

An Evaluation of the Social Value-Action Gap in the Governance of the Nairobi River System

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ABSTRACT

The restoration of urban river ecosystems in Nairobi faces persistent challenges stemming from a disconnect between communities' environmental values and actions despite the robust legal structure governing environmental management. This study quantifies the Social Value-Action Gap among 400 respondents in riparian communities along the Nairobi River system, by assessing individual social value orientations, disposal/sanitation practices and participation in governance. Using a mixed-methods, cross-sectional research design, data were collected from a stratified random sample across the dominant land uses; residential, commercial, agricultural, and industrial. To contextualize and complement the quantitative data, key informant interviews with relevant line authorities were also conducted. Psychometric assessments were used to evaluate environmental concern and the levels of participation in governance. The descriptive analysis provided a baseline for the significant levels of environmental apathy within the population. Based on measures from the Value-Belief-Norm theory, results showed predominantly self-enhancing values among individuals with 78.7% not keen on waste segregation, 60.8% prioritizing economic growth over environmental stewardship, and 61.1% viewing waste management as solely a government obligation among other actions. Active civic engagement was critically low, with a marginal 5.6% engaging in direct communication with authorities and only 6.6% involved with environmental groups. Inferential analyses confirmed that age and education significantly influence ecological profiles ($p < .001$), with young adults (ages 18–34) displaying the highest levels of environmental apathy. Furthermore, Spearman's rank-order correlation revealed a statistically significant, strong negative correlation ($r_s = -.72$, $p < .001$) between environmental apathy and local governance participation, alongside a moderate to strong positive correlation ($r_s = .4989$, $p < .001$) linking environmental apathy to unsustainable waste disposal/sanitation practices. These findings affirm the ineffectiveness of conventional approaches towards environmental governance as they fail to account for social values and meaningful integration of riparian communities into both formal and informal governance frameworks.

Keywords: Environmental Governance, Nairobi River, Pro-environmental Behavior, Urban riparian communities, Social Value-Action Gap

INTRODUCTION

While urbanization has historically been linked with advancements in human development and societal progress (Opoku and Akotia, 2020; UN-Habitat, 2016), recent research indicates that urban environments have contributed to notable socio-economic disparities and environmental decline (Van Ham et al., 2021). On account of the pressing global environmental challenges, there is an increasing demand for substantial and revolutionary modifications to anthropogenic attitudes, behavior and the mechanisms that support our existence on Earth. This

transformation necessitates transitioning from unsustainable methods to sustainable ones like integrating green technologies and embracing the principles of a circular economy in production. In cognizance of this, governments worldwide have made significant efforts towards regulating the debilitating impacts of human activity. However, most countries in Africa have not been able to effectively manage their ecological dynamics for sustainable development. In turn, the impacts of urbanization have led to massive pollution and depletion of natural resources.

Water is universally acknowledged as the planet's most crucial natural asset that supports life and drives development. Nonetheless, Vörösmarty et al., (2010) point out that freshwater ecosystems are increasingly facing direct threats from human activities and are poised to undergo additional impacts due to human-induced climate change. Africa is home to the largest freshwater systems on Earth (Papa et al., 2023), distinguished by a vast spatial distribution and diversity of surface waters holding immense significance for global climate and water systems. Over recent decades, the cumulative impact of human action and climate change has elevated freshwater availability to a significant global concern. As African economies expand rapidly, the growing need for fresh water to support burgeoning urban populations, agricultural activities, and industrial growth is now placing considerable strain on existing natural water resources (Papa et al., 2023; Etikala et al., 2022; Mehran et al., 2017; Steffen et al., 2015). The susceptibility of water systems to human influences both within their ecosystems and beyond, particularly in urban areas, underscores the imperative for adopting an integrated approach to environmental management aimed at ensuring sustainability.

The governance of urban water systems is complicated by the plethora of competing economic land uses and social values. It is increasingly recognized that barriers to achieving sustainable development in the water sector are often caused by socio-institutional challenges (Hoffman and Jennings, 2015) rather than technical issues, a lack of knowledge or resources, or financial constraints (Franco-Torres et al., 2021; Dijk, 2012). Environmental changes like land use shifts, water resource depletion and quality deterioration, combined with ineffective governance of local and shared river systems, has rendered African populations especially susceptible to fluctuations in weather and climate, as well as to prospective alterations in the hydrological cycle. Considering the trends in water resource management in Africa, there has been a growing recognition of the importance of sustainable water governance practices to enhance the resilience of water systems by resolving the primary threats to the quality of urban water systems. Further, consensus generally holds that the river basin level serves as the basic natural context for addressing and solving water challenges, incorporating planning and management activities as essential elements of water governance.

Kenya's urban conglomerates are frequently evolving without the benefit of the necessary governance interventions or investments capable of addressing the urbanization challenges. Nairobi city's environmental outlook is a classic example of the pernicious impacts of unregulated urbanization on natural resources. The city presents complicated and diversified development challenges, characterized by urbanization pressures, limited infrastructure, and natural resource management difficulties (Nairobi City County, 2014; Ogutu et al., 2021). The status of the Nairobi River system demonstrates a failure in governance of urban water systems in Kenya despite various attempts to rehabilitate it throughout various political regimes. Besides the critical levels of pollution of the river, Karangi, (2017) observed that between 1988 and 2014, there was a significant increase in the extent of built-up areas encroaching upon its 30-meter riparian buffer zone (Environmental Management and Coordination Act, 1999). This, coupled with weak enforcement of environmental regulations, has no less vitiated the river's ecotone. A considerable portion of the research into regulatory enforcement has overlooked the significance of social dynamics in policy implementation, resulting in insufficient and disjointed engagement of stakeholders. Nonetheless, emerging systematic social research reveals that the effectiveness of implementing environmental policies relies heavily on providing practical mechanisms for community engagement; and the endorsement and adherence of the public (Syahputra et al., 2023; De Vries, 2020; Muhar et al., 2018; Pahl-Wostl et al., 2011; Viviroli et al., 2011). Existing studies on natural resource management have failed to account for the effectiveness of social values and environmental behavior transformation in Kenya. This research seeks to establish the significance of the gap between the communities' social values and the actual environmental actions within the governance framework of natural resources in Kenya.

MATERIAL AND METHODS

This study employed a mixed-methods research design, where quantitative data pertaining to socio-ecological attitudes was gathered from psychometric assessments and demographic profiles to establish a baseline for determining the participants' social value orientations. Further, qualitative data were obtained from self-reported waste management practices, environmental knowledge and perceptions regarding prevailing governance frameworks and institutional arrangements. The limitations of the primary data collection tools were effectively addressed through supplementary dialogues conducted with representatives from relevant government agencies and non-governmental actors. Expert engagements also provided a comprehensive overview of the current and historical natural resource governance approaches, as secondary literature review completed knowledge of documented pollution concentrations and temporal patterns to conduct situational assessment of the Nairobi River's physiological conditions and determine oversight deficiencies. The extent of riparian community engagement in the governance of the river system was demonstrated through an integration of descriptive and inferential statistical analyses, while the basis of the data collection design underpinned the targeted exploration of various aspects of the observed and reported environmental practices and attitudes.

Sampling Procedure

The study drew its participants from both upstream and downstream riparian sections of the Nairobi River system, following a stratification of the prevailing land use configurations, documented pollution hotspots and demographic profiles. The sample size was determined using Taro Yamane's statistical formula (Yamane, 1973), at a confidence interval of 95% estimating a target population of about 2,000,000 individuals dwelling along the banks of the Nairobi River within Nairobi County (Nyika, 2017). The calculation yielded a sample size of approximately 400 respondents. A stratified random sampling technique was implemented, whereby the total sample was proportionally allocated across four primary subpopulations reflecting the predominant land use categories within the Nairobi River Basin: residential, commercial, agricultural, and industrial.

Data collection

A cross-sectional survey design was used to investigate the social value orientations and participation levels of participants living within the riparian areas of the Nairobi River. Data was collected through self-administered questionnaires containing both demographic questions and psychometric assessments – a helpful tool for measuring social value differences between individuals or groups of persons (Wijsen *et al.*, 2022). The survey items were adapted from validated instruments in existing literature (Chin *et al.*, 2019; Franco-Torres *et al.*, 2021; Jones *et al.*, 2016; Kendal & Raymond, 2019; Milfont & Duckitt, 2010; Nahar *et al.*, 2023). More specifically, the questions adapted from the NEP (Dunlap *et al.*, 2000), and the General Environmental Behavior Scale (Kaiser, 2020) and modified to the context of the study area were used to assess the social value orientation and participation in governance. The survey made use of two subscales: environmental concern – to assess individual inclinations toward self-transcendence versus self-enhancement; and participation in governance. Further, sanitation practices and policy awareness of the participants were documented. To address information gaps regarding policy execution, primary survey data were complemented by key informant interviews with various sectoral authorities.

Study Area

The research participants comprised of the riparian communities along the Nairobi River system within Nairobi County (Figure 1), selected from residential, commercial and industrial establishments proximate to the river. The Nairobi River cuts through various urban neighborhoods across Kenya's capital, including the CBD (Central Business District), Dandora, Mathare, and Kibera often classified as Africa's largest informal settlement (UN-Habitat, 2020). The system features tributaries like the Ngong River, Mathare River, and Motoine River which converge to the eastern periphery of Nairobi, forming the expansive Athi River, which ultimately drains into the Indian Ocean. Located between coordinates 1°11'59"S and 37°9'26"E, the river's primary channel separates the northern edge of the city center, marked by severe pollution from improper solid waste management, agricultural runoff from the upstream sections of the neighboring county, and untreated domestic and industrial effluents as it progresses to the east (Kageche & Kipkirui, 2020). Previous situational analyses confirm that the riparian

communities of the system are predominantly informal settlements inhabited by low-income households, with over 50% deriving their sustenance from the informal sector activities, including micro to small-scale enterprises situated along these riverbanks or within the city (Ngatia et al., 2023; Nyika, 2017; Alukwe, 2016).

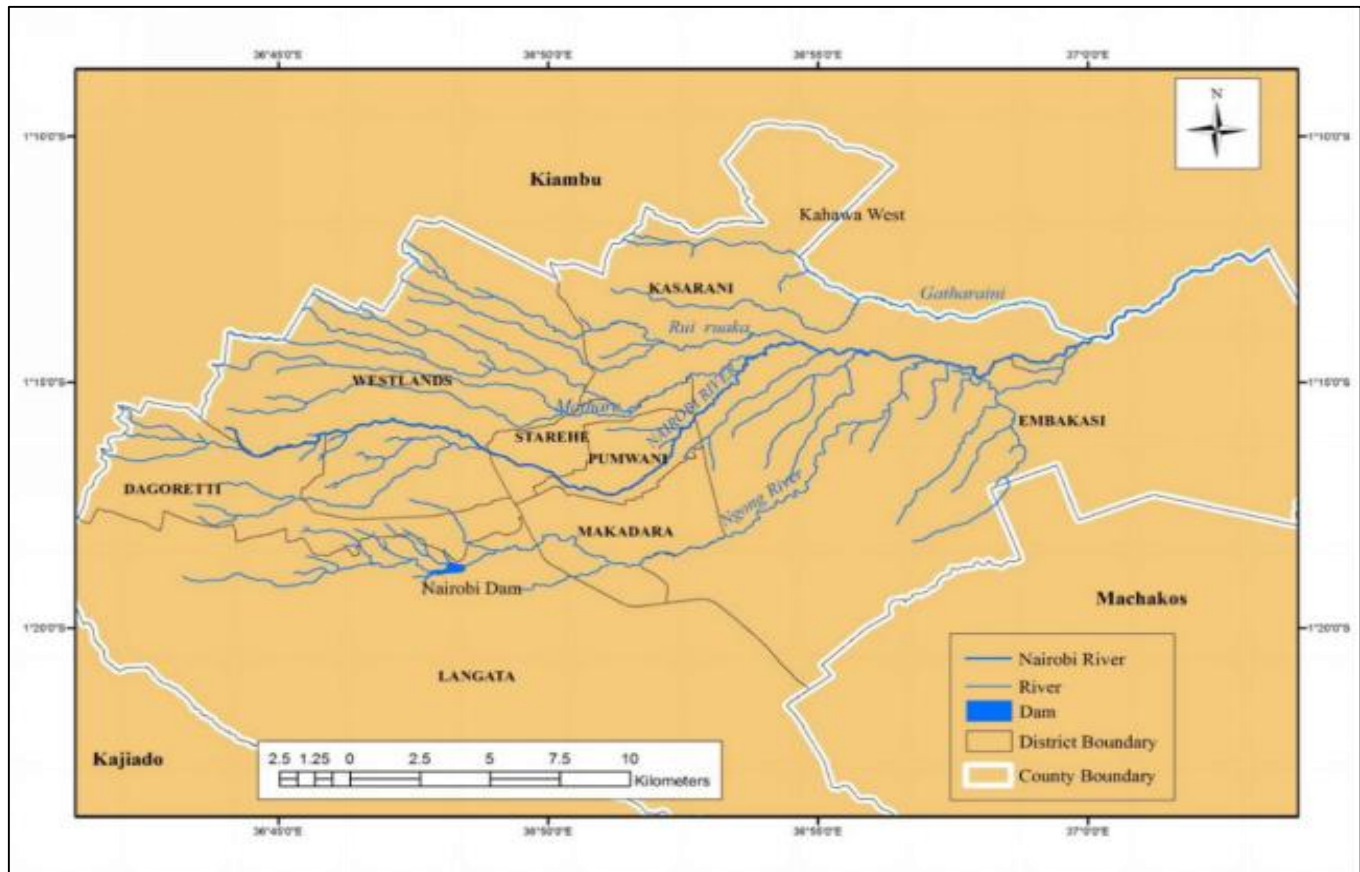


Figure 1: A map of the study area

Data analysis

The study utilized both descriptive and inferential statistical methods, with a set significance level of 5% for all hypothesis testing. Descriptive statistics provided the basis for the qualitative analysis by summarizing the overall demographic attributes of interest, waste management/sanitation practices and psychometric responses for environmental concern and participation in governance. Inferential analyses then followed by first conducting the Kolmogorov-Smirnov test to determine the normality of data for appropriate choice of statistical methods. For this study, environmental concern was used as a scale for determining the social value orientation where a composite score was derived from the five survey items in that subscale. The scale was tested for internal consistency resulting in a Cronbach's $\alpha = 0.859$ to ascertain the reliability of the scale and measured on a four-point Likert scale. Similarly, a composite score was derived using median ranks from an 8-item scale for participation in environmental governance. This was also tested for consistency and reliability to yield a Cronbach's $\alpha = 0.924$.

The relationships within the study variables were evaluated through several non-parametric analyses. The Spearman's rank correlation was utilized to explore the relationships between environmental concern, governance participation, and sanitation practices. For the categorical variables, the Mann-Whitney U test was utilized to assess differences in environmental concern, and participation levels based on gender while the Kruskal-Wallis H test was performed to evaluate the influence of age and education levels on participation, environmental concern, and sanitation practices.

RESULTS AND DISCUSSION

Demographic Outlook

From the 400 participants in this study, 63 respondents (15.8%) fell within the 18-24 age group, while the 25-34 cohort represented the largest portion with 143 participants (35.8%). The 35-44 age group comprised 27.8% of the sample, followed by 45-54 (15.8%), 55-64 (3.8%), and those aged 65 and above (1.3%, n=5). Educational attainment showed secondary education as most prevalent (45.0%), followed by tertiary (35.8%) and primary (19.3%). Occupationally, the analysis affirmed the dominance of the informal sector as 236 participants (59.0%) fell within this group, with formal employment accounting for 27.8%, students 6.8%, and the unemployed were 6.5%.

Social Value Orientations

In this study, environmental concern is used as a determinant of an individual's social value orientation depicting the environmental attitude that determines the intention of an individual to act in a certain way towards their environment, hence their motivation to participate in governance or comply with set environmental regulations. Figure 1 displays percentage responses to survey items that collectively measure various environmental attitudes resulting to an understanding of the levels environmental concern on a 4-point Likert scale, ranging from Strongly Disagree to Strongly Agree (N = 400).

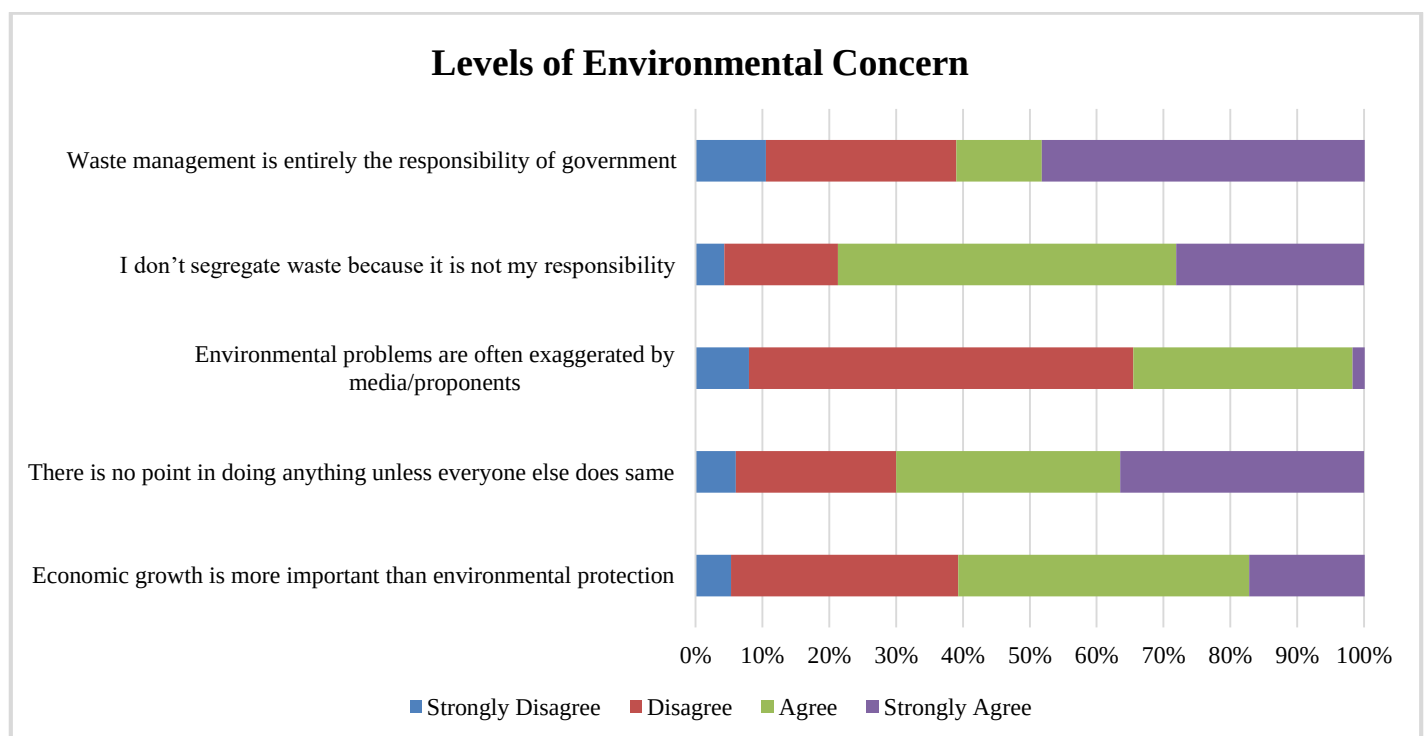


Figure 2: Bar Chart displaying levels of concern

From the data, approximately 61.1% of respondents agree or strongly agree that waste management is entirely the government's responsibility, and 78.7% admit they do not segregate waste because they feel it is not their duty. A majority 60.8% of participants prioritize economic growth over environmental protection. 70% of respondents feel there is no point in individual action unless there is collective participation, indicating a perceived lack of individual efficacy. While other areas show negative environmental attitudes, most participants (65.5%) disagree that environmental problems are exaggerated, showing that they do recognize the reality of the crisis even if they do not feel personally responsible for fixing it. Evaluating this sample population through the psychological framework of social value orientations specifically as described by Stern's (2000) Value-Belief-Norm theory of environmentalism this population would be classified as predominantly self-enhancing rather than self-transcendent.

Waste Disposal and Sanitation Practices

Waste Disposal and Sanitation

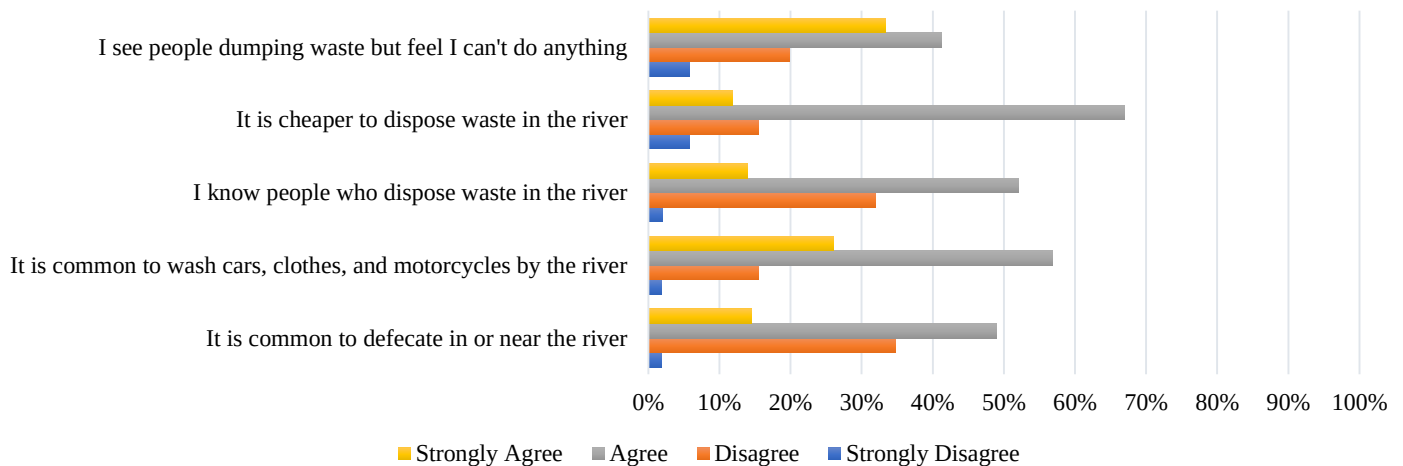


Figure 3: Common waste disposal and sanitation practices

Figure 3 depicts a summary of prevalent waste disposal and sanitation practices as undertaken or observed by participants. Washing cars and clothes by the river is the most widely acknowledged practice, with 82.8% of respondents agreeing or strongly agreeing that it is a common occurrence. A significant majority of 78.8% view waste dumping in the river to be the cheaper option for waste disposal, signaling the role of economic constraints and/or a lack of affordable waste management alternatives. 66% of participants had observed or personally know people who dispose of waste in the river, while 74.6% have witnessed river dumping but felt a lack of agency or incentive to intervene. Similarly, 63.5% of participants acknowledge that open defecation near the river as a common practice, implying a failure of governance mechanisms in the area.

Participation in Environmental Governance

An analysis of the levels of Participation in Governance revealed a generally low level of active engagement among the surveyed participants. Most respondents tended toward "Disagree" or "Strongly Disagree" for most survey items in the governance scale as shown in Figure 4.

Participation in Environmental Governance

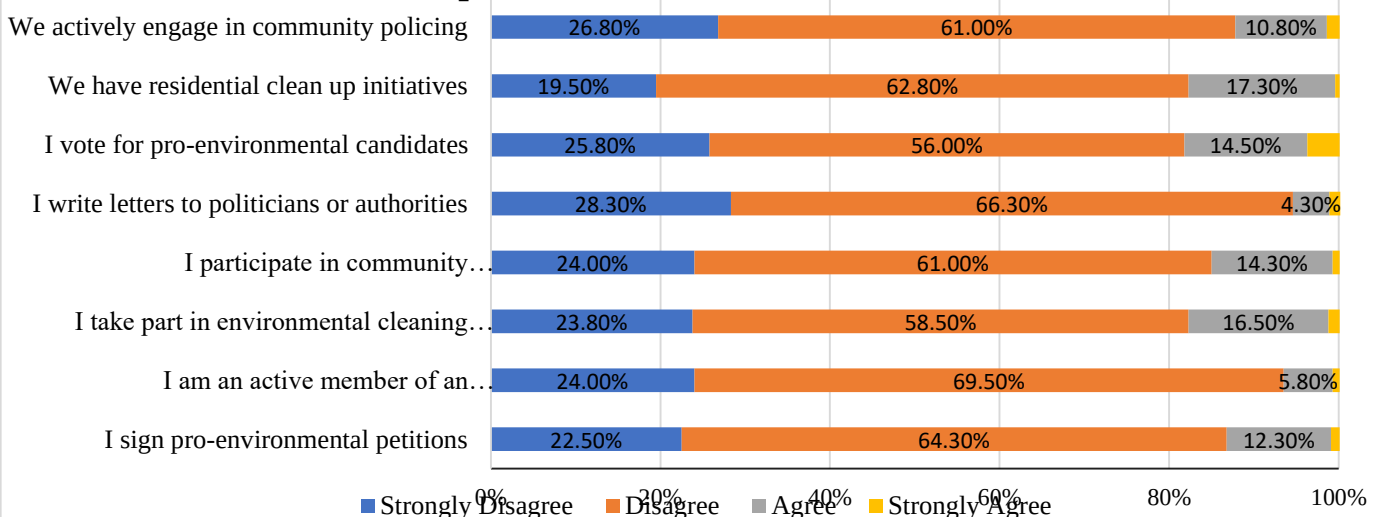


Figure 4: A bar chart showing levels of participation.

From the data, active engagement remains exceptionally low among the participants. A marginal 5.6% engage in direct forms of advocacy and structured involvement, close to 5% reported direct communication with

authorities on matters environmental governance participants who engage in direct communication with authorities and the 6.6% who maintain active membership in environmental groups. Additionally, only about 18% would consider voting for pro-environmental political candidates and 17.8% take part in residential clean-up initiatives. Over 80% of the participants also never bothered with signing pro-environmental petitions. This only goes further to suggest that while there is widespread awareness of the river's degradation, such knowledge does not necessarily translate into meaningful participation in environmental governance and management.

Social Value-Action Gap Analysis

Fundamentally, this study reveals the disconnect between the riparian communities' concern for their environment and the actual environmental practices. To quantify that disparity, the study utilized various non-parametric statistical inferences where relationships between variables were tested for significance.

Demographic aspects of Environmental Concern

To evaluate how environmental concern varies across different age groups, a Kruskal-Wallis H test was performed. A composite score was computed for environmental concern and used to test variation across various age groups. The following hypotheses were tested:

H₀: There is no significant difference in the distribution of environmental concern composite scores across different age groups.

H₁: There is a statistically significant difference in environmental concern composite scores across different age groups.

Table 1: Environmental Concern across age groups

Age Group	Sample Size (n)	Mean	Standard Deviation (SD)	Median
18–24	63	18.62	3.95	19.0
25–34	143	19.21	4.08	20.0
35–44	111	16.01	5.21	16.0
45–54	63	13.70	5.33	12.0
55–64	15	12.27	4.99	10.0
65 and over	5	16.60	4.72	15.0

The results show that young adults (18-34) exhibit the highest levels of environmental apathy, peaking in the 25–34 category with a Median = 20.0. on the other hand, older residents score significantly lower on the apathy index Median = 12.0 and 10.0, indicating a stronger sense of personal accountability and higher overall environmental concern therefore rejecting the null hypothesis.

A Kruskal-Wallis H test revealed a statistically significant difference in environmental concern composite scores across the different age groups, $H(5) = 65.44$, $p < .001$. This result indicates that a participant's age is a significant factor in determining their environmental attitude profile.

To assess whether levels of environmental concern differ significantly between genders within the study area, the Environmental Concern composite score ranging from 5 (highest level of concern) to 25 (lowest level of concern) was computed between genders.

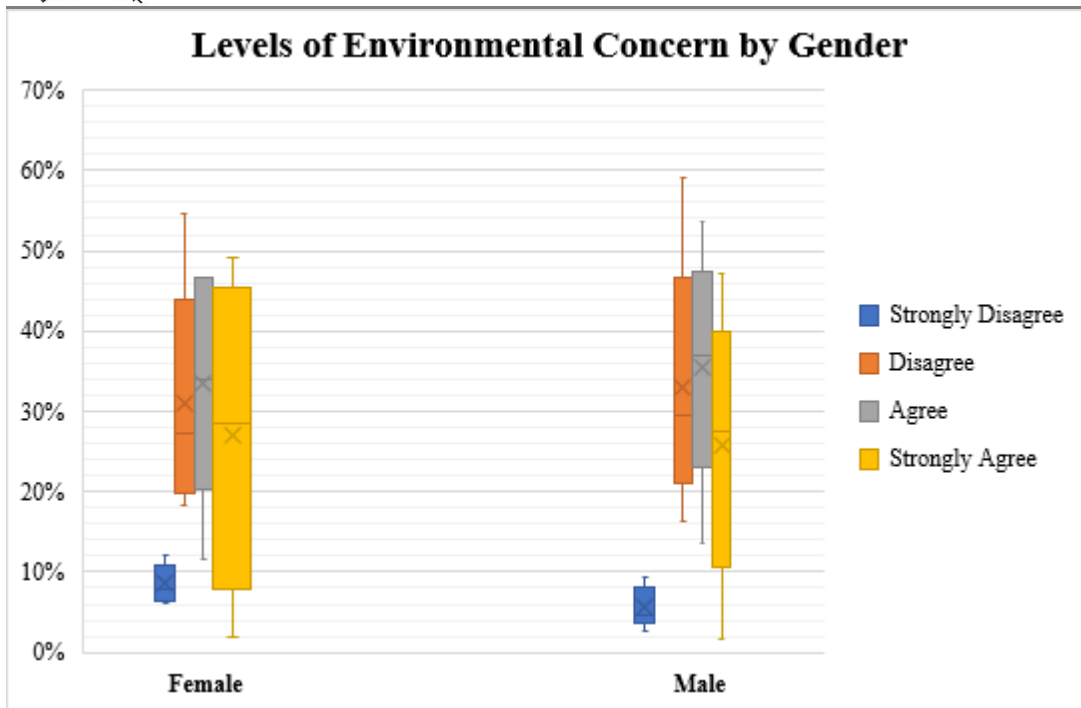


Figure 5: A graph showing a gendered perspective of environmental concern

Mann-Whitney U test was conducted to evaluate if the distributions of environmental concern differ significantly by gender.

H₀: There is no significant difference in the distribution of environmental concern composite scores between male and female participants.

H₁: There is a statistically significant difference in environmental concern composite scores between male and female participants.

The test indicated that there was no statistically significant difference in environmental concern composite scores between female participants (Median = 19.0) and male participants (Median = 19.0), $U = 19231.0$, $p = .994$. Individual item-level Mann-Whitney U tests also confirmed no significant variations between genders on any single statement (all item p -values $> .25$). Therefore, we fail to reject the null hypothesis.

To evaluate how environmental concern differs across educational levels within the riparian community, a Kruskal-Wallis H test was performed. The study measured education levels in three tiers: primary, secondary and tertiary. The composite score summary features reverse coded responses that show an increasing trend in environmental concern as education level increases among participants. A high score ranging between 5 and 25 represented higher levels of environmental indifference, while a lower score signified a higher sense of concern and personal feeling of responsibility towards the environment as shown in Table 2

Table 2: Results of the environmental concern composite scores across educational levels

Education Level	Sample Size (n)	Mean Score ($\bar{x}$)	Standard Deviation (SD)	Median Score
Primary	77	20.14	3.39	21.0 (Lowest Concern)
Secondary	180	17.98	4.17	19.0
Tertiary	142	14.29	5.66	13.0 (Highest Concern)

The following hypotheses were tested:

H₀: There is no significant association between educational levels and environmental concern

H₁: There is a statistically significant association between educational levels and environmental concern

The Kruskal-Wallis H test showed a statistically significant difference in environmental concern composite scores across the educational cohorts, $H(2) = 62.51$, $p < .001$. The null hypothesis was therefore rejected because the p-value was below 0.05. Therefore, there is significant evidence to support the alternative hypothesis that environmental concern levels are impacted by formal education.

Environmental Concern and Sanitation Practices

To evaluate the relationship between environmental concern and sanitation/waste disposal practices, a Spearman's Rank Correlation (r_s) analysis was performed. The Environmental Concern Composite Score was constructed by summing numerical values assigned to the 5 negative environmental attitude statements (1 = Strongly Disagree) to (5 = Strongly Agree). A higher composite score (range of 5–25) reflects a higher degree of environmental apathy and externalization of behavioral accountability towards the environment. Similarly, responses to the 5 sanitation and dumping practices were converted to Likert values (1 to 5) and analyzed both individually and as an aggregate Sanitation Practices Score (where a higher score indicates higher observed or normalized pollutive behavior). Since the baseline frequencies had revealed a community heavily exposed to or participating in river degradation, a Spearman rank correlation test was conducted between the Environmental concern composite score and each individual statement.

Table 3: Results of the composite scores for sanitation practices across levels of environmental concern

Sanitation Practice	Spearman Rho (r_s)	p-value	Significance Level	Relationship Strength
<i>"I see people dumping waste... but feel I can't do anything about it"</i>	.5824	< .001	Highly Significant	Strong Positive
<i>"It is cheaper to dispose waste in the river"</i>	.5323	< .001	Highly Significant	Strong Positive
<i>"I know a number of people that dispose waste in/by the river"</i>	.3900	< .001	Highly Significant	Moderate Positive
<i>"It is common for people to wash cars, clothes, motorcycles by the river"</i>	.2711	< .001	Highly Significant	Weak-Moderate Positive
<i>"It is common for people to defecate in or near the river"</i>	.1500	0.0027	Highly Significant	Weak Positive
Overall Sanitation Composite Index	.4989	<.001	Highly Significant	Moderate-Strong Positive

The Spearman's rank-order correlation analysis revealed a statistically significant, moderate-to-strong positive correlation between the overall environmental concern and waste disposal and sanitation practices. At the item level, various deductions can be made where the strongest associations with environmental apathy were found for individuals who felt powerless when witnessing dumping ($r_s = .58$, $p < .001$) and individuals who endorsed the view that river dumping is an economically cheaper waste management option ($r_s = .53$, $p < .001$). The analysis also shows that as a resident's personal environmental responsibility drops, their likelihood of validating, observing, or engaging in high-risk sanitation behavior surges. When a citizen shifts the responsibility to government agencies, they tend to normalize destructive environmental habits.

Environmental Concern and Participation in Governance.

To assess the relationship between environmental concern and participation in local environmental governance, a Spearman's Rank Correlation analysis was performed ($n = 400$). A composite score for the five environmental concern survey items was computed (a higher score signified lower environmental concern) and the same was done for the 8 (eight) participation survey items. A Spearman's rank-order correlation was then conducted to

evaluate the relationship between community's level of environmental concern and participation in environmental governance. The analysis revealed a statistically significant, exceptionally strong negative correlation between the environmental apathy composite score and the aggregate participation in governance index, $r_s(397) = -.72, p < .001$. This indicates that as individuals' levels of environmental apathy, their active participation in both formal and informal environmental governance frameworks decrease drastically. Figure 6 is a picture that demonstrates the levels of pervasive sanitation and waste disposal practices at different points within the study area that even the warning signs are not heeded. It points to high levels of environmental apathy and poor enforcement of regulations as evidenced by the encroachment of the riparian zones.



Figure 6: Disregarded prohibition sign and encroached riverbank

CONCLUSIONS

The findings of this study demonstrate that environmental degradation within the Nairobi River system is also a result of a socio value-action gap and systemic governance vulnerabilities, rather than a lack of awareness. While previous studies have pointed towards poverty, lack of regulatory enforcement, poor monitoring and other structural inefficiencies, it is worth noting that scholarly and policy directions have seldom paid attention to the role of social values and individual attitudes towards the longstanding debilitating state of the Nairobi River system. While majority of the riparian community acknowledges the reality of this situation, the high levels of environmental apathy and lack of personal behavioral accountability severely stall active participation in governance of the river ecosystem. Utilizing Stern's Value-Belief-Norm theory, findings show that the demographic profile leans toward a self-enhancing orientation with a majority prioritizing economic growth over sustainable environmental management. The role of economic status also plays out as most people view river dumping as a cheaper alternative to waste disposal. The widespread sense of low individual stewardship is further underscored by the qualitative analysis of that reveals high levels of environmental apathy among younger adults and individuals with lower educational attainment.

Consequently, this is manifested as localized ecological strain, turning the riparian ecosystem of the river into a hotspot for pollutive sanitation practices. Strong positive correlations confirm that as personal environmental responsibility drops, the normalization of destructive behaviors surges, primarily driven by economic constraints and a perceived lack of individual agency. Further, the strong negative correlation between environmental apathy and participation in governance index scores highlights the need for structural transformation that recognizes these dynamics to enhance an integrated approach towards the governance of natural resources. To achieve sustainable restoration of the Nairobi River system and other urban ecological resources, future environmental policies must transcend short-term awareness drives and instead focus on targeted civic empowerment, equitable infrastructure provision, and the active inclusion of riparian communities within the formal and informal co-

management frameworks as envisioned under Article 69 (2) of the Kenyan Constitution.

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Conflicts of Interest

The authors of this article have declared no potential conflicts of interest with respect to the research's contributions, authorship, or publication.

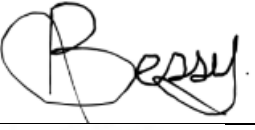
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Data Availability

The datasets used during this study are not publicly available to ensure anonymity. The nature of the study contains sensitive socio-economic and spatial information. The data can be made available from the corresponding author upon reasonable request where applicable.

Author contribution

SN	Name of the author	Contribution	Sign
1	Karatu Kiemo	Supervision, data analysis, review editing.	
2	Bessy Kathambi	Supervision, data curation, review editing, investigation and plagiarism checking	
3	Ogega Bosibori	Conceptualization, investigation, data curation, original drafts preparation	

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