MALAYSIA ARCHITECTURAL JOURNAL

Malaysia Architectural Journal

Journal homepage:
https://majournal.my/index.php/maj
e-ISSN : 2716-6139

Inflow/Outflow: A Web of Contrasting Realities and Aspirations in Shapeshifting Urban Accra

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ARTICLE INFO

Article history:
Received: 30 April 2024
Received in revised form
Accepted: 15 October 2024
Available online: 23 June 2025

Keywords:
urban mining; waste economies; ecological restoration; informality vs. formality

ABSTRACT

Accra, Ghana is a city in constant flux. It finds itself entangled on several fronts, caught in the push-and-pull of divergent national and international aspirations, optics, and realities. Amidst the glitz and glamour of global media coverage touting it as a growing cultural force due to its artistic and tourism ecosystem, the spotlight shines unfavourably on the Odaw River-Korle Lagoon catchment. Originally a wetland that now serves as Accra's principal drainage system, Odaw-Korle is at once croaking from the informal communities formed along its bank and the decades-long domestic and international e-waste dumping volumes on its surface areas. Not only does the compromised Odaw-Korle threaten Accra's full-service drainage capacity, but it also leaves Accra vulnerable to a multitude of environmentally-driven public health devastations. The paper contextualizes the Odaw-Korle catchment, from its historical evolution, its relationship to past and current governmental efforts to tackle this challenge, and utilizes research papers and scholarly research studies to gain a broad-spectrum and multi-scale understanding of the issues and forces at play. Operating mainly as a speculative study driven by findings expressed or alluded to from the presented research methodology, the paper will explore concepts of waste economies, socioecological infrastructural systems and adaptive urbanism strategies. Through this, the paper builds upon past literature, but goes further through a landscape urbanism praxis to reimagine an Odaw-Korle Catchment and Accra that is resilient and supports the agency and balanced livability of its residents across a wide spectrum of economic classes.

1. Introduction

Since the dynamic days of Kwame Nkrumah's administration, Accra – Ghana's capital – despite its status as an African city, has long attracted attention due to decades-long global contributions by its residents in realms as far ranging as art, architecture, music and intergovernmental diplomacy. Amidst Accra's dogged march towards becoming a premier international city, there exist numerous visible and under-reported risk factors that if left unchecked, will derail the city's socioeconomic and environmental vitality, thus effectively denying current and future residents a high quality of life. One

such factor requiring swift planning attention is the endangered and contaminated Agbogbloshie and Old Fadama "informal economy and settlement" (Njoku *et al.,* 2023). Situated northwest of Accra's Central Business District and occupied since the early 1960s, the adjoining Agbogbloshie and Old Fadama blur the boundaries between commercial, industrial and residential activity daily as seen in Fig. 1. Surrounding Agbobloshie (scrapyard) and Old Fadama (informal settlement with a 40,000+ population) in this land-use adjacency and intensity is Accra's largest fresh food market, and directly across along the Abossey Okai Road, lie a plethora of commercial and industrial enterprises from a brewery to several bank branches and a Pepsi bottling plant (Njoku *et al.,* 2023) (Akese & Little, 2018).

These resultant and curious spatial adjacencies trace their formation to a 1993 city authority decision to decongest the Central Business District by relocating both hawkers and the yam market to the edge of the Korle Lagoon. The Korle Lagoon is a critical drainage basin nexus that empties into the Gulf of Guinea, West Africa's predominant southern edge and the tropical Atlantic Ocean's northeasternmost point as seen in Fig. 2. Feeding into the Lagoon is the Odaw River, Accra's principal waterway, itself a drainage source for other metro Accra water bodies before making a southward journey towards Agbogbloshie and Old Fadama, which collectively rest on the banks of the Korle Lagoon. The 1993 decision initiated Agbogbloshie's gradual status as a scrapyard, firstly for auto-related services – spare parts trading, welding to tire replacements – that formed a supply chain network for vehicles used in food transport operations (Njoku et al., 2023) (Akese & Little, 2018). Agbogbloshie, previously a "formalized settlement under customary land administration" over the years, devolved and eventually became synonymous for hosting one of the world's largest electronic waste (e-waste) dumpsites, before a July 2021 local government eviction order (Amoako, 2016). However, this 2021 shutdown has merely shifted urban mining operations to nearby Old Fadama and other locations across Accra where industry players continue diligently to recover copper, aluminium, steel and glass. These recovered materials are a vital supply chain link for local repair workshops who in turn, channel these materials to create newly repurposed products for local consumption (Njoku et al., 2023) (Daum *et al.,* 2017).

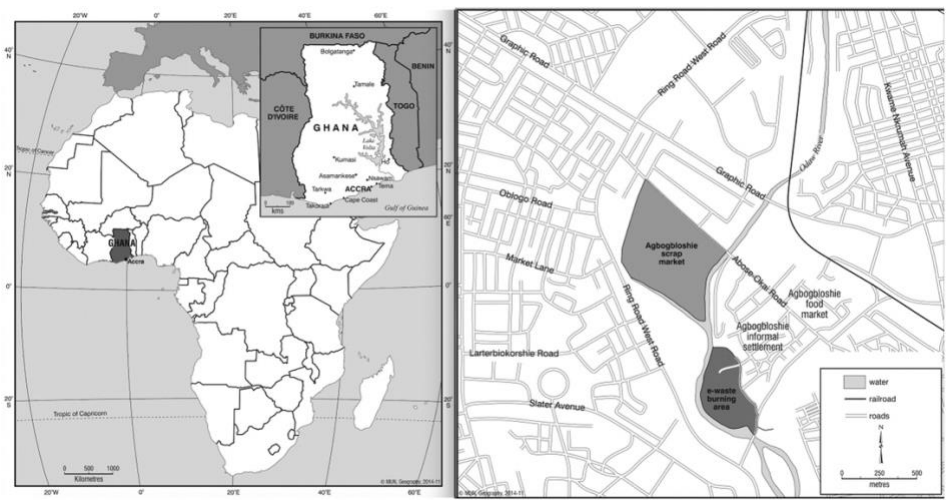

Fig. 1. Site Context Map of Agbogbloshie and Old Fadama
(Source: Akese, G. A. and Little, P.C. (2018)

Driving this industry are used or discarded electronics originating from wealthier nations who shirk their recycling responsibilities by offloading and outsourcing these extraction processes to less cash-rich nations. It is thus unsurprising that the Odaw River-Korle Lagoon catchment's air, water and soil quality is dire due to improper recovery methods like burning and the barrage of industrial and domestic effluent & sewage deposits into its boundaries. The consequence is an informal community battling with alarming incidences of nervous, reproductive and respiratory diseases in tandem with

high levels of flooding and marine life depletion (Daum *et al.,* 2017). Efforts to address these environmental and public health devastations have proved challenging. On one hand, Accra's authorities openly scapegoat the settlement viewing it as antithetical to the ambition to transform the 146-hectare area into a recreational amenity and consistently wield eviction threats against Old Fadama residents. On another, these residents whose sheltering conditions are already perilous and heavily reliant on urban mining incomes will face widening social exclusion should city authorities dismantle this industry without providing viable alternatives or well-considered overhauls presented (Daum *et al.,* 2017). Numerous papers discuss Agbogbloshie and Old Fadama's e-waste legacy, typically through a social exclusion and environmental justice lens due to its prominent global media coverage, but there exists an underexplored opportunity of examining this issue through a landscape urbanist praxis. Thus, the paper will investigate this legacy and provide guiding recommendations – not prescriptive solutions – to re-imagine these lands, Accra, and Ghana as a whole, through the lens of comprehensive waste economic management, socio-ecological infrastructures and adaptive urban patterns.

Fig. 2. Odaw-River Korle Lagoon Context Map
(Source: Wikimedia Commons)

2. Methodology

2.1 Contextual Layers and Literature Review

The preceding sections of the paper provide a foundational understanding of how the issues of waste, informal settlements and unregulated resident behaviours that have hastened the ecological decline of the Odaw-Korle Catchment. Structured to supplement this foundational understanding, this section offers deeper contextual grounding to support the paper's aim of examining the Odaw-Korle Catchment through a landscape urbanist praxis. To ensure a comprehensive examination of the Catchment, the paper looked at a range of data, from multi-phase project proposals, newspaper and blog reportages of current issues plaguing the area in question, alongside various journal articles and assessment plans from an array of academic, public, non-profit and governmental sector sources. Through the breadth of data analysed towards framing the paper's arguments through waste economies, socio-ecological infrastructures and urban patterns, several themes began to emerge, from informal settlements as a result of housing affordability challenges, the link between regional and global e-waste policies to sanitation and waste collection practices that create conducive conditions for flooding.

Tracing historical flows, e-waste arrives in Ghana after exit points in Europe, North America and Asia before transiting through the Durban, Bizerte and Lagos ports. Through manipulative labelling such as "development aid" or "charitable donations," cash-rich nations and regions ship goods that flout the rules stipulated by the Bamako (1998) and Basel (1992) Conventions. Both Conventions, particularly the Bamako ratification, place bans on hazardous waste shipments from not only wealthy to emerging economies but also across intra-African borders, particularly those without suitable recycling facilities. Duam et al. (2017) found that despite the glaring global and domestic infractions of e-waste inflows, urban mining is a considerable economic player, generating $105-238 million annually while supporting some 200,000 people across Ghana.

Attempts to recapture the wetland state of the Odaw-Korle catchment led to the $26.14 million two-phase Korle Lagoon Ecological Restoration Project (KLERP) launched in 2000. Activated by funding from such varied sources as the Ghanaian government and the Arab Bank for Economic Development in Africa, KLERP was envisioned as a climate adaptation program and specifically, as a water and sanitation directive. Established with the Hydrological Department at the Ministry of Works and Housing as the executing agency, KLERP had four goals: (1) develop wastewater disposal system, sewage treatment plants and pumping stations; (2) de-silt the Korle Lagoon through dredging to prevent flooding; (3) install 1.5km outlet pipe to hasten the Lagoon's drain time into the Gulf of Guinea and (4) rehabilitate polluted shore areas and redevelop it for recreation (OpecFund.org, 2021). However, a crucial error to include an oversight measure designed to anticipate and account for primary waste offenders – industrial and domestic sewage at the upstream and midstream sections of Odaw-Korle – soon stalled project coordination and implementation (Abraham et al, 2006).

Studies by Boadi & Kuitunen (2016) and Onuoha (2016) further speak to the environmental challenges that plague the Odaw-Korle Catchment. In their respective articles, these authors highlighted the failure of Accra's primary planning agency, the Accra Metropolitan Agency (AMA) to provide adequate waste disposal and collection facilities as amongst the greatest barriers to Odaw-Korle's restoration. The authors found that without these facilities, any plans to install sewage treatment plants to reduce biochemical oxygen demand (BOD) and landfill leachate loads will yield very little value. The above-mentioned studies and project reports offer a brief sampling of the issues, concerns, motivations and implemented proposals that have impacted the Catchment at one point or another. Together, they give historical and contemporary credence to subsequent sections in the paper when discussions delve deeper into the sort of policy and implementation strategies the AMA and its partners could deploy towards achieving much more favourable outcomes for the Odaw-Korle Catchment and Accra as a whole.

2.2 Speculative Considerations: Waste Economies

As a lucrative venture, Ghana's urban mining and waste industry will only acquiesce to incentivized measures that keeps players' economic livelihoods intact. A sheer majority of industry players are rural-urban migrants, many of whom originate from Ghana's underfunded northern regions and therefore seek expanded fortunes in Accra, which receives disproportionate governmental and private sector investment. Typically, urban mining is an introductory avenue for recent lower-income urban residents to establish themselves, and though the work poses grave dangers, it remains a viable launchpad before shifting towards safer and stable work alternatives (Njoku et al., 2023). Enforcing import regulations of e-waste flows into Ghana proves challenging as e-waste exporters originate from both non-signers and non-ratifiers of the Bamako and Basel Conventions. However, there is a need for stricter due diligence amidst sensitive diplomatic manoeuvring between industrialised and industrialising nations, but perhaps utilizing and enhancing the existing e-Stewards system may be a worthy solution to correct these unchecked waste flows (Daum *et al.,* 2017).

Boosting the e-Stewards system could include attaching substantially higher tax penalties and stringent conditions that guide electronic exports. For donor countries, this means a non-negotiable

requirement to export electronics with a verified level of at least 50% functionality, rather than the end-of-life functionality of products often earmarked to recipient countries. Violating countries found exporting unverified products without stamped certification from independent regulators will have substantial levies imposed upon them; this is to encourage good faith practices between Customs Officers and sharply curb illicit global transactions. The high toxic waste tonnage in Accra left to rot and disintegrate without any efforts toward value extraction or addition potential is a passive stance by the Ghanaian government at both the local and city levels.

By taking on a more proactive approach through actively monitoring the waste mining industry, taking note of crucial connections and innovations, the Ghanaian government in conjunction with relevant private-sector partners can work to comprehensively shore up Ghana's capacity to operate in the waste management value and supply chain across the housing, commercial and industrial sectors. Following a mandated and standards-driven e-waste recovery process can yield a plethora of trace and rare earth metals; for example, controlled extraction returns gold and silver 10x (times) in quantity from one (1) ton of e-waste than from one (1) ton of ore sourced in traditional earth mining (Osseo-Asare, 2017). The urban mining industry's high returns should therefore galvanise Accra's city authorities to consider the multi-layered impact of implementing and maintaining a well-coordinated industry, both in terms of local, regional and global scales. Not only will it preserve informal residents' economic lifelines, limit and eventually eradicate unsafe extraction processes, but also develop and establish first-rate data structures and systems that track the full waste management value chain to support the commissioning of strategically-sited e-waste and other waste recycling/salvage centre(s) in Accra and across Ghana.

This approach builds upon Ghanaian-American architect D.K. Osseo-Asare and French architect Yasmin Abbas' project. Through their *Agbogbloshie Makerspace Platform (AMP)*, Osseo-Asare and Abbas leveraged the skills of 750 Agbogbloshie youth with that of 750 STEAM students and young professionals. AMP goals included "greening" the extraction process, i.e., strip rather than burn salvaged products, and creating a mobile makerspace culture throughout Accra, complete with a kit-of-parts and easily assembled fabrication structure using local renewable resources like bamboo (Osseo-Asare, 2017). While Osseo-Asare and Abbas' intentions were to counter the traditional fixed fabrication lab (fab-lab), the waste quantities that cover Agbogbloshie/Old Fadama and now across several Accra locations suggest broadening these ambitions. A full-scale urban mining policy in action that cuts across building materials, household, commercial and industrial waste alongside e-waste, will require specialized facility space requirements, machinery and adaptable capacity-building operations.

Such a policy must place informal e-waste industry players – Greater Accra Scrap Dealer Association – at the heart of workforce training in various waste management practice roles, leading to enhanced socioeconomic prospects of Accra across class lines, and restructure citywide and national collection, recycling and repurposing capacities and abilities (Njoku *et al.,* 2023). As certain waste types may necessitate controlled and fixed conditions, an urban mining policy that deploys stationary waste facilities that can connect to mobile fab-labs would be ideal. This approach will support a robust and flexible industry that supplies discarded and salvaged material for both in-house and out-house product repair or wholly new and recycled material or product development. These centres stand to re-entrench a systems-driven "making" culture in Accra and Ghana as a whole, that blends the formal and informal to drive applicable solutions that address Ghanaian needs while helping undercut the high incidences of precarious livelihoods in and around Accra's urban core.

2.3 Speculative Considerations: Socio-ecological Infrastructure

Sited within a critical ecological network, the Odaw River-Korle Lagoon drains a catchment area of about 400 km^2 in Accra, accounting for about 60% of citywide drainage. Before emptying into the Korle Lagoon, the Odaw River serves as a drainage basin for four tributaries – Nima, Onyasia, Dakobi, Ado – that flow both laterally and longitudinally across Accra's landscape (Mwh.gov.gh, 2019).

Accra's advantageous topography enabled much of the city's earlier drainage system to rely heavily on natural patterns (waterways) alongside a small number of constructed stormwater drains. Recent explosive urban and increasingly peri-urban developmental constructions within and around these critical city ecological armatures have significantly eroded these benefits. As detailed at the start of the methodology section of the paper, it is the erasure of these benefits that induced the need for Accra's planning authority, the AMA, to advocate for the establishment of the Korle Lagoon Ecological Restoration Project (KLERP). Conceptually, the KLERP is a necessary missive, but lacks deep contextual understanding of the situation at hand, thus often rendering its efforts as limited at best and ineffective at worst.

KLERP in action until recent years, often defaulted to extensive dredging procedures to de-silt the Odaw River-Korle Lagoon Catchment typically for flood reduction and water quality purposes. While dredging does support those targets, dredging performed too frequently can disturb a waterway's natural balance and increase erosion around its banks. Effectively addressing the challenges at the Odaw-Korle Catchment must consider at the fundamental level, that it is a highly polluted ecological network that weaves around and towards the heart of Accra at three intersecting points: upstream, midstream and downstream. Attempts to restore this network without examining the breadth and depth of this decades-long contamination is worrisome, especially with the persistent antimony, lead and polychlorinated biphenyls (PCBs) exposures found downstream at Agbobloshie/Old Fadama (Njoku *et al.,* 2023). Conducting in-depth examinations of the Catchment across its entire length is thus an unmissable foundational catalyst to developing sound remediation strategies to fully clean and restore the network's previous ability to support expansive biotic and abiotic interaction possibilities.

Concurrent with these remediation and monitoring protocols are integrated surface and subsurface LIDAR and hydrological modelling to support scenario tests of variable human-water behaviours in Accra. Such modelling will prove useful in several ways, including helping determine the types of targeted filtration, planting (phytoremediation) and nitrification processes needed for land, soil, water and air quality restoration. Additionally, it aids in accurately defining watershed and floodplain extents, and by extension indicate flood-prone areas and peak discharges points; it also helps pinpoint suitable locations for water capture, filtration, conveyance and reuse at various time periods. These studies are vital for the Odaw-Korle Catchment and Accra as a whole, in light of the latter's propensity to shut down during rain events courtesy of its two rainy seasons (April-June; major) and (September-November; minor). Amidst more bruising rain events that quickly rendered the KLERP obsolete, emerged a 2019 report and project proposal –backed by a $37-million World Bank credit facility – titled the Greater Accra Urban Resilience and Integrated Development (GARID). The GARID project bears similarities to the KLERP, but distinguished in form through a stronger emphasis on strengthening city flood and waste management as well as improving living conditions of vulnerable communities within the Odaw Basin boundaries (Mwh.gov.gh, 2019).

Improving the living conditions of vulnerable communities in the Odaw-Korle Basin must firstly recognize the reality and value of floodplains along the banks of these waterways. Living by water amidst properly defined measures that guide the planning, design and construction of settlements can offer a rich quality of life. But this is not the case of the Odaw-Korle context, which struggles under the weight of shoddily constructed structures, sparse sanitation facilities + connections and unclear or ill-defined spatial buffers to prevent building too closely to the water's edge. Accra's status as a coastal city necessitates its inhabitants' understanding of the floodplain as instrumental to preserving the health and regenerative capacities of its riverine systems. Alongside maintaining water quality, helping halt land erosion rates, providing multi-level support to numerous plant and animal species, floodplains are a natural infrastructure resource that mitigate flooding (FEMA.gov, 2022). According to the US Federal Emergency Management Agency (FEMA), an acre of a floodplain flooded 1-foot deep is able to hold approximately 330,000 gallons of water alone (FEMA.gov, 2022).

The aforementioned contextual realities at the localized Odaw-Korle scale and at the citywide scale should thus inspire stricter regulations related to siting structures within a floodplain. The minimum

regulation typically permits particular building typologies such as constructions on piers, posts or columns and most importantly, the lowest floor levels set above the base flood elevation (BFE) of the location-specific tidal waterways (AonEdge, 2024) (SEMA.org). Current GARID interventions within the Odaw-Korle Catchment include retention ponds, dredging the Odaw River, removing or adjusting obstructions to drains as well as widening existing drains with an aim to prepare the Catchment to withstand a 10-year flood event. These efforts are laudable, particularly the launch of a social and behavioural change campaign to help shift residents' attitudes towards solid waste management practices (Myjoyonline.com, 2024). Human attitudes to developmental planning as it pertains to natural systems and its interface with constructed systems such as housing and transportation must also advance towards a symbiotic relationship. Though these relationships may be complex and multi-layered, at its core, it should neither prevent any actor's – be they passive or active – ability to function nor undermine its structural integrity (Ramaswami *et al.*, 2012). Thus, it is prudent that subsequent developmental models, if any, within these contexts consider the cross-scalar linkages between social dimensions and practices with built-and-natural systems that can reliably future-proof them for not only a 10-year flood event, but a 25-year, 100-year and 500-year flood event.

2.4 Speculative Considerations: Urban Patterns

A critical aspect underpinning the long-term stability of public sector-backed initiatives to resolve the Odaw-Korle Catchment is long-range urban planning. The Odaw River-Korle Catchment has the highest population density in Ghana, home to 60% of the Greater Accra regional population, with approximately ≥ 30% housed within informal settlements (Mwh.gov.gh, 2019). The informal settlement population, chiefly those at Old Fadama, have since 2003, gained crucial lobbying prowess by employing Shack and Slum Dwellers International (SDI) principles in engaging various governmental bodies. Armed with SDI's toolkits of mediation and partnerships, residents have made inroads with agencies as varied as the Ministry of Works and Housing and the Ministry of Tourism (SDInet.org, 2018). In addition to curtailing regular evictions, this approach underscores this community's – which has a six-decade history in central Accra – conviction to remain an active participant in all public infrastructure matters. These conditions then suggest an ambitious overhaul of socio-spatial development, both at the city and national scale, a decision that starts with an introspective view of historical investments in and around Ghana. Historically, post-Nkrumah governments' have prioritized quality of life upgrades into Accra and much of the Ghana's southern and middle-belt territories, complete with the associated public, quasi-public and private goods. In contrast, little to scant efforts have gone into improving social-spatial realities and outcomes into Ghana's northern regions, which have concurrently marked Accra as an oversubscribed destination for intra-country migration, and also hampered nationwide structural development and industrial output.

The combination of this historical investment legacy alongside unimaginative planning policy at the local, subregional and national level of Ghana is thus the principal cause of Accra struggling to contain both its formal and informal settlements. Administrative authorities at these distinct levels must recognise the value of leveraging decentralised and centralised systems, industries and services where appropriate alongside vital interdependencies such as transportation networks that will facilitate and support higher socioeconomic outcomes for ALL Ghanaians from north to south. A wholesale dissociation from insipid developmental visioning will thus engender a more adaptive approach to urbanism in Ghana's cities and towns. Advancing this approach simultaneously recognises the draw of urban areas and the conditions that catalyse the formation of informal communities. Informal communities are largely a response to a lack of affordable housing opportunities and restricted access to basic services normally found in formalised city systems. Where such barriers abound, rural-urban migrants typically take proactive action to shape unoccupied lands for their sheltering needs and enhance their proximity to jobs and other city resources (Dovey *et al.,* 2023) (Vahapoğlu, 2019).

As difficult as it may be for the AMA to support these increasingly convergent informal and formal realities particularly at the centre of Accra, the answer is not to displace the informal communities without reason. Unless settlements are obviously and erroneously sited in critical ecological and/or other vulnerable infrastructural limits, AMA policymakers would do well to embrace a dynamic mix of interventions within informal communities that tactically integrate its spatial logic and operational fluidity with that of the larger formal urban framework patterns. For such structures, the AMA and agencies such as the Ministry of Works and Housing must strategise on relocation and resettlement strategies in partnership with affected households in non-vulnerable locations. Actively enforcing a place-based and ethnographic sensibility to planning & design policy and practice ensures that community understandings, values and concerns of target populations are considered and thus, cultivate in greater buy-in from both informal and formal settlement residents (Dovey *et al.,* 2023) (Vahapoğlu, 2019). For the Odaw-Korle context and citywide in Accra, it is a chance to experiment with various affordable housing typologies and material choices, from the traditional Ghanaian courtyard multi-family to modular, prefabricated structures made of laterite brick. Complementing this housing approach is increased investment into the sanitation and drainage needs of the community; a much-needed step as current AMA waste handling capacity is at 70% for incorporated areas and 25% for unincorporated areas.

The prolonged interaction with these informal and formal settlements will help the AMA develop and build sophisticated accounting, tracking and monitoring databases of demographic trends in relation to the city's changing patterns. It will arm the AMA with reliable data to navigate between emergent settlement and predicted settlement conditions both within and outside of the Odaw-Korle context. Additionally, it would enable the AMA to perform a multitude of sophisticated scenario testing that could potentially guide particularly complex short-term and long-term planning and design actions. Such critical knowledge will also aid the AMA to take an informed approach to variable land tenure practices and possibilities, housing affordability levels and proactively connect key infrastructural linkages such as water, power and street network distribution across Accra.

3. Conclusions

3.1 Multi-Sector Partnerships

As the GARID project begins to take shape, it is clear that the challenges the Odaw River-Korle Lagoon catchment in Accra, Ghana faces are vast, and thus, require a multitude of phased and/or concurrent measures. There are hardly any prescribed pathways or solutions to make for this project with so many competing variables of man-made and natural phenomena, often set at the mercy of impatient political establishments. The project demands taut coordination, political will, and codified earmark as 'high-priority' for current and successive Ghanaian governmental administrations at the local, subregional and national levels. Furthermore, by cultivating partnerships and optimizing tools between "governmental institutions, non-profits, private and public organizations, community groups and target populations," it enhances the likelihood of delivering new urban architectural + landscape typologies and city services that drastically reduces barriers to social mobility and critical access to social amenities and city resources (KU.edu 2024). The Odaw-Korle catchment is one characterized by flows, from water of course, to waste, and waste to interactions between its permanent population and commuter population. Honing an assemblage mindset to spatial planning, it frees Ghanaian policymakers across various sectors and disciplines from rigidity, recognizing that cities and the many districts and subcultures that comprise them are in constant flux, framing and reframing itself as necessary (Amoako and Boamoah, 2016).

The GARID has high potential to become Ghana's most significant waterworks project since the 1960s Lake Volta/Akosombo Dam. Like the latter, it too deals with complex ecological, urban/regional planning and resettlement concerns. In many ways the Lake Volta project provides a lesson for

GARID, not as an exact replica, but the need to better incorporate affected populations in decision-making that has both site-specific and national repercussions. While the Lake Volta project still fulfils its purpose of supplying hydroelectric power, it provided subpar housing resettlement packages and triggered an economic decline for an estimated 80,000 people. By infusing this assemblage mindset into the GARID towards moulding multi-layered solutions, the project can avoid this wanton population displacement and resultant socio-cultural fractures. Rather by actively engaging with waste economical structures, socioecological infrastructural systems and adaptive urban planning, the GARID project can introduce new models of urban planning policy and practice, where informality and formality converge to breed new patterns, technologies and interventions, allowing for both structure and freedom in urban living and place-making at the Odaw-Korle scale and citywide scale.

3.2 Limitations, Implications & Future Recommendations

Although this paper explored the need to examine the Agbogbloshie and Old Fadama "informal economy and settlement sited within the Odaw-Korle Catchment through the framework of waste economies, socio-ecological infrastructures and urban patterns, the potential for future research is rife. These frameworks, taken individually and collectively, provide comprehensive layers that buoy understanding of the issues at hand. However, as the paper's intent is to pique interest and examine speculative approaches to addressing these challenges, without a series of tests, be it multiple pilot programs or full-service implementation, the credibility of these ideas and its real-time plausibility is questionable. As such, the paper's proposed speculations operate in an unbuilt capacity, missing the opportunity to refine action plans and implementations as well as perform effective post-occupancy assessments of solutions, with a particular focus on unconventional solutions. Additionally, real-time testing and evaluation of a solution's impact on affected communities would prove crucial to ensuring interventions from the small to large-scale are uniquely suited for each section of the Odaw-Korle context.

Another potential dimension previously discussed in the Methodology section that could provide grounding for additional scholarly research is that of informal settlements. As mentioned, these settlements often arise out of a lack of access to affordable and stable housing in urban areas. These informal settlements, including Agbogbloshie and Old Fadama, draw both direct and indirect lineage to the 300,000+ housing units deficit in the city. Accra's housing market is increasingly untenable for many of its long-term residents, burdened by low wages, high-interest mortgage rates and entrapped in an unregulated, and often exploitative rental system. Besides this rental system, where renters pay 1-2 years of rent in advance before securing a place, is the puzzling trend of quoting rental and house prices, not in Ghana cedis, but in USD. Further compounding this housing crisis is the proliferation of luxury real estate ventures all across Accra, much of which too loosely use the "luxury" tag. Marketed heavily to the monied, jet set class, these housing actions further lock out long-time Accra residents from being able to secure multiple housing options, be it affordable rental properties to reasonably-priced lands upon which they can build their own homes. Thus, this housing affordability issue could provide a strong basis for additional research, which could further highlight the physicality and practicality of housing design. By drawing upon this paper's landscape urbanist lens to guide the spatial parameters of where to build, who to build for and what materials are appropriate both environmentally and economically, perhaps, it could reveal useful insights that mitigate myopic urban housing policy and design implementation (Appiah 2023) (Housing 2024).

Acknowledgement
This research was not funded by any grant.

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