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# Community adaptation strategies in Nairobi informal settlements: Lessons from Korogocho, Nairobi-Kenya

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Informal settlements are often the hotspots of vulnerability as evidenced by the recurrent environmental and climate-related shocks and stressors. Despite this exposure and susceptibility, their role in spearheading disaster risk preparedness and response is often overlooked. This exploratory research profiles four local community initiatives for climate mitigation and adaptation within Korogocho informal settlement in Kenya. Findings from 10 purposefully sampled key informants and 30 stratified sampled residents across nine villages within the informal settlement demonstrated the impact of locally led initiatives in creating awareness and developing the absorptive, adaptive and transformative capacity of communities for climate resilience. The research findings elaborate on the outstanding performance of community derived initiatives, whilst putting emphasis on the need for active dialogue and collaboration between communities, policy makers and practitioners. Additionally, the climate agenda ought to be able to simultaneously promote environmental benefits and the socio-economic wellbeing of the people. This study accentuates the role of smart approaches to climate literacy based on existing community structures that leverage on local experiential knowledge. These include digital storytelling, comics, art, music, local radio stations, community opinion leaders and chief *barazas*. A key takeaway is the significant role of children in transformative climate resilience. This is facilitated by the fact that they may comprehend climate change implications better than adults augmenting the possibility of human behavioral change toward pro-environmental deeds<sup>1</sup>.

## KEYWORDS

climate shocks and stressors, disaster risk preparedness and response, collaboration, climate literacy, local experiential knowledge, community initiatives, mitigation and adaptation, transformative climate resilience

## Introduction

Discussions on climate change have gained political momentum and taken the front stage among states especially with regards to deriving mechanisms to keep the temperature rise below the scientifically established tipping point of 1.5 degrees. Globally recognized pivotal initiatives in the history of climate change include United Nations

1 <https://www.resilience.org/stories/2019-11-01/mind-the-climate-literacy-gap/>

Framework Convention on Climate Change (UNFCCC)-1992, and its Kyoto Protocol and the COP21 Paris Climate Agreement-2015. Within Africa, there are two main policy forums that call for unity of purpose to tackle environmental concerns and climate change, namely; the United Nations Environment Assembly (UNEA) and the African Ministerial Conference on the Environment (AMCEN). Notable though is the unequitable distribution of the burden and responsibilities in response to climate change; Africa contributes just about 4% of global emissions (Forbers Africa, 2022) but stands out with a disproportionate share of lethal climatic disasters. This vulnerability is driven by the high dependency on natural resources (Reid et al., 2009) among other factors such as low absorptive and adaptive capacities, and poor diffusion of climate literacy (Grant, 2015).

In the dawn of this harsh reality, African countries have proactively mainstreamed climate change responsiveness in their plans, policies, strategies and programmes. It has become imperative to develop statutory instruments specific to climate adaptation and transformative resilience. In Kenya, for instance, the operational framework includes the Vision 2030; Ministry of Environment and Forestry, 2010; Climate Change Act, 2016; Government of the Republic of Kenya, 2018; The National Treasury, 2018; The Green Economy Strategy and Implementation Plan; and the National Climate Change Framework Policy. These are supported by institutional establishment at the national and sub national level to facilitate implementation. However, one key obstacle to meet planned milestones has been budgetary allocations amidst competing financial obligations to cater for primary socioeconomic needs. The recommended tactic is to identify and undertake local innovative mitigation and adaptation actions that unlock both climate/environmental benefits and socioeconomic dividends, simultaneously.

This perspective that has led to the emergence of novel and triumphant community-based strategies for transformational climate resilience at the neighborhood scale. This study identifies and profiles such local community initiatives in response to climate shocks and stressors within the informal settlement of Korogocho in Kenya. This community case study aims at amplifying the power of localized efforts in driving change, and the need for collaborative and decentralized urban climate governance approach (Hegger et al., 2017). This paper calls for a praxis where communities lead the process based on their needs, priorities and knowledge, with the help of policy makers and technocrats to anticipate, guide, or recover from devastating climate change impact.

The study had the following three research objectives of:

1. Assessing climate literacy and the most effective learning tools.
2. Identifying locally led climate change interventions and their contribution toward transformative climate resilience.

3. Evaluating the perceived level of collaboration among actors for climate action.

## Literature review

This research examines locally designed and implemented initiatives as a pathway to inculcate climate awareness, and to transformational climate resilience. Specifically, this section reviews scholarly works that speak to locally led climate action and its competitive edge over the heavily laden and often non-inclusive top down approach. Literature on transformative climate adaptation is also analyzed to decipher the perpetual influence that community-based strategies have in reforming policy and human behavior. Imperative to driving change is community awareness on climate change. This section therefore explores innovations in imparting climate literacy. It also discusses citizen science as a tool to sensitize and engage locals in the co-production of knowledge.

## Community-based perspective

Community based refers to a methodological approach in which communities actively contribute toward finding interventions to issues according to their needs and priorities (Hubberstey et al., 2015). This approach recognizes the value of local knowledge in addressing complex societal challenges in a holistic manner (Hubberstey et al., 2015). Kirkby et al. (2017) define community-based adaptation (CBA) as an approach to combating climate change through locally-led interventions that strengthen the adaptive capacity of communities. Adaptation refers to the capacity of a community to learn and adjust its responses to changing external and internal processes, while continuing to develop (Castro-Arce and Vanclay, 2020). CBA approach leads to appropriate design solutions, quicker redress to problems, greater commitment to implementation and higher beneficiary satisfaction (McNamara et al., 2020). CBA gives a voice to the voiceless by bridging the power gap inherent in a society's urban governance structure (McNamara et al., 2020).

Trundle et al. (2019) observe that community structures and informal systems are poorly understood. This is a costly oversight because building directly on locally identified priorities and decision-making processes provides a pathway for ensuring that endogenous resilience systemic traits are not interfered with. Endogenous resilience is a burgeoning concept adopted from Ziervogel et al. (2017) as "where systems create, or build on and enhance, people's own capacity and resilience." Trundle et al. (2019) recommend the integration of CBA and formal urban governance structures to attain inclusive and sustainable climate action.

## Transformative adaptation

Transformative adaptation is an approach that identifies the fundamental causes of vulnerability to climate change with the intention of systemic overhaul in order to improve climate resilience. This is epitomized by restructuring, shifting of trajectories, innovation and persistent system wide changes to build the transformative capacity of a society (O'Brien, 2017). Transformative capacity refers to the ability of a system to initiate social transformation that moves away from untenable trajectories, toward desired ecosystem states and values (Olsson 2003 as cited in (Lonsdale et al., 2016).

Béné et al. (2012) identifies transformative capacity as one of the features of a resilience socio-ecological system, the other two being the absorptive capacity and the adaptive capacity. Similarly, Fedele et al. (2019) categorizes responses to climate change events into three namely; coping, incremental adaptation, and transformative adaptation.

According to Bahadur and Tanner (2014) transformative resilience seeks to directly confront the deep-seated political, economic, institutional and cultural processes that amplify a society's vulnerability to climate related disasters. Transformative climate action is often led by the local communities through endogenous resilience (Ziervogel et al., 2017).

## Innovative climate literacy and citizen science

Literacy generally refers to competence in a specific context. It defines one's ability to understand and interpret thoughts in an informed manner as pertains to a specific subject matter (Milér and Sládek, 2011). Climate literacy qualifies one's ability to understand anthropogenic impact on socio-ecological systems (SES) leading to climate change, and how climate change affects life on earth (Mittenzwei et al., 2019).

According to Simpson et al. (2021), climate change literacy entails being aware of both climate change and one's influence on the climate system, and thus buttresses informed mitigation and adaptation responses. A person who is climate literate is able to cohesively articulate the subject of climate change. Through understanding the various dimensions of Socio-Ecological Systems, such a person is able to make informed and responsible decision aligned with environmental protection (Azevedo and Marques, 2017). The person is eager to learn more about climate, and is able to sieve through credible sources of information on the subject.

## Study area and context

Korogocho is the 4<sup>th</sup> largest slum in Nairobi, located 11 km northeast of the city center (Omedo, 2010). It has a population of

36, 900 people (11, 757 households), 0.9 km<sup>2</sup> of land area, and a density of 42, 401 persons per sq. km (KNBS, 2019). It is located in Ruaraka constituency, Kasarani Sub-county. The settlement grew in the 1960's on government land. However, most of the parcels are now under private land ownership.

The settlement consists of nine villages, namely: Gitathuru, Grogan A and B, Highridge, Kisumu ndogo, Korogocho A and B, Ngomongo and Nyayo (see Figure 1). Korogocho is bounded by two rivers, Mathare River to the north and Nairobi River to the south, and Kenya's largest landfill (Dandora dumpsite). The housing structures are constructed from recycled materials such as corrugated iron sheets, timber, mud and natural stone and many of the residents pay rent for their houses (IFRA Nairobi, 2011). Small scale urban agriculture is a common practice despite the crowded conditions.

As part of the development programs to help improve the state of Korogocho, the Government of Kenya together with the Italian government and UN-Habitat formed a joint initiative called the Korogocho Slum upgrading program in 2008 (IFRA Nairobi, 2011), with the aim of improving the living and working conditions of the inhabitants while fostering inclusivity and capacity building (Elfström, 2021). The program has led to construction of a pedestrian walkway that links Korogocho to Dandora, an office that is used by Korogocho committee, water tanks that provide safe and healthy water for drinking, a hospital that promotes hygiene initiatives (Mbaabu, 2017), streetlights, a footbridge and a network of streets as well as a public toilet (HFHI, 2019).

Several development projects have taken place in the area through community-based organizations. These initiatives majorly aim to steer climate change literacy in the area and to help with adaptation and mitigation of the effects of climate change so as to help the community to be more conscious of disaster risk preparedness and management. Historic records of environment and climate-related disasters in Korogocho include: floods, fire outbreaks, health epidemics, droughts and famine (Owuor, 2010). Vulnerability to climate change has been enhanced by factors such as increasing population; inherent chaotic nature (poor infrastructure and sanitation); location, next to the river, and the dumpsite; socio-political marginalization and exclusion; poverty and unstable social networks, among others (Owuor, 2010).

## Research methodology

At the onset, desk top reviews were conducted to gain an understanding of documented community efforts for climate adaptation and the local administrative structure in Korogocho. For this exploratory research, a combination of cluster sampling, stratified random sampling and purposive sampling method were used to select 36 respondents for the household questionnaires. In the cluster sampling, each of the nine villages were used to represent a cluster, and stratified random sampling

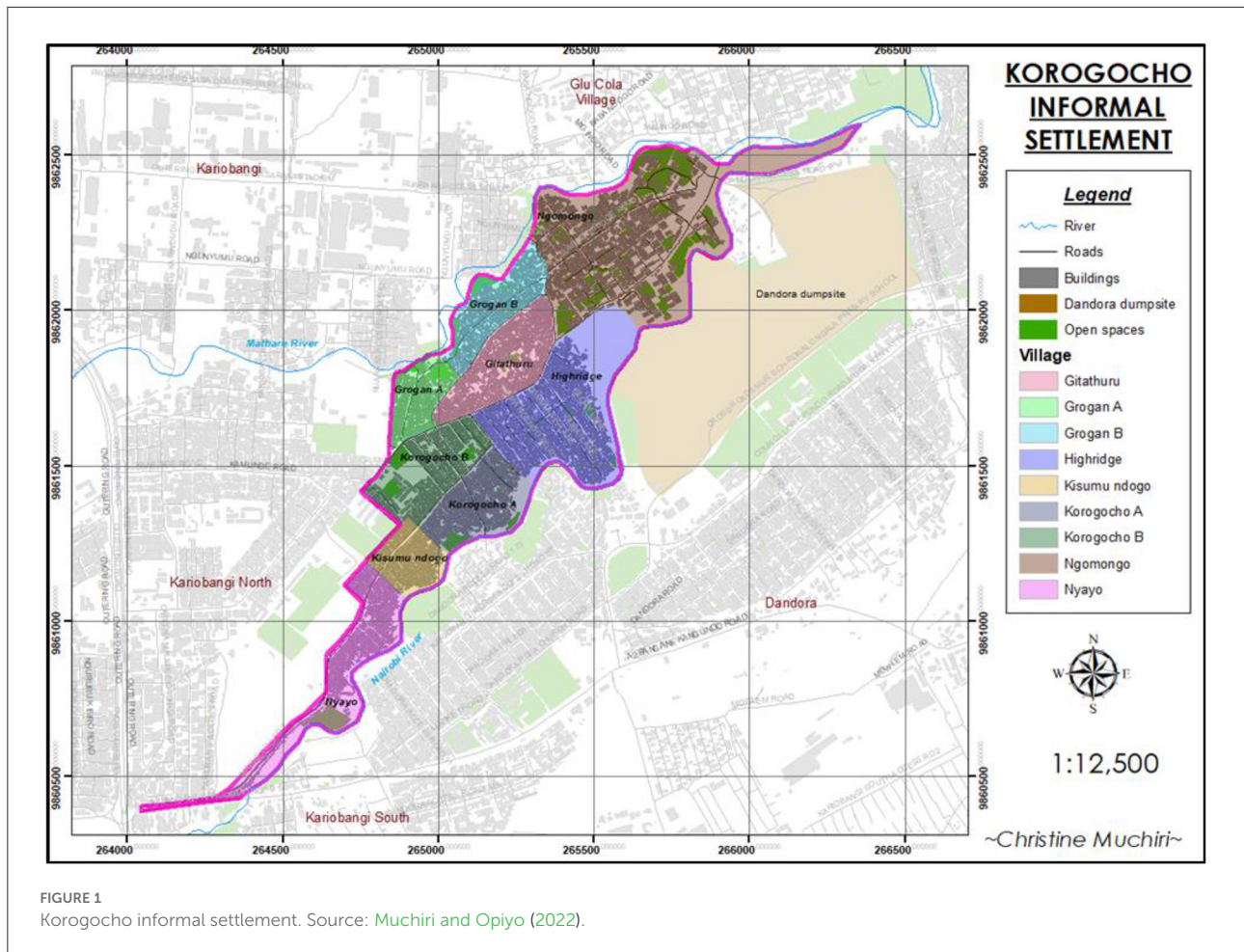


FIGURE 1  
Korogocho informal settlement. Source: Muchiri and Opiyo (2022).

was used to pick three respondents from each village. The land use being mixed with both residential and commercial uses, one trader from each village was also interviewed to ensure that the data obtained was representative and accommodating of varying socio-economic dynamics. Purposive sampling was employed to select the traders. Out of the 36 administered questionnaires, six were unresponsive. Those, mostly, were cases that asked to be left to answer the questionnaires for collection at a later date. For the key informants, the research employed purposive sampling technique to reach the targeted respondents. The key informants were from Ecological justice, Hope raisers initiative, KochFM, St John’s Sports Society, Korogocho Peace and Justice center, KombGreen, Daniel Comboni Primary School and the local administration and community leadership.

The household survey focused on ascertaining awareness on climate change and the best sources of information on the subject matter. The respondents also enumerated community adaptation initiatives and highlighted economic, environmental and social transformation resulting from the most influential programmes. The Key informant interview aimed at establishing the nature of relationship between the state and non-state actors

in mitigating climate shocks and stressors. The key informant interview also aided in identifying the challenges faced by community led initiatives in meeting climate goals.

Four community researchers assisted in data collection. These were beneficiaries of citizen science through which the youth have developed integral data collection and analysis skills overtime. Heigl et al. (2019) highlights the role of Citizen Science as a smart tool for gathering information and initiating basic design, as well as a strategy for outreach and sensitization. Citizen Science refers to voluntary, collaborative and complementary participation by non-technical persons in scientific activities, and the process is often initiated by a scientific or academic institution (Heigl et al., 2019). This was a stimulus to the data collection process since the respondents were more responsive to familiar faces. Elfström (2021) elucidates the significant influence of digital storytelling due to its ability to appeal to human emotions and resonate with personal experiences thus compelling the audience to take action. Exploring art, theater, music, comics and peer-to-peer learning is considered instrumental in closing the education gap in the society’s understanding of climate change. The University

of Brighton describes digital storytelling as a creative way of sharing a personal story through filming still images and voiceover. These films can then be streamed on the web or broadcast on radio or television. From this, the lesson learnt was that while planning for mitigation and adaptation, the interplay between innovative scientific research approaches and local experiential knowledge needs prioritization to enhance project realism, acceptability and sustainability.

Analysis was done by collating the data and coding it into different themes. The frequency of the responses was then analyzed, and patterns were drawn from it in order to generate meaningful information.

The main challenge encountered during the research was managing the expectations of the respondents who demanded to know the expected tangible outputs from the research that would substantively contribute to environmental benefits and socio-economic dividends. The research aims at increasing the visibility of the contribution of community adaptation strategies toward transformative climate resilience.

## Results

- *Awareness about climate change*

All interviewees attested to believing that climate change was a reality and that their community was impacted by climate change. Their beliefs were supported by occurrences such as extreme temperatures, drought, and water scarcity, strong winds and flooding. These disasters have negatively impacted the community's quality of life. Water and food scarcity have led to high cost of living, while the air pollution has brought about emergence of respiratory diseases that sometimes culminate in loss of lives. Most respondents (40%) believed the greatest impact of climate change was the rise in the cost of living (see Figure 2). Community sources of information on climate related matters included political campaigns and forums. Some members learnt through community initiatives such as the planting of bamboo trees and global debates on various social media platforms.

- *Main actors collaborating in curbing the impacts of climate change*

The research established that while community initiatives take a leading role in creating pathways toward a climate resilient community, their efforts are supported by government ministries and agencies, international organizations and Non-Governmental Organizations. Local CBOs such as KombGreen Solutions and Hope Raisers Initiative were instrumental in raising awareness, research institutions such as African Population and Health Research Centre (APHRC) research work in collaboration with the community,

International Organizations like World Food Programme offering food support to those that were severely hit by disaster, United Nations provided funds and training to help run climate adaptation related programs, the Ministry of environment and Kenya Forestry Services waste management and sensitization activities. Non-Governmental Organizations such as *Muungano wa Wanavijiji* supported the development of cohesive community structures and the Public Space Network that provided technical guidance in managing green and open spaces.

- *Community-led interventions toward disaster risk preparedness and responses*

The research sought to profile the local community organizations that had been formed over the years to prepare and respond to climate related disasters and risks. From the survey responses, a series of climate change mitigation and adaptation champions emerged including the Temple Art Youth Group, Korogocho Peace and Justice Center, Ecological Justice, Red Cross, *Ayiera* Initiative, Korogocho Response and Safety Team, KombGreen and Hope Raisers Initiative (see Figure 3).

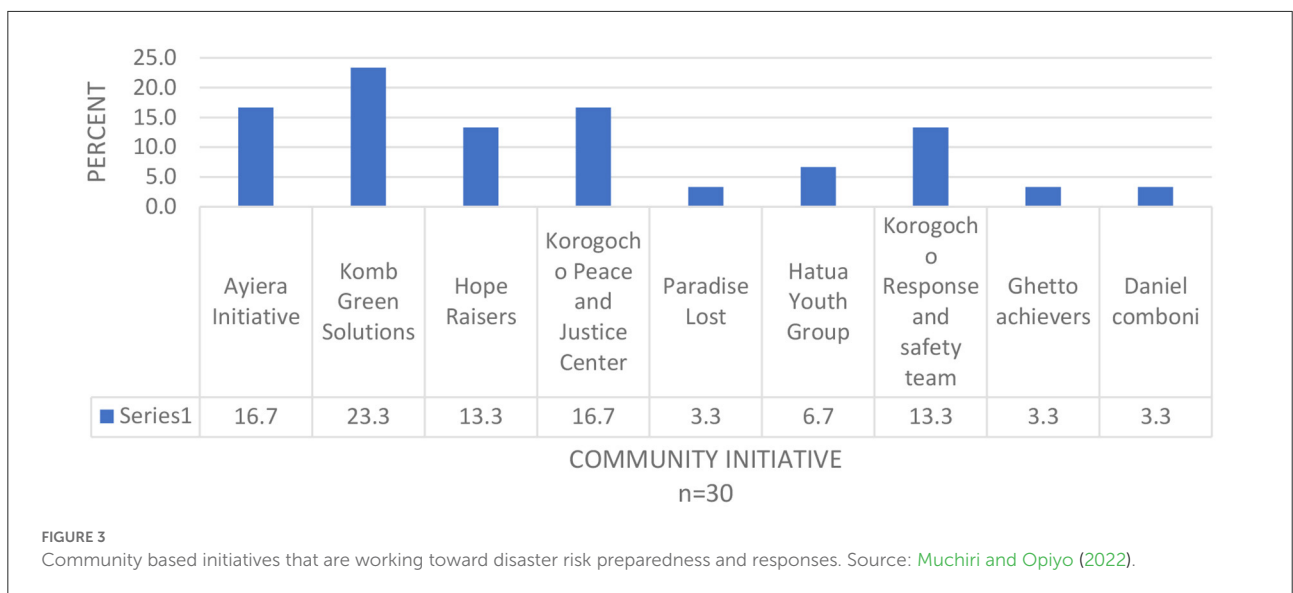
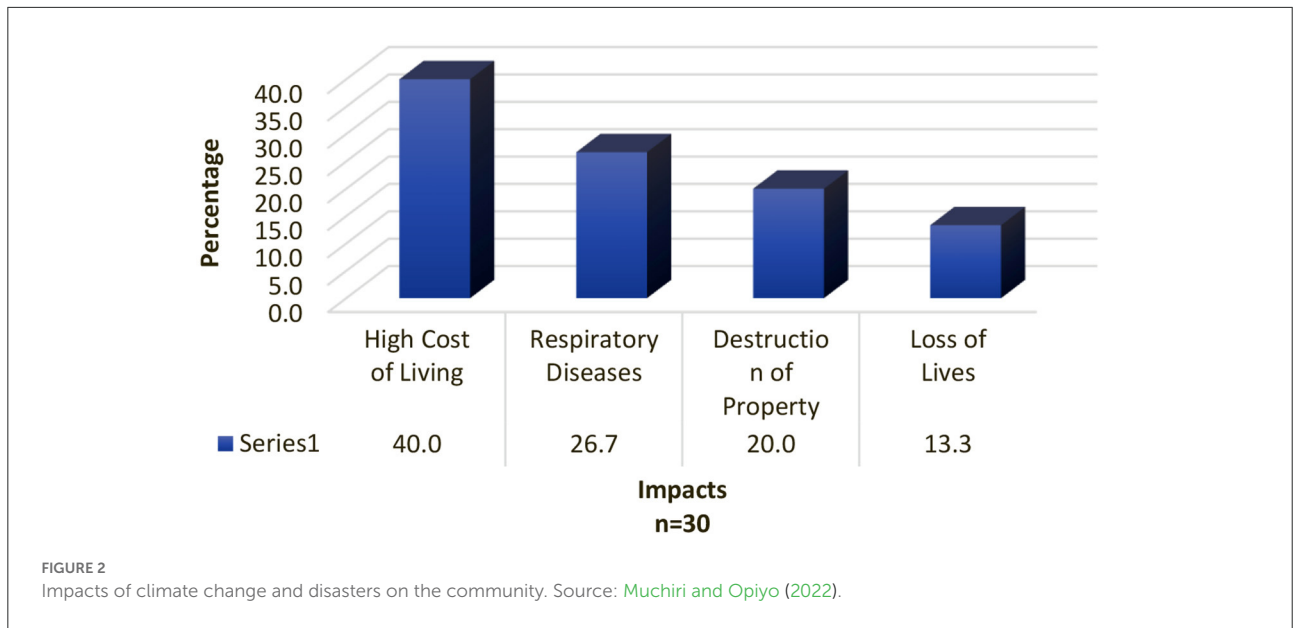
The research further sought the opinion of the respondents on the initiatives that were perceived to be most impactful. The highest ranked initiatives were; KombGreen, Hope Raisers Initiative, *Ayiera* Initiative and Korogocho Peace and Justice Center. These four initiatives play a focal role in this paper.

## KombGreen solutions

This is an environmental organization that started out as a way of providing clean water and curbing air pollution in Korogocho (Wairimu, 2020). It later became an employment opportunity for the youth who had participated in the construction of the bridge linking Korogocho and Dandora settlements, so that they would not go back to the life of crime. The youth began by clearing out the dumpsite that was next to the Nairobi River to create a space/park for relaxation. Cleaning up of the riparian was done, gabions constructed, and bamboo trees were planted, hence creating the park that was named "People's Park." Today, it offers a green space for relaxation, and an urban garden that provides vegetables to the poorest families in the area (see Figures 4, 5). The bridge is in good condition, and community members can enjoy recreation at the People's Park.

## Hope raisers initiative—*Future Yetu* (our future)

To counter environmental degradation and climate related threats, the residents modeled a campaign slogan dubbed "our future, let's be responsible" in 2020, under



a project called *Future Yetu* (Our Future). The main goal of the project was to sensitize the residents about climate change and adaptation (Cities Alliance, 2021)<sup>2</sup>. Notable achievements of *Future Yetu* include: Building the communities’ technological literacy; increased awareness of strong linkage between climate change, air pollution and health through a multimedia campaigns; establishing a Carbon Sink Pocket Park project at Daniel Comboni Primary School; demonstrating the utilization of free public space for green gardens; and integrating local groups into

<sup>2</sup> <https://www.citiesalliance.org/resources/publications/project-case-studies/future-yetu-digital-story-telling-climate-adaptation>

the participatory process through linkage with Nairobi County Government’s Environment Department. The main outputs include forming the Korogocho Climate Adaptation Manifesto and establishing the Korogocho climate change adaptation committee.

### Ayiera initiative

*Ayiera* was founded in 2007 as a charitable “sports for development” Community Based Organization. It aims to improve the lives of children and young people through education and talent development. *Ayiera* is involved in



FIGURE 4  
Korogocho People's park. Source: Muchiri and Opiyo (2022).



FIGURE 5  
Sustainable urban farming practices for food security in Korogocho. Source: Muchiri and Opiyo (2022).

awareness and sensitization on matters affecting the society to mitigate the impacts of climate change. It mobilizes residents to plant trees on the riparian reserves and in the pocket of green spaces within the villages<sup>3</sup>. Ayiera has kept thousands of children and youths away from the dumping site, drug abuse and crime by engaging them in activities that promote their well-being and that of the community. Locals that form membership within Ayiera are able to brainstorm and find lasting solutions to societal problems<sup>4</sup>.

<sup>3</sup> <https://ayiera-initiative.org/>

<sup>4</sup> [http://www.climatechangeeducation.org/pdf/climate\\_literacy\\_k-12.pdf](http://www.climatechangeeducation.org/pdf/climate_literacy_k-12.pdf)

## Korogocho peace and justice center

The center was established by a group of human rights defenders after assessing the community and realizing that there were myriads of social injustices that were going unpunished due to vulnerabilities affiliated with being economically disempowered. The victims either lacked knowledge on their rights or were financially incapable of contracting a lawyer. The center offers legal advice on different issues affecting the community. It tackles a broad array of concerns ranging from employment rights, accidents, child abuse/defilement, housing, land, environment, police abuse and any other human rights violation (Kituo cha sharia, 2016). A significant portion 43% of the respondents identified the works of the center as having been instrumental in creating climate literacy and providing guidance in determining mitigation and adaptation strategies.

- *Setbacks to implementing community-initiated projects*

The challenges enumerated from the survey as a deterrence to meeting climate goals include; inadequate funding to run the projects, encroachment of riparian reserves after relocation, inherent grassroot power play and cartels that frustrate certain projects for selfish gains, inadequate tools for clean-up exercises, rain-reliant urban farming and lack of water storage, lack of appropriate infrastructure for solid and liquid waste management, and poor coordination among the actors leading to duplication of projects. Despite high climate literacy levels, the culture of negligence dumping of waste was found to be the greatest setback to achieving an environmentally sound neighborhood.

## Discussion

### Climate literacy and locally led initiatives

From this paper, it is eminent that community-based strategies greatly influence the attitude, behavior and perception among residents. The findings indicate that embracing creative methodology such as citizen science is important in generating local interest and ownership and it is not only enhancing local climate-related literacy but also help in addressing the socio-economic concerns of the community which are rarely factored in top-down climate change solutions driven by government agencies and partners.

One cross-cutting observation from the sampled locally led initiatives is that they were framed to meet socio-economic needs, while at the same time achieving pro-environmental goals. KombGreen, for instance, was established with the aim of reclaiming the riparian reserve while creating employment for the youth who had initially been regarded as social misfits. *Future Yetu* was centered on creating climate awareness, and a

call to action for government and other partners to collaborate in combating the destructive impacts of climate change, while addressing socio-economic dimensions such as health, housing, infrastructure and income generation. Besides curbing air pollution, *Ayiera* initiative also targeted alleviation of poverty, illiteracy and social ills such as crime and drug abuse.

Community-based adaptation is seen to leverage on local knowledge to map climate change and sensitize others through similar relatable personal experiences. Notable from this research was the use of digital storytelling in the Hope Raisers Initiative as a powerful tool for imparting climate literacy.

## Community-scale capacities

Welle (2014) assesses the resilience of Social-Ecological Systems (SES) at the household, community and city level. The report evaluates climate resilience through the SES absorptive, adaptive and transformative capacities. The absorptive capacity is the ability of a system to preserve and restore essential basic structures and functions in the face of climate change adversities through pre-established coping structures (Cutter et al., 2008; Béné et al., 2012). Continued enhancement of the absorptive capacity in Korogocho was exhibited through training on disaster risk by the Kenya Red Cross, saving schemes with various CBOs to mitigate climate risks and construction of gabions to offset floods.

The community in Korogocho illustrated adaptive capacity through change in planting techniques to include smart innovations such as hydroponics and vertical gardens, river cleanup exercises, and climate change awareness campaigns through print media and broadcasting. Transformative capacity refers to the ability of a system to change intrinsically in order to address the root causes of vulnerability when pre-existing conditions succumb to insurmountable adversities of climatic change (Walker et al., 2004; Béné et al., 2012 as cited in Welle, 2014). Korogocho community illustrates this through human settlement relocation from the flood risk zones, youth rehabilitation from crime and drug abuse to decent means of earning a living, and the use of solar and gas as a source of lighting and cooking energy, respectively.

## Policy recommendations

Kenya has a sophisticated top-down climate policy setting which undermines decision making in local contexts thus channeling investment into unequitable and unjust programmes. The progressive development of this legal and policy framework points toward a strong political will to support climate action (Odhengo et al., 2019). However, there are a

few persistent impediments that obstruct the country's climate agenda with reference to the objectives of this research. There is need to decentralize the institutional framework for climate action to benefit setting of local priorities and guarantee project ownership and perpetuity.

Second is the need to make good pledges that have been made at the national level; Kenya has its revised Nationally Determined Commitments to the Paris Agreement, among other climate plans and programmes. Local communities are stepping up to take action with radical achievements such as the preparation of Korogocho Climate Adaptation Plan which superseded the Nairobi City Climate Action Plan.

Finally, in accordance with the Global Green New Deal (GGND), governments are called upon to allocate a significant share of stimulus funding to green solutions for climate action. Some counties have established County Climate Change Funds (CCCFs) but the linkage between these funds and the national system is still currently relatively underdeveloped as observed by Orindi et al. (2020). Appropriate mechanisms ought to be developed to ensure that these funds equitably and proportionately trickle down to the grassroots level particularly to the most vulnerable societies. Oversight structures for accountability and transparency are necessary to inspire the people's confidence.

## Research limitations/constraints

The main constraints for this research include limitations of the concept of community adaptation, and the tools that are used to track and measure it—their narrow scope; the complexity of shocks and of systems; the relationship between climate change and environmental degradations; the fact that the methodological approach chosen is highly subjective and widely influenced by personal judgement and perceptions; and the fact that climate data at city level is scarce and mostly completely absent at neighborhood scale<sup>5</sup>.

## Conclusion

The paper concludes that locally led climate change interventions have great potential in addressing the community-felt climate adaptation priorities. This converges with the postulation by McNamara et al. (2020) that CBA promotes community approval and ownership, incorporates local realities, and catalyzes holistic foresighted planning. This approach contributes to sustainable transformative climate resilience. The study findings underscore the importance

<sup>5</sup> <https://www.unrisd.org/en/research/projects/state-of-resilience-in-africa>



of collaboration among strategic partners in tackling climate shocks and stressors. The research emphasizes the role of citizen action and local politics in achieving transformative resilience at city and national level. The nexus between local experiential knowledge and impact-based scientific inputs is considered invaluable to the process of knowledge co-production. It is paramount that adaptation and mitigation measures touch on basic socio-economic factors such as food security and employment. Programmes such as waste recovery and urban agriculture for revenue generation create interest among the youth and the wider local community to champion the agenda of climate change. Additionally, the study accentuates the use of citizen science and creative methods such as digital storytelling as smart and innovative ways of building local capacities through climate literacy.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

Ethics review and approval/written informed consent was not required as per local legislation and institutional requirements.

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