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Stakeholder Roles, Perceptions and Behaviour towards Conservation of Riparian Zones in Nairobi River Basin

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Abstract

Stakeholder participation is key to the determination, use and management of riparian zones. International treaties, conventions and laws as well as the Constitution of Kenya of 2010 are very clear about the inclusion of stakeholders in the protection of the environment. This paper outlines the stakeholder participation in the determination, use and management of riparian zones. Respective parcel numbers were used as the sampling frames for land users. Key informants included county planners, development control officers as well as National Environmental Management and coordination (NEMA), Water Resources Authority (WRA) and Ministry of Lands officials. Data was collected using both secondary and primary methods. Archival methods were the main secondary methods used. An electronic questionnaire and observation schedule were administered using a kobo collect android tool that could capture the Global positioning system (GPS), take a photograph of the target and allow answers to be keyed in. The tool had a positional error of two metres. Both qualitative and quantitative data was coded, cleaned and then analyzed using SPSS. The study undertook that factors that contribute to riparian zone degradation can be grouped into: physical, socio-economic, legal and policy as well as level of awareness of the meaning of the zone. This paper therefore recommends formulation and implementation of a riparian reserve conservation policy that would protect the zones and ensure their proper determination, use and management. Further the article recommends proper demarcation of riparian zones using clearly identifiable pillars and advocates that the policy include penalties to those who defile the zones regulations.

Keywords: Behavior, Conservation, Land users, Perception, River basin, Roles, Stakeholders.

INTRODUCTION

Riparian zones have four distinctive qualities that make stakeholder responses to their conservation weak. First, because of their nature as interfaces between terrestrial and aquatic systems, the zones create management challenges due to multiple roles, perceptions, behaviour and interests of stakeholders (Home, 2004). Secondly, stakeholders often ignore the functions of the zones if only going by the nature and extent of encroachment and degradation (Kahara, 2002).

Third, the zones are seen as sources of free land for building structures and dumping wastes (Mburu, 2007). Finally, the mainstream urban land use planning discourse often fail to ensure proper planning (Mwangi, 1994) and development control (Ayonga, 2008). In this respect, the role, behaviour and perception of stakeholders during determination, use and management of riparian zones without impairing their physical existence and ecological quality form the central premise of this paper.

Guthiga and Makathimo (2010) have argued that there is a wide range of actors with stakes in the use and management of ecosystems of Nairobi Rivers. These include national government officials, county government officials, non-governmental organizations (NGOs), community-based organizations (CBOs), professionals like planners, land surveyors, architects, environmentalists, land users and land owners. According to Guthiga and Makathimo (2010), land users include public and private enterprises operating next to selected rivers. Stakeholders have different and often conflicting interests in the management of the river and its riparian zone (Home, 2004). However, the conflicts extend beyond management to the determination and use as established in

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equally different and conflicting policy and legal instruments.

The main objective of this paper was therefore to determine and evaluate the roles of the stakeholders, their perceptions and behaviour and to propose suitable strategies for conservation of riparian zones within the Nairobi River Basin.

THEORY

Participatory planning emerged in the 1990s as a vehicle for empowering those who participated in making decisions and choices. In Kenya, new approaches have been advanced through enactment of legislation including the Constitution of Kenya of 2010 and the County Governments Act of 2012. Article 69 of the Constitution states that the state shall encourage public participation in the management, protection and conservation of the environment (Government of Kenya (GoK), 2010). According to section 115 of the County Government's Act, public participation in the county planning processes is mandatory (GoK, 2012). However, public participation in planning has its own weaknesses in that it is frequently used in some planning works like change of user and rarely used where development interacts with natural ecosystems.

Institutional theory appears better placed to address the research problem but focuses on the roles of norms, symbols, myths, belief systems and informal arrangements that constitute culture of organizations (Garson, 2008). As a result, institutions appear not to have established legitimacy to influence behaviour of organizations nor human behaviour through established rules and norms (Garson, 2008).

Hall and Taylor (1996) have identified the following three broad traditions of institutionalism, namely: rational choice theory that includes public choice model and decision-making model of self-interested optimizers; principle-agent theories and liberal market theories. Institutional theory in the paper, concerns the behaviour of public institutions that have roles on riparian zones and their underlying factors. The roles include, among others: land allocation, planning, surveying, development control, monitoring and evaluation, and environmental and resource management.

Institutional theory places a lot of emphasis on political and economic conditions that influence decisions that are made which point to the role of the state in development (Ochola, 2007). Problems, constraints and issues in politics are encapsulated in the theory. The role and behaviour of institutions are an aspect that affects formulation, application, implementation, monitoring and evaluation of policies (Wanyande, 1981). However, this theoretical framework has failed to address challenges facing riparian zones.

Overtime, norms have been overtaken by practice. In as much as the theory is seen as an integrative one, it fails to capture other aspects like behavior, planning issues and perception of non-state stakeholders. The systems theory therefore finds its place in this paper as the proponent theory because it offers a holistic approach to the resolution of the research problem. In a nutshell, if all stakeholders are considered as a sub-system with bounded limits where what is determined, used and managed is considered in the perspective of the whole as postulated by Mcloughlin (1969), then the riparian zone problem ought to be holistically addressed. In land surveying, the principle of the whole to the part is relevant to this debate where the sum of the part must constitute the whole and vice versa.

RESEARCH METHODS

Data on personal profile, roles, behavior and perceptions of land users and professionals regarding current land use, land tenure, physical infrastructure, compliance with policies and laws and involvement and participation in protection and conservation of the zones were collected. Data needs also involved gaps in existing management strategies and possible strategies for managing the zones in the future.

The sampling frame for professionals was based on a list of those who are registered in respective professional bodies and government boards of registrations. Physical planners and surveyors were considered in the study to form the most basic and critical group of professionals who have a direct role in the determination of the riparian zone of any river.

Architects, land valuers, environmentalists, engineers, among others, form level two of such professionals and, therefore, the information acquired from them was meant to triangulate what physical planners and land surveyors indicated about the subject matter. Physical planners and surveyors were therefore sampled using proportionate sampling methods while the other groups of professionals were purposively sampled.

There were 150 registered planners and 95 licensed land surveyors in Kenya at the time of study. Out of the 150 planners and 95 land surveyors, 106 and 75 are located in Nairobi respectively. The list kept by respective registration boards formed the sampling frame for each profession based on their physical address. Ten percent of 181 professionals give a sample of 18 for the study. The proportionate sample for planners and surveyors was as follows:

Planners - 106 out of 181 multiply by 100 is 58.6%. 58.6% of the 18 is approximately 11 planners; and

Surveyors – 75 out of 181 multiply by 100 is 41.4%. 41.4% of the 18 is approximately 7 surveyors.

The 11 planners and seven surveyors were randomly picked using simple random sampling technique. The other professionals including architects, environmentalists, engineers, land administrators and land valuers were sampled purposively by picking at least three per profession giving a total of 15. A total number of 33 professionals were sampled for the study. A total 360 of land users were randomly selected within the study area using their respective parcel numbers as the sampling frame.

Questionnaires were administered to collect data from professionals and land users. The questionnaires captured roles and opinions of stakeholders on the determination, use and management of riparian zones. Data on extent of engagement of the locals in determination, use and management of riparian zones was also addressed in the questionnaires.

Data was also captured from secondary sources through archival methods. The method involved review of secondary data in existing documents and records.

In analyzing opinions of professionals and land users, both quantitative and qualitative techniques were employed. Quantitative data was coded and entered into a designed data entry frame. The data was then cleaned and checked for consistency, validity and reliability before it was input and analyzed using Statistical Package for Social Scientist (SPSS) computer software. Analysis of frequencies and cross-tabulation were made. The analysis of qualitative data involved data organization, creation of data categories, themes and patterns and ranks. Qualitative data analysis methods helped to understand better how and why riparian zones are encroached and degraded.

RESULTS AND DISCUSSION

Criteria for demarcation of riparian reserve

The determination of the riparian extent was based on established flood plains as stipulated in various legislations. The Physical Planning Act (Legal notice140 rule 15(c) and (d) of 1998, defines riparian reserves as way leaves or reserves along any river, stream or watercourse not less than 10 meters in width on each bank except in areas where there is an established flooding. The Physical Planning Handbook of 2007 defines the riparian reserve as land on each side of water course with minimum of 2 meters, or equal to the full width of the river as measured between the banks of the river course up to a maximum of 30 meters. Further, the handbook states that riparian land adjacent to a stagnant body of water is defined as a minimum of 2 meters vertical height or 30 meters horizontal distance, whichever is less. From field surveys and from the highest recorded water level.

Records of the highest recorded water level are not documented in the basin. Hence, the determination was based on an established flood plain as could be seen on Google earth images and the first 2m contour from the river as observed from available topographical plans of the city. GIS analysis, it appears these criteria have not been adhered to. There indications of structures within the river and at the river banks contrary to the provisions in the laws.

Roles, perception and behaviour of Professionals

Data analysis revealed that professionals are the main players in the allocation, planning, surveying

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and land subdivision as well as in the preparation and approval of development requests that are implemented in riparian zones.

According to professionals, the socio-economic dynamics of Nairobi City, which is mainly characterized by urbanization of poverty, played a huge role in the degradation of riparian zones. Professionals pointed out that urban poverty has led to informal settlements, majority of which have developed along the riparian zones. The urban poor have limited access to housing and security of land tenure. Contemporary perception of the riparian zone as space revolves around its role to locate uses such as residential, industrial and recreational. These uses of the zone are, however, constrained in that each riparian space has a unique set of biophysical characteristics that would make it suitable for some land uses but not others (**Table 1**). Informal settlements were ranked as the land use with most serious impacts holding a mean of 4.73. Other land uses that recorded high means are garages (4.46); industries (4.35); and quarries (4.34) respectively. Land uses with the lowest mean, implying that they had the least adverse impacts, were urban parks (1.69) and recreational spaces (2.08). As a result, urban parks and recreational spaces were deemed suitable land uses along riparian lands.

Professionals further indicated that a disjointed regulatory framework, conflicting roles, weak enforcement and *laissez-faire* of policies were to blame for the encroachment and degradation of the zones. Initially, in low income areas, riparian zones were key areas for harnessing water. However, with time the rivers became places to dispose-off waste (**Figures 1** and **2**). Professionals also attributed the problem to rampant illegal allocations of riparian zones by the provincial administration and the vigilante groups.

TABLE 1: Professional Opinions on Impacts of Land Uses on Riparian Zones

Type of Land Use	N	Minimum	Maximum	Mean	Std. Deviation
High Income Residential e.g. Kileleshwa	27	1	5	2.96	.980
Informal Settlements e.g. Mathare 4B	27	2	5	4.81	.622
Public Institutions e.g. National Museum	27	1	4	2.04	.854
Private Institutions e.g. Boulevard Hotel	27	1	5	2.48	.753
Quarrying e.g. at Pipeline Quarry village	27	3	5	4.41	.636
Urban Agriculture e.g. at Mukuru Kwa Reuben	27	2	5	4.19	1.039
Formal Businesses e.g Nakumatt Westlands	27	2	5	3.74	1.130
Informal Markets e.g. Gikomba market	27	2	5	4.22	.847
Urban Parks e.g. Arboretum	27	1	4	1.81	.962
Heavy Industries e.g. Industrial area	27	2	5	4.63	.688
Garages e.g. along Kirinyaga road	27	2	5	4.59	.694
Open Recreational Spaces e.g. Kamukunji grounds	27	1	4	2.30	1.031
Physical Infrastructure e.g. sewers along Ngong River	27	2	5	3.78	.934
Valid N (listwise)	27				

Source: Field analysis 2019

FIGURE 1
Informal settlements and waste dumping along Ngong' River
Source: Field work 2019

FIGURE 2
Solid waste on the river channel in Mukuru Slums
Source: Field work 2019

The study also revealed that the existing planning practice in Nairobi River Basin has two challenges. First, it is based on multiple and often conflicting provisions in legislation on conservation of riparian zones. As a result, this creates confusion and conflicts to land users, professionals and policymakers with interests and responsibilities at the river front. Information flow as provided in survey plans and subdivision schemes does not give professions the right motives of conserving riparian zones. This has resulted in professionals especially planners preparing incompatible land use plans next to rivers, policy makers and city managers approving any development next to rivers. This has contributed to poor management especially where land development is not integrated into the existing planning framework.

Secondly, the behaviour of professionals in the study area is influenced by their values, preferences and perceptions towards conservation of riparian zones. In most cases, professional preferences relate more to achieving highest economic use of the riparian zone as demonstrated by subdivisions that set aside very small riparian width setbacks. Also, economic perspectives are quite influential on attitudes of professionals.

Data analysis revealed that the size and sites of the zones to earmark for protection and the criteria to be employed in the determination of riparian zones has remained subjective. There are no useful approaches to developing common norms to support the practice of professionals and minimize misinterpretation of concept application in policies.

Roles, perceptions and behaviour of Land Users

Data analysis revealed that land users have limited or no roles in conservation of riparian zones. They also have varied perception about the riparian zone. They perceive the zone as private land, idle, free land or public land. It was also revealed that land users behave differently and act in contrasting ways in their use of the riparian zone. Some have opted to encroach and degrade the zones while others have maintained a good conservation ethic.

Based on the analysis, it gives an impression that the riparian zone has both economic and legal meanings. The economic meaning emerges from the fact that riparian zones are perceived by land users as a livelihood asset in form of places to obtain income, food and shelter. The legal meaning of the zone underscores legitimization of right(s) to access and occupy it as a public and private entity supported by public and private law as well as in terms of customary practices of the rights to land.

These findings underline the importance of roles, perceptions and behaviour of land users as factors in the conservation of riparian zones. The findings are in agreement with views of (Lelo et al., 2005) whose study on managing the river Njoro watershed in Kenya established that a free access mentality had developed in relation to the riparian zone leading to its degradation.

Pointedly, the decision of professionals and land users depend on their roles, perceptions and behaviour. The manner in which these stakeholders

respond helps to conserve or otherwise encroach and degrade the riparian zones. Data analysis and interpretation of questionnaire responses from land users and professionals confirmed that the roles, perceptions and behaviour of professionals and land users are influential in conservation of riparian zones. The roles, perceptions and behaviour of these actors must be taken into account in designing, formulating and implementing policies and laws for conservation of riparian zones.

Technology innovation by Land Users

Construction work to canalize the river channel is a river management tool that focuses on maximizing the economic use of riparian zones. Proponents of urban development in the riparian zone suggest that technology is used in other parts of the world to avail riparian zones for urban development.

The technologies identified in the Nairobi river basin, are canalization, diversion and building on the river channel. These were observable on rivers and their riparian zones in Nairobi (**Figures 3** and **4**). For instance, canalization of Kibagare stream involved reducing and deepening the river channel and reducing the riparian zone so as to create space for construction of buildings such as the Nakumatt Ukay Hypermarket.

However, the use of technology to lay the basis for urban development in riparian zones ignores the benefits that conserved zones provide to a greater majority of the urban communities. This study posits that use of technology to facilitate urban development of the magnitude of Nakumatt Ukay Hypermarket on the riparian zone is facilitation of free market capitalism that curtails long term sustainable river ecosystem.

In fact, the use of modern technology to modify fragile ecological areas where riparian zones happen to be negates the very essence of environmental sustainability and biodiversity conservation and goals of livable urban habitats. However, use of technology to enhance conservation and sustainability of river ecosystem while monitoring social and economic development would go a long way in the protection and conservation of riparian zones.

FIGURE 3
Canalization along Ngong River
Source: Field work 2019

FIGURE 4
Construction within the River Channel
Source: Field work 2019

Factors contributing to encroachment and degradation of Riparian Zones

According to the professionals, riparian zones seem to have been properly demarcated in prime (high income) areas of the city. However, they indicated with great certainty what could be the biggest challenges warranting encroachment into the zone. The reasons are grouped into three main categories of socio-economic factors (livelihood strategies, gentrification, no-man's-land/ wasteland), legal and policy factors (disjointed regulatory framework, conflicting roles, weak enforcement and *laissez-faire* of policies) and awareness level.

CONCLUSION

The roles of professionals are weak and ineffective while perceptions and behaviour of land users towards riparian zones adversely affect rather than secure the zones. This has undermined effective determination, use and management of riparian zones. The existing institutions have also not influenced proper determination, use and management of riparian zones in the basin.

RECOMMENDATIONS

The paper recommends formulation and implementation of a riparian reserve conservation policy. The policy should ensure that riparian zones are set aside for conservation with specific uses such as parks, water catchment areas, cycling tracks and forested areas. Landscaping of the riparian zone would be appropriate to make it more attractive for picnics and outings by city dwellers and the general public.

In terms of perception, the policy should harmonize demarcation of and clearly define riparian zones. It should also, include penalties to who break the riparian policy. This will help reduce the different perceptions stakeholders have on riparian zones and promote its conservation.

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