' awareness of the multiple benefits of UGS in tackling climate change impacts diverges from their prioritization of the amenity. To navigate such a prioritization conundrum—i.e., how to account for residents' awareness and priorities in urban planning and plan for goals that residents do not consider a priority?—the paper argued for co-benefits as it can create an avenue to achieve both residents' socio-economic and UGS goals. First, effective mainstreaming of UGS co-benefits into urban planning is necessary for navigating the prioritization conundrum. Secondly, traversing the prioritization conundrum is also dependent on the capacity to effectively mainstream the co-benefits of UGS in urban planning and shift from doing business as usual—without which promoting UGS as a pathway for addressing climate change impacts can be hindered.

Generally, Global South cities are constrained when it comes to funding their development. However, through co-benefits, the situation where residents' UGS awareness and priorities present a planning conundrum in urban planning can be navigated to ensure that Global South cities can still ensure residents' access to the benefits of UGS including using the amenity to tackle climate change impacts while also meeting their socio-economic needs. This can make urban planning more inclusive and help to contribute to increasing access and availability of UGS in Global south cities as encouraged by SDG 11-Target 7 as part of promoting sustainable cities. In addition, this can provide pathways to meet other SDGs such as improved housing, employment, and health care needs of residents. For cities in the Global South, understanding residents' rationalities of UGS and addressing the prioritization conundrum that may result from conflicts in these rationalities by mainstreaming UGS via the lens of co-benefits will ensure that the amenity is effectively used to tackle climate change impacts.

Nonetheless, further research is needed to expand the discourse on UGS prioritization and planning in Ghana and Global South cities in general, particularly within the context of co-benefits. Indeed, while some studies (de Oliveira 2013; de Oliveira et al. 2013; Doll et al. 2013; Giordano et al. 2020; Raymond et al. 2017) have offered different frameworks for mainstreaming co-benefits into urban planning, it is unclear how these approaches are applicable for UGS planning in Africa. Studies that seek to explore effective ways to account for co-benefits in urban planning in African cities are thus suggested for further research. Additionally, the study focused on the awareness and priorities of residents 18 years and above through snowball sampling. Future research can include residents below 18 years to understand UGS rationalities and adopt qualitative approaches which can provide alternative perspectives to residents' UGS rationalities. This is important as UGS studies in Africa reveal the saliency of children's perceptions in UGS planning (Pedrosa et al. 2021).

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