

ECOLOGICAL RISK PERCEPTIONS AND PUBLIC PARTICIPATION IN RECREATIONAL ACTIVITIES WITHIN LAKE WATERFRONTS IN KISUMU COUNTY

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ABSTRACT

Most waterfronts supply ecotourism potential world over, and it is believed that local inhabitants at recreational-potential sites bear the first-hand opportunity for exploitation of water-based ecotourism. However, the vulnerable status of potential sites instills ecological risk perceptions in local people, and this has a bearing on participation by potential recreationists. This ultimately inhibits the benefits of ecotourism in a community. This study aimed at demonstrating the ecological risk perceptions on participation by local people in lake waterfronts recreational activities in Kisumu County. The study was conducted in 4 beaches of Lake Victoria (Asat, Usoma, Ogal and Lwangni). The study sites were grouped into rural and urban clusters. Approached by structured interviews, its outcomes were arrived at through correlation, regression and analysis of variances at 95% confidence levels. Research variables were grouped into genres such as participation in recreational activities, nature of ecological risks and psychological and cognitive influences- all which bore respective sub-attributes. Results suggest that dire ecological status of the waterfronts generate risks which significantly influence low participation by local people. Participation ratio was determined at only 9.48%. This correlated positively with perceptions concerning nature of environmental risks (perceived possibility of pollution (.522), perceived extents of impacts of pollution (.581) and perceived severity of disastrous consequences (.437).

Keywords: *Ecological Risks Perceptions, Public Participation, Lake Waterfronts, Recreational Activities and Kisumu County*

1. INTRODUCTION

Traditionally, human activities around most waterfronts of Lake Victoria have centered on commercial fishing and local trading but with little regard to recreational activities that ought to be harnessed for ecotourism development (Okungu, Hayombe and Agong', 2014). This makes clear the general scenario in developing countries world over, in which there exists an evident disquiet over little participation in water-based recreational activities at various lake waterfronts (Godbey 2009). It further confirms the growing concerns that have been raised over disconnect between people and nature (Kareiva 2008; Turner, Nakamura, & Dinetti, 2004). Such disengagement, also known as *nature deficit disorder* (Louv, (2005), bear significant implications on ecological sustainability and socio-economic development.

African nations, despite being endowed with abundant natural resources, have demonstrated little growth in

ecotourism sector with regard to recreational beach activities at lake waterfronts (UNEP, 2012). Specifically, Kisumu County, just like other waterfront neighborhoods, has experienced difficulties in engaging in water-based ecotourism despite its endowment with the large water mass of Lake Victoria (Okungu, *et al*, 2014).

Literature cite reasons for dismal uptake of water-based recreational activities by local communities around the waterfronts of Lake Victoria to include vulnerable ecologically sensitive features, inadequate infrastructure, poor water quality and lack of branding of the ecotourism sites (Okungu, *et al*, 2014). But it is understandable that beach communities world over differ in several ways in the kinds of recreational activities they engage in. This further influences attributes and perceptions towards their surroundings within lake waterfronts, which can be of some recreational potential (Bird 1996). That which remains merely speculated is a perception of the public about

likely risks associated with poor ecological quality around the water masses, and their influence on local and eventual universal participation in the recreational activities. The recreational activities at lake waterfronts under review include swimming, boating, fishing and sunbathing, while the risk issues entail physical hazards, water pollution, aesthetic quality and wildlife attacks.

Governments have made decisions regarding ecological pollution based on reports from development agencies' estimated risks; however, local resident's risk judgments are not well understood or considered. Any such understanding has not further been established to encompass significant influence on participation on recreational water activities at the lake waterfronts by communities. But it is largely arguable that when locals do not embrace their resources, even visitors do not have a basis to engage in the activities. As affirmed by Kiper, (2013), a symbiotic and complex relationship between the environment and tourist activities is possible when this philosophy can be translated into appropriate policy, careful planning and tactful practicum. He elaborates that carefully planned and operated ecotourism sites, especially if it is village-based and includes local participation, is able to provide direct benefits that might offset pressure from other less sustainable activities that make use of natural and cultural resources.

Unconfirmed common suggestion underlies the fact that local communities around Lake Victoria, Kisumu County - and similar environs - are not keen to engage in water based recreational activities due to their risk perceptions. The same culture escalates to potential foreign recreationists. This unquestionably culminates to underutilization of the lake resource for recreational activities. Eventually, this confirms the current scenario where the Lake Victoria waterfronts suffer dormant or null utilization of the resource for ecotourism purposes. This scenario sustains the basis of assessing community perceptions of risk levels at lake waterfronts with a view to understand resultant influence on recreational beach activities in Kisumu County.

This study aimed at developing a cause-effect perception scenario for all the 25 beaches of Kisumu County, by sampling and studying 4. The outcome of this study yields a basis for an understanding of public judgment and social commonality with an aim of developing planning approaches for preliminary considerations prior to perception changes and destination branding in the study area and other affected areas.

2. LITERATURE REVIEW:

Beach communities world over differ in several ways in the kinds of recreational activities they engage in, as well as their personal attributes and perceptions concerning their recreational surroundings within lake waterfronts (Bird 1996). An individual's socio economic class, cultural ties and past experiences determine the manner in which he/she perceives risks towards engaging in water-based activities (Achieng', Hayombe & Agong,' 2014; Renn *et al*, 1992). Moreover exposure associated with information concerning risk issues can interrelate with these individual attributes to influence the overall perceptions and eventual participation in recreational activities. A mixture of these leisure patterns across individuals may affect how specific water based recreational sites are handled (Jackson *et al* 1989).

Stern, (2000); Stern, Dietz, Abel, Guagano, & Kalof, (1999) suggests that fear, experience and cultural background influences civic perception on ecological threats or risks, and that threat salience, in turn, shape intended and actual behaviour of people. The mental state in which people's cognitive faculties establish a harmony in order to establish knowledge, courage and action is universal—it is a common element in everyone—too (Mehmet, 2007). Hence, risk perceptions at lake waterfronts are presupposed in the same way in all humans and these processes are based on the same subjective principles.

Crawford-Brown (1999) illustrates that local community's perceived risks might depend on the facts they possess regarding the frequency, severity, and variability of effects. Ordinary people's risk judgments entail perceived severity of catastrophic consequences, and perceived control (Fischhoff, Ann, & Marilyn, 1993; Slovic, 1987). A careful consideration of ethics in ecotourism, according to Fennell, (2001), is therefore critical because this form of tourism fundamentally relies on principles which are grounded in ethical behaviour and because of its concern and respect for the environment and local people. A danger exists for ecotourism ethics because of the challenges that ecotourism faces, especially it is incorrectly presumed that it shares the same priorities of the overall tourism sector for economic and marketing outcomes. Essentially, for ecotourism to be ethically consistent with the basic principles upon which it is based, it must embrace cooperation or participation at community level.

Since participation by local communities is considered to be an enabling factor for success in project development, most states and non state actors have established policies that incorporated participation

(Pretty 1995). There is, however, little debate as to whether or not and how the local community should be involved in ecotourism transformation (Mowfort & Munt, 1998). This is because of the unlikely realization of their perceptions of risk levels at waterfronts, which eventually influence participation in ecotourism activities. Most often, people get scared if there exist physical hazards within freshwaters where they would participate in various recreational activities including swimming, boating, leisure transport, surfing, sunbathing, scating or camping (Maillard & Pinheiro, 2008; Kotti *et al.*, 2005).

In Cambodia, transformations that are experienced in surface water flows have negatively created fear and perceptions against involvement in recreational activities. These transformations include alkalinity, colour, clarity and turbidity, and are documented as the physical parameters of recreational water quality (Keys, Barron & Lannerstad, 2012). Exposure to hazardous chemicals to human body is a sure health risk against any potential recreationist whose body comes into contact with water while participating in the activities. World Health Organization, (2003) exemplify that chemical contaminants may enter water bodies and be deposited on beaches from both natural and anthropogenic sources. Hence, it is generally recommended that water that is used primarily for recreational purposes should be adequately void of microbiological risk hazards (Canadian Council of Ministers of the Environment, 2004).

Currently much of the literature in relation to ecotourism is investigative and expressive. The literature falls short of the needed understanding of the role of perceptions by potential ecotourist on their possible participation in water-based recreational activities (Fennell, 2001). Additionally, the available literature tend to focus primarily on the need for the *adoption* of ecotourism norms sector players and, and not on the successful *achievement* of just conduct of the local people. It is important to consider that local population is a key factor to the desirability of ecotourism products, and a key participant in the initiation and approval of the outcome of the ecotourism concept (Piyapong and Tsunemi, 2014). It is therefore, imperative to explore what influences perceptions and actions by the people who have first-hand experience with the waterfronts prior to inviting visitors to embrace water-based recreational activities at the lake waterfronts. As such this study sets out to capture how Perceptions of Community about Risk Levels at Lake Waterfronts influences Participation in Recreational Beach Activities in Kisumu County.

3. THEORETICAL CONTEXT

Crawford-Brown (1999) defines risk with a perceptive approach as the set of all destructive consequences that are believed to be possible by a person who has evidence about the frequency, severity, and variability of the effects. Conversely, Fischhoff, *et al.*, (1984,) declares that no definition of risk is ultimately accurate, because no suitable one applies to all problems. Lately, customary risk appraisal based on science alone has increasingly come into question because according to Ropeik (2011), risks to a society exhibit far more diverse aspects beyond the scope of scientific estimation. He argues that although scientific risk assessment is cautiously conducted by using reliable techniques, there is conflict with the manner in which people perceive risk since the way ordinary people endure life is not well understood by experts or policymakers.

Several scholars are today interested in risk perception; hence the understanding of how it is perceived may significantly enhance mitigation of underlying impacts on participation in water-based recreational activities. Aven and Renn (2010) argue that risk perception is a judgment of possible unpleasant consequences of a particular vulnerability and this perception may be constructed by a society a group or an individual. On this note, WHO, (2013) defines Risk Perception as both belief and self-appraisal about natural hazards and threats to environment or health. Leiserowitz, A. (2006) and WHO, (2013) assert that besides psychological and cognitive factors, ordinary people's apparent risks can be built based on their logical way of thinking about the nature of risks, including the likelihood of water pollution, probable impacts, and the superficial rigorousness of catastrophic consequences.

Figure 1 demonstrates an overview of the conceptual model of risk perception as conceived by the research team. This model is based on the assumption that ordinary people have the potential to evaluate risk, and risk might be judged and perceived based on their rational process system rather than the experimental process system.

On another note, by Kant, (2000) proposes Aesthetic Theory that can be relied on by this study. It suggests that the feeling of aesthetic taste is universally communicable to all humans and that it creates an interest to beauty and disinterest to the contrary. Since every interest contains a relation to human way of existence, there is an existential propensity in humans in the direction of attractiveness contrary to threats and risks. In other words, people's feeling of aesthetic sense should have a close connection to their way of subsistence.

In the phenomenon of beauty, people's minds discover that nature reflects a kind of purposiveness for them and this must not be subjected to fear or threat, the existence of which completely welcomes disinterest and eventual lack of participation. A suggestion by research team for this study insinuated that based on this theory, an individual's perception at site (synonymous to the *Figure 2*) would possibly enhance his/her optimism towards active involvement in contact with water and its other ecological features. This would possibly be because of aesthetic appeal, which generally makes out safety and pleasure

Conversely, disinterest may emanate from a derelict-depicted site as suggested in *Figure 3* and this might affect participation of people in recreational activities due to the possibly of hazardous impacts of beach environment. Such perceptions may re-energize pessimism when eyes of potential recreationists meet the site of a beach influent such as that in.

Nevertheless, a change of mind can be obtained through sanitization and branding processes and hence, enable recreationists' become unreservedly interested in participation in swimming, boating, fishing and sunbathing among other beach recreational activities.

Study Objective

The objective of this study was to demonstrate ecological risk perceptions on public participation in Lake Waterfronts recreational activities in Kisumu County.

4. MATERIALS AND METHODS

4.1 Study Sites and Target Population

The study targeted waterfronts of Lake Victoria in Kisumu County. Lake Victoria is the second largest fresh water lake in Africa with an average depth of 40m, maximum depth of 80m and a water volume of 2,750 km³ (East African Community, 2011). Situated at an altitude of 1,134m above the sea level the lake lies between latitudes 000 30" N and 355 km from west to east between longitudes 310 37" and 340 53" E.

The study targeted the beaches 25 beaches with a selection of four through purposive sampling. The four included Asat, Ogal, Usoma and Lwangni beaches and were selected based on their accessibility and the existence of human activities.

The study sites were paired for their urban and rural set-ups because it was presumed that there would be diversities of outcome based on human activities within their upstream neighborhoods. *Figure 5*

illustrates the physical features of the selected study sites of Lake Victoria as established in a past study.

4.2 Determination of Sampling Group

The study sites were categorized into rural and urban clusters and they comprised local residents living at the beach areas within buffer zones of 0.6 km from the lake shoreline for the urban sites while those for rural sites were considered at 1.5 km from the lake shoreline. The sites had other physical characteristics as illustrated in *Figure 5*. The total population for all the 4 study sites constituted 4,506 adult people. A sample size (n=351) was chosen proportionately to respective population ratios, through Robert and Morgan's (1970) table of determining sample size. Consequently, as demonstrated in *Table 1*, a total of 101 household questionnaires were administered in Asat, 112 in Ogal, Usoma (109) and Lwangni (29).

4.3 Data Collection

Interviews were conducted between 24th November and 19th December, 2014 using structured questionnaires. The questioners were administered to 351 adult household respondents living within the communities, through systematic sampling method. A first household was randomly selected from each site then the second and subsequent ones got picked systematically within the beach buffer villages. To qualify for participation, a respondent must have been be an adult member of the community hailing from a family that had not participated in this very survey exercise and should have lived in the community for at least 2 years. In total 348 (99.4%) were successfully completed.

A Likert Scale, a single-select technique for measuring opinions by Likert, (1932) was widely used to collect data related to respondents' mind-set about participation in water-based recreational activities, nature of ecological risks, psychological and cognitive influences and psychological and cognitive influences of their perceptions on participation in water-based recreational activities.

Participation in recreational activities: Participation was measured by enquiring on how often a respondent would go to the beach in a typical month, and if the respondent went ahead to make contact with the beach water. A 5-point rating scale ranging between 1 = "Not at all" and 5 = "Always" was used. This was followed up by asking what the respondent did in the water if indeed they went into the water. This was prompted by choices entailing swimming, boating, fishing, sunbathing or other.

In case a respondent had never gone to the beach he/she was asked whether they planned on going to the

beach but if not, choices were prompted for possible reasons, including: fear of physical injuries; water too polluted; attack by animals; no good space, transportation problems; and no time and / or personal reasons. Participation was also measured by enquiring the opinion of participating respondents about their perceived popularity of the respective water-based recreational activities.

Nature of ecological risks: By prompting options for possible answers, ecological risk attributes were measured by enquiring on the levels of perceived possibility of water pollution and aesthetic conditions on a 5-point rating scale ranging between 1=“Strongly Disagree” and 5 =“Strongly Agree”. On the other hand a 5-point scale was used for measurement of perceived extents of impacts of pollution with a scale ranging between 1=“Most Likely” and 5 =“Least Likely”. Perceived severity of disastrous consequences was similarly measured on a rating scale that ranged between 1=“Least Important” and 5 =“Most Important”.

Psychological and cognitive influences: In order to establish the issues that would influence participation in water based recreational activities, responses were prompted through Likert rating Scale of between 1=“Strongly Disagree” and 5 =“Strongly Agree”. This was to attain perceived *ability to control risks*, *previous experiences* and *perceived benefits* from recreational activities.

Intervening civic information: The study considered the possibility of any available public information that could be provided by authorities so as to control risks at the waterfronts of Lake Victoria in Kisumu County. Hence, responses were prompted to establish whether the communities were privy to news or stories about water quality at the beaches; had heard of beach closure as a result of risks associated with water quality; and if they previously had warning signs or any advice against swimming, boating, recreational, fishing or sunbathing. Respondents were finally asked to indicate whether they thought the lake water pollution problem had gotten better or worse over the previous years. They were prompted to provide answer of worse, better, same or whether they didn't know.

4.4 Data Analysis

Data was statistically analyzed using two approaches: First, Analysis of Variance (ANOVA) was executed to identify any considerable variation in risk perception by local community within respective urban and rural waterfront clusters. Secondly, a bivariate correlation analysis was performed in order to assess the existing relationship between public participation in recreational activities (dependent variable) and risk

perceptions by local communities (independent variable). The results were presented as a set of equations describing the statistical relationship between the dependent and independent variables.

Various attributes were categorized to obtain perception of sources of pollution and the sources that were perceived to exhibit high risks. The sources prompted for response included Oil/Chemicals from Industry; Sewerage / domestic wastes; Solid wastes disposal and Agricultural wastes from storm drains. These attributes were combined with *reasons for not participating* and Two –tailed test was performed spearman's correlation. Because the level of participation (and popularity of the same) was significantly low, reasons for not participating in the water-based recreational activities were analyzed for rural and urban setup (at $P=0.05$). The results are discussed in terms of their implications on opportunities of recreational ecotourism in water resources within beach environments, Kisumu County.

5. FINDINGS AND DISCUSSIONS

5.1 General Characteristics of Respondents

The number of respondents comprised 212 from rural waterfronts (Asat and Ogal beaches) and 136 from urban waterfronts (Usoma and Lwang'ni beaches) with diverse demographic characteristics as illustrated in Table 2. Overall the number of female respondents was 56.4% compared to male respondents (43.6%). Respondents of between the 18-30 years age group constituted 33.75%, those that belonged to the 31-40 year old bracket were 36.8% while 41-60 year olds were 20.5%. Only about 8.7% of the respondents were above 60 years old. Majority of the respondents in the rural cluster (79.7%) had lived in the study area for more than 5 years. On the contrary only a few (36.8%) of the urban respondents had lived there for more than 5 years. Respondents from rural and urban set-ups exhibited diversity in their sources of economic survival with more people engaging in commercial fishing in rural setups compared to urban setups. On the other hand *Jua kali* (informal artisan labour) was more prominent in urban clusters compared to rural clusters. A good number of the respondents had attained some level of education. The above illustration provides a comfortable mixture of characteristics of the respondents (at $F=3.081$ for 95% confidence level) which enhanced impartial reliability for the study.

5.2 Extent of Participation in Recreational Activities

The study revealed that most of the respondents at least went to the beaches to engage in some errands. Further enquiry, which aimed at establishing what exactly they

went to do at the beaches provided options of recreational activities (swimming, leisure boating, leisure fishing and sunbathing) with likely cases of engagement in any other non-recreational errands. Results were obtained by Pearson X^2 ($=24.321$ ($P=0.06$ (2-sided)) and Fisher's Exact Test ($=23.377$). The mean response of participation in at least a recreational activity by an average beach community member was only 9.48% (with the same likelihood ratio). Engagement in non-recreational beach activities e.g. commercial fishing, commercial boat transport or other errands was a high of 62.1%. Table 4 illustrates the results.

Respondent's perceptions of popularity of the recreational activities were prompted through rejoinders of *High*, *Neutral*, *Low* and *Don't Know* options in a Likert Scale measurement. The outcome of *High* popularity of the respective recreational activities (Table 4) was tested for correlation with the mean averages for actual participation (Table 3). This yielded a strong correlation coefficient of 0.915068 (at $p=0.05$). Fisher Transformation was performed at this correlation and the stronger correlation was confirmed ($F=1.55783$). This authenticated the low participation levels in recreational activities at the waterfronts of Lake Victoria in Kisumu County.

5.3 Risk Factors Influencing Levels of Participation in Recreational Activities

Factors influencing levels of participation in recreational activities were analyzed by descriptive statistics with regard to the rural and urban clusters. Results, as illustrated in Figure 6, express that urban communities were more concerned with *aesthetic conditions of the beaches*, *water pollution* and fear of *injury or drowning* at the beaches. These assertions are a demonstration of the low extents of participation in recreational activities at the waterfronts. On the other hand rural communities blamed *attack by wildlife*, *injuries/drowning* and *water pollution* for their dismal participation in recreational activities. However, a correlation coefficient of 0.1608 and $F=0.1622$ (at $P<0.05$) claims weak association between clusters, implying that the factors have irregular variations across rural and urban set ups.

Table 5 shows the mean scores of the correlated attributes of pollution sources and severity of their consequences. Results of Bivariate Pearson Correlation Analysis suggest positive association between the attributes. Hence, *oil/chemicals*, and *sewerage/domestic waste* constitute the most sources of water pollution. This has the same implication for as attributes that create fear of water-borne illnesses and poor aesthetic conditions at the waterfronts from the studied beaches.

The mean scores of Participation index in recreational activities as demonstrated by the responses from all the clusters (Urban and Rural) were statistically proven by the results of one-way ANOVA. The test of homogeneity of variances showed asymmetrical variances across groups (sig.0.000). The results exhibited majorly positive correlation with participation as illustrated in Table 6.

These findings showed that the levels of participation significantly differed among respondents living in clusters respective to rural and urban set-ups because of existing diversities. This confirms suggestion by Stern, (2000); Stern, Dietz, Abel, Guagano, & Kalof, (1999) that fear and experience influences civic perception on ecological threats or risks, and that threat salience, in turn, shape intended and actual behaviour of people. It also supports Crawford-Brown's (1999) illustration that local community's perceived risks depend on the facts they possess regarding the frequency, severity, and variability of effects.

Caveat Communication (Information)

The study initially relied on the assumption of whether or not there existed civic warnings or advice against engagement in water-based recreational activities for any reason. However, as a matter of curiosity, responses were sought on whether respondents had heard information that could inhibit them from getting involved in the recreational activities other than the factors tested above. Results, as pointed out in Table 7, indicate that only 16.4% of the respondents in overall had ever seen or heard any news or stories about water quality at the beach; a paltry 7.2% had ever heard about beach closures as a result of risks associated with water quality; while merely 4.6% had ever gone to the beach and seen a sign warning "No Swimming/ Swimming / Boating/ Fishing / Sunbathing". The rest of the respondents either had not or could not remember such information.

A further implication is that that participation levels and risk perceptions do not have a bearing on the information received against non-participation in the recreational activities. The results also imply the laxity on the part of sector players (water and tourism) for purposes of sanitization of the beaches and branding of water-related ecotourism activities at the beaches. By themselves communities were able to judge whether health and safety fears should be enough reasons not to engage in water-based recreational activities. This perfectly corroborates with Kant's, (2000) suggestion that people's minds discover that nature reflects a kind of purposiveness for them and this must not be subjected to fear or threat, the existence of which completely welcomes disinterest and eventual lack of participation.

Finally the perception of the lake ecological status was sought from respondents. Results point at *Worse* sanitary conditions compared to the previous status (*NB: the study did not carry out comparisons with any previous status of the waterfronts (beaches)*). Results suggest worst scenarios at an overall 56.6%. *Better*, *Similar* and *Ignorance* of the status were compared to previous knowledge and results demonstrated to be at the ratios of 17.2%, 16.1% and 10.1% respectively. This further confirmed that pollution of the water and the aesthetic conditions are a major concern leading to dormant or non-participation in recreational water activities.

6. CONCLUSIONS

It is evident that waterfront neighborhood members, of Lake Victoria frequent the shore area to engage in some activities. These activities are, however, significantly short of leisure-based errands, hence the little engagement in swimming, leisure boating, leisure fishing and sunbathing was evident across board. The *actual participation* in recreational activities and *opinion of popularity* of the same is exhibited without limits to cluster, gender, level of education ages and other experiences.

The uptake of recreational ecotourism at the waterfronts of Lake Victoria can potentially be realized if urban communities are satisfied with *aesthetic conditions of the beaches and adequate ecological sanitation* which is devoid of pollution impacts of the beach waters. Additionally, urban people must be assured of sites that are free of *injury or drowning* risks. Rural communities will quite participate if they are assured of sites that are devoid of *wildlife, injuries/drowning* and *water-borne illness* risks. Oil/chemicals, raw sewerage/domestic wastes, and solid waste constitute the most sources pollution and unacceptable aesthetic conditions at the waterfronts with urban areas exhibiting more prominence compared to rural areas. The same exhibit most likely attributes that repulse eagerness to participation in the recreational activities by members of the community.

Both urban and rural communities at the lake waterfronts of Lake Victoria are not able to control the sources of ecological risks since such control require policy implementations and a culture of responsibility among source quarters. Hence the risks associated with them can only be avoided by none-involvement in activities that necessitate significant contact with water at the lake waterfronts or beaches. Previous experiences with the above risks do constitute a noteworthy basis for the very little participation.

The deficiency in information regarding water and environmental (ecological) quality at the beaches, or

lack of caveat enforcement against probable disastrous consequences of various risks, as established, is an indication of the foregoing dominance on the part of water and tourism sector players. This also exterminates branding spirit that may well motivate participation in the water-based recreational activities at the lake waterfronts. It sheds light on the reason why communities are not aware of the potential benefits from recreational activities as found out by the study. There is, hence, a proven consideration that local population is a key factor to the desirability of ecotourism products, and an important participant in the initiation and approval of the outcome of ecotourism concept. The exploration and ultimate suggestion by this study is that ecological status supply risks that influences actions or involvement by the people who have first-hand experience with the waterfronts prior to inviting visitors to embrace water-based recreational activities.

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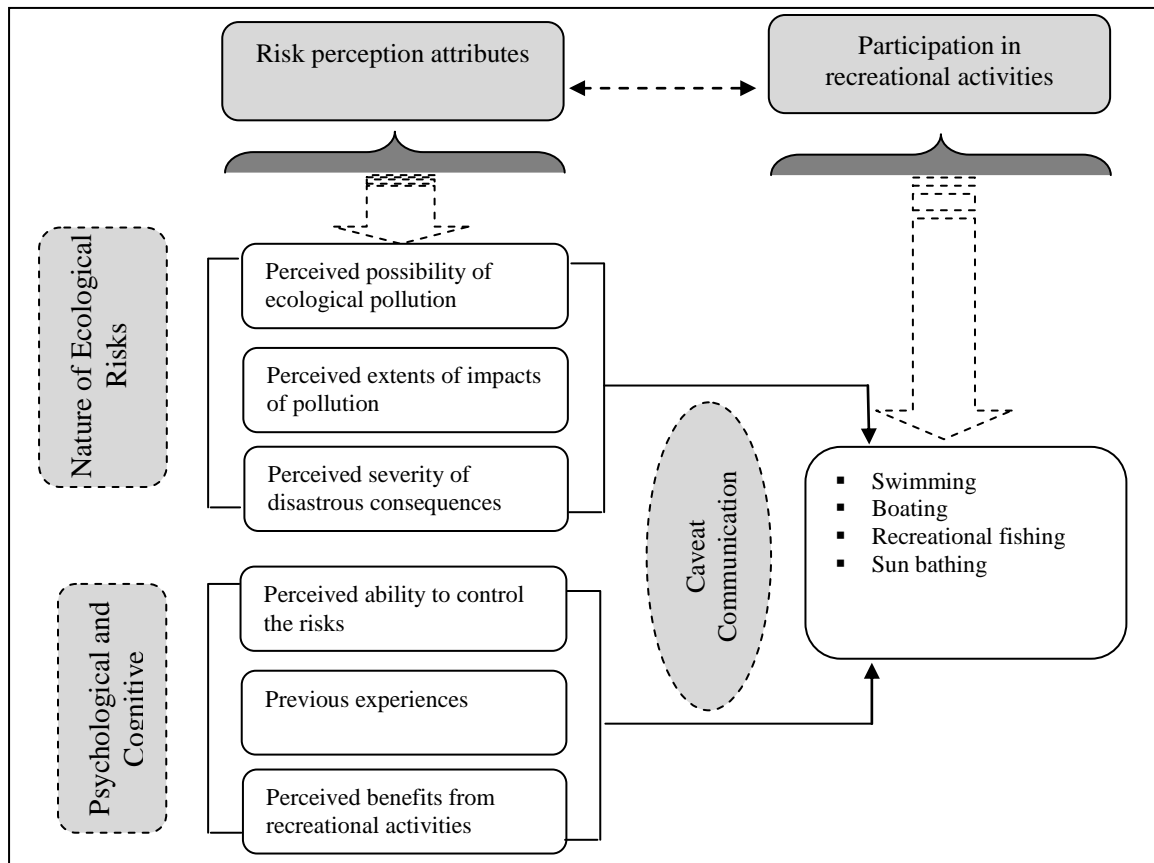


Figure 1: A conceptual model of risk perception and participation in recreational activities



Figure 2: A rural lake waterfront along Lake Victoria, in Kisumu County



Figure 3: Raw surface effluent drains into Lake Victoria in Kisumu County



Figure 4: Map showing study sites around of Lake Victoria, (Source: Okungu, et al, 2014)

<u>SITE</u>	<u>Area (sq km)</u>	<u>Shoreline stretch</u>	<u>Dry</u>	<u>Wetland</u>
Asat beach	0.22 km ²	0.36 km	95%	
Ogal beach	0.27 km ²	0.45 km	80%	
Usona Beach	0.17 km ²	0.29 km	80%	
Lwang'ini beach	0.19 km ²	0.32 km	85%	

*Taking inland buffer zone of 0.6km

Key	None					Low					Moderate					High					Total				
	0%	10%	20%	30%	40%	40%	50%	60%	70%	80%	80%	90%	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%		
	[Visual representation of the key showing different patterns and colors corresponding to the percentages in the header]																								

Figure 5: Physical features of the study sites (source: Okungu, et al, 2014)

Table 1 Sample Size calculation (Source: Kenya Population Census Report, 2009)

Sites	Cluster	Adult population	Percentage sample	Sample Size
Asat beach area	Rural	1291	28.7%	101
Ogal beach area	Rural	1446	32.1%	112
Usoma beach area	Urban	1394	30.9%	109
Lwangni beach area	Urban	375	8.3%	29
TOTAL	-	4,506	100.0%	351

Table 2: General Characteristics of Respondents

Characteristic	Cluster:	Rural				Urban			
		Site:		Ogal		Usoma		Lwang'ni	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender	Male	42	36.7	36	37.5	49	79.7	12	19.7
	Female	60	62.5	74	64.3	58	76.3	17	22.4
Occupation	Fishing/fish trading	33	44.6	41	55.4	33	78.6	8	19.0
	Small-scale farming	29	61.7	18	38.3	21	91.3	1	4.3
	Jua Kali /other	23	52.3	21	47.7	32	76.2	10	23.8
	Some employment	11	42.3	15	57.7	14	63.6	8	36.4
	None	5	25.0	15	75.0	6	75.0	2	25.0
Level of Education	No formal	38	55.1	31	44.9	28	90.3	3	9.7
	Primary	49	49.5	50	50.5	47	90.4	5	9.6
	Secondary	10	26.3	28	73.7	21	63.6	10	30.3
	College	4	80.	1	20.0	10	47.6	11	52.4
Age	18-30 years	49	48.5	16	14.3	40	37.7	10	34.5
	31-40 years	23	24.8	64	57.1	31	34.2	7	31.1
	41-60 years	17	16.8	20	17.9	21	19.8	8	27.6
	>60 years	12	9.9	12	10.7	14	8.2	4	6.0
Lived How long in The stud area	<2yrs	0	0.0	2	1.8	9	8.	4	13.8
	2-5yrs	2	2.0	4	3.6	9	8.5	6	20.7
	5-10yrs	15	14.9	1	0.9	20	18.9	9	31.0
	10-20yrs	39	38.6	52	46.4	32	30.2	4	13.8
	>20yrs	45	44.	53	47.3	36	34.0	6	20.7

$F=3.081$ for $\alpha = 0.05$

Table .3: Extents of actual participation in recreational activities

Activity	Mean	f	%	SD	
Recreational activities	Swimming	1.23	33	9.5	0.439
	Boating	1.21	44	12.6	0.426
	Fishing	1.25	28	8.0	0.463
	Sunbathing	1.18	27	7.8	0.393
<i>Subtotal</i>	<i>1.218</i>	<i>132</i>	<i>Av = 9.48</i>	<i>0.431</i>	
Other Non-recreational activities	1.42	216	62.1	0.495	

Table 4: Community Perception of popularity of recreational activities

	High (%)	Neutral (%)	Low (%)	Don't Know (%)
Swimming	7.6	11.6	53.5	27.3
Leisure Boating	22.3	17.7	39.4	20.6
Leisure Fishing	9.2	14.9	41.8	34.1
Sunbathing	8	12.1	42.4	37.5
	11.8	14.1	44.3	29.9

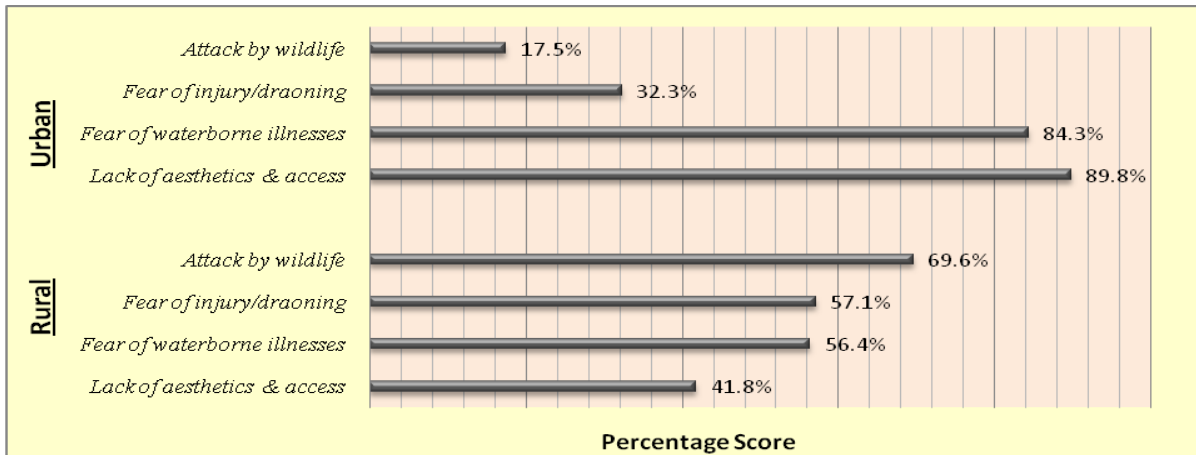


Figure 6: Reasons why people wouldn't get into contact with the beach water

Table 5: Correlated attributes of pollution sources and severity of their consequences

Spearman's rho		1	2	3	4	5	6	7	8
Suggestion on Pollution Sources	Oil/Chemicals	1							
	Sewage/domestic wastes	.313**	1						
	Solid wastes	.134*	.213**	1					
	Storm drains	-.09	-.085	-.005	1				
Opinion on Severity of Pollution sources	Oil/Chemicals	.139**	.064	.011	.07	1			
	Sewage /domestic wastes	.061	-.056	.017	.01	.032	1		
	Solid wastes	.108*	.096	.047	.125*	.126*	.087	1	
	Storm drains	.099	.079	.092	-.068	.087	-.017	.179**	1
	Mean	2.61	2.46	2.18	2.34	1.88	1.57	2.04	1.89
	SD	1.154	1.043	.974	1.048	1.175	.972	1.046	1.01

** . Correlation is significant at p< 0.01 level (2-tailed).

* . Correlation is significant at p< 0.05 level (2-tailed).

Table 6: Average Participation scores of against perception variables

	Items	Weighted average, μ	SD	Correlation with Participation
Participation index in recreational activities	Participation in recreational activities (swimming, leisure boating, leisure fishing, and sunbathing)	1.185	0.431	1
Perceptions concerning nature of environmental risk	Perceived possibility of pollution	2.41	.279	.522
	Perceived extents of impacts of pollution	1.85	.301	.581
	Severity of disastrous consequences	2.499	.503	.437
Perceived Psychological and Cognitive Influences	Ability to control the risks	1.839	.029	-.411
	Previous experiences	2.783	.201	.467
	Benefits from recreational activities	1.984	.223	.078

Table 7: Caveat Communication (Information) Attributes

		f	%
Have you ever seen or heard any news or stories about water quality at the beach?	Yes	57	16.4
	No	189	54.3
	Can't remember	102	29.3
Have you ever heard about beach closure as a result of risks associated with water quality?	Yes	25	7.2
	No	292	83.9
	Can't remember	31	8.9
Have you ever gone to the beach and seen a sign warning "No Swimming/ Swimming / Boating/ Fishing / Sunbathing"?	Yes	16	4.6
	No	291	83.6
	Can't remember	41	11.8