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Fishermen Migration in Lake Victoria (Kenya): Implication for Sustainable Harvesting of Fisheries Resources

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ABSTRACT

Migration of fishermen is common in the Kenyan waters of Lake Victoria. It affects the way people use and manage this natural resource. But little attempt has been made to relate migratory behavior of fishermen and the impacts of migration on fisheries conservation and management. This paper observes that fisheries related migration has some triggers. The paper therefore analyses the causes as well as demographic characteristics of fishermen using neoclassical economic theory and Logit model. Results show that fishermen have fishing as a primary source of income and are likely to be less literate. It is also shown that migration among fishermen is male dominated and has a clear gender-labour division. Further investigation revealed that migration reduces the positive attitude towards management of the common property. It is always assumed that population is the main driving force behind migration. However, this paper further reveals that age, income and educational level, experience and family size are the main determining factors towards long/ permanent fisheries related migration. In relation to educational level, it is noted that those who have been for long and still in fishing is because they are illiterate and have been involved in fishing from their childhood and therefore lack other skills. It is concluded that there is a significant relationship between migration variables of fishermen and the reduced efforts towards conservation in Lake Victoria fishery. It is thus recommended that, since there is no clear sign to halt fishermen's migration in Lake Victoria, there is therefore a need to create public awareness to improve knowledge of the dangers of migration to fisheries conservation and management.

Introduction

The term migrant is usually taken to cover all cases where the decision to migrate is taken freely for reasons of personal convenience. Migration is caused by geographic difference in the supply and demand for labour. It therefore applies to persons moving to another place to better their material or social conditions. A migrant fisherman is one who leaves his natural community and moves from one habitation to another in the fulfillment of his occupation (Tawari, 2002). From economic point of view, migration is viewed as a household decision taken to minimize risks to family income or to overcome capital investment on family production activities. Additionally, while risk minimization may be the families' objective, individuals usually have the goal to maximize income (Curran, 2002). Time and direction are identified as two dimensions of mobility (Rajan, 2002). Time mobility could be inter-generational and intra-generational while directional mobility may be vertical, horizontal and spatial (Rajan, 2002). The term migration implies to move, either temporarily or permanently, from one pace to another. It is regarded as one of the most important demographic factors affecting environment yet it is also one of the most difficult to adequately assess (Mokua *et al.*, 2014).

Globally, fisheries are vital resources to mankind. Fisheries are a source of income and protein to several millions of people (Okemo *et al.*, 2017). It is food and livelihood for many coastal and inland populations. Livelihoods of many fishermen are affected since their activities are determined by seasonal upwelling. In Lake Victoria, movement in search of fisheries is a common characteristic of many fishermen, shared majorly by patterns of resource availability, in addition to economic factors (Mokua, 2007; Mokua *et al.*, 2014). According to a survey conducted by the then Ministry of Livestock and Fisheries Development in Kenya (Republic of Kenya, 2013), the number of fishermen was on the rise therefore underlying the need for sustainable management of the fishery. However, with a fishery where the fishermen are highly migratory, sustainable management becomes difficult to achieve. This paper sets out to explain the fisheries-related human migration and outlines the conservation implications underlying fisheries activities.

A number of theories have specified the factors influencing human migration. This study used the neoclassical economic migration theory which specifies that migration is a consequence of differentiated economic opportunities across regions or countries, especially earnings differentials (Afolayan, 2006).

Materials and Methods

This study employed a sociological survey and identified migration as a factor which may have a significant impact on the sustainability of fisheries. The variables associated with migration included; *age, culture, educational level, experience and family size.* The variable of year of registration (entry) was considered a proxy of experience. This is because experience contributes to knowledge about

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the fisheries ecology and abundance. Experience is expected to have a positive impact on the performance of the regulations subject to the user's willingness to support fisheries conservation. It was also envisaged that the longer the period of fishing, the higher the level of income.

Theory shows that there is a direct link between education level and awareness attributes of fisheries management. It also shows that there is a direct link between culture and the level of income. This relates to the fact that certain habits and activities are peculiar to a particular group of people that are involved in fishing. Similarly, Age of the resource user determines sustainability of fishing.

Data Collection and Analysis

Data collection was carried out by use of structured questionnaire. The parameters collected included the socio-economic factors of fishermen. Qualitative data included awareness about the changing fishery and the effectiveness of enforcement of the regulations.

Simple descriptive statistics was employed to understand the data on the fishermen's socio-economic characteristics. The hypothesis was that there are factors that trigger the movement of fishermen. A logistic regression model was used to identify the significant socio-economic variables of fishermen, which significantly impact on effective management of Lake Victoria fisheries. The dependent variable was dichotomously measured and the independent variables were also categorical and assumed the value (0) zero or one (1).

In the regression model, the variable migrant was treated as a dummy, which takes on the value of one (1) for migration to other fishing areas, and the value zero (0) for non-migration. Age was taken as a continuous variable, while education was another dummy with a value one (1) when the fisherman has at least primary education and above, and zero (0) value otherwise. Wealth status of the fishermen was analyzed with the help of a proxy, namely household size, while the year of registration was used as a proxy for experience. Other variables included in the analysis were related to awareness about management issues in the Lake Victoria fishery. The regression model constituted the following variables:

Migrant……Non migrant-Dummy
Education……..No education-Dummy
Age……..Continuous variable
Wealth status…….Household size
Awareness……..Experience
Year of Entry…….Experience
Sex……Gender/culture

The decision variables were: decision to join fishing, to migrate, knowledge about fishing regulations, about institution managing the lake, about changes taking place in the lake and about the species in the fishery. This was presented by the functional relationship where it was assumed that effective fisheries management (dependent) is enhanced by certain socio-economic factors of the fishermen (explanatory variables). It was anticipated that sex or gender, age, and educational level should have a strong positive impact on the conservation of fisheries resources (Geheb, 1997; Ikiara, 1999). Sex was thus analyzed in relation to the other characteristics such as culture/ gender that influences fishing habits. This study anticipated a strong linear correlation between the management of fisheries resources in Lake Victoria and socio-economic aspects of the fishermen.

It was also anticipated that level of education would increase awareness on the need for fisheries conservation. Based on theory, education has a strong positive influence, while the influence of age depends on experience. Consequently, explicit consideration of the level of education was found essential for assessing the degree of success/ failure of fisheries management. It was also anticipated *a priori* that the income levels have a significant influence on decisions to join and fish daily and therefore resulting to a negative impact on the conservation of fisheries resources.

One hundred and eighty two (182) fishermen were involved. The objective was to show the link, for example, the decision to fish daily with some specified characteristics, which were taken to be the covariates. It was also necessary to know whether or not the age of a fisherman was related to the likelihood of him/ her migrating and also linking to the descriptive statistics and to identify the sub-groups (age) that have migrated more.

The effect of any independent variable on the dependent variable was expressed as an odds ratio, which is a percentage increase or decrease in the odds of occurrence. The estimated coefficients are measures of the change in the odds ratio. A positive coefficient increases the probability of an event occurring while a negative coefficient decreases the predicted probability. The hypothesis was that certain fishermen's characteristics limit effective management of fisheries resources. Normally, these characteristics reflect the fishing behaviour, and failure to understand them would mean incomplete management plans. The Logit regression model was thus used to test the hypothesis that socio-economic aspects of fishermen determine the management of Lake Victoria fisheries resources.

Results and Discussion

Socio-economic Characteristics of Fishermen

The findings show that 97.8% of the fishermen were men; meaning that the primary sector of fishing is male dominated. The fishermen noted that this is not unique, since, historically; fishing was predominantly a male activity. The traditional division of labor in most parts of the world dictates that men spend more time fishing than is the case for women. This is because of the cultural division of labour that requires women to be near homes to take care of the family (Abila, *et al.,* 1997).

Culture can be at individual and community level. Individual culture is what the individual carries with him as a result of having been brought up in a particular culture. It is said that there is abundant evidence that migrants tend to adopt the behaviour patterns of their new homes, at least in their economic decisions. Community culture tends to reinforce and be reinforced by patterns of behaviour. It is obvious that the behaviour patterns and the associated cultural norms can be a serious obstacle to economic progress and resources management and can also limit a stranger from the use of a particular resource. This study found out that the fishing community around the Kenyan sector of Lake Victoria has a common culture. Culture was therefore found not to be a major determinant for migration.

The study revealed that fishermen ages ranged from a minimum of 23 to a maximum of 80 years with a mean of 44. According to the fishermen, majority of them belong to the lower and middle age bracket because fishing nets are heavy, limiting older age group's ability in the primary sector. The results show that there is a positive correlation between the fishermen's age and level of income. Thus age of the resource user strongly determines sustainability of fishing.

Significance of age clearly demonstrates that the dominance of the lower age group is a major contributing factor to the current overfishing and unsustainable management in Lake Victoria fisheries.

The study revealed that migration is common among fishermen who are 44 years and below. This is because younger members among the fishermen still have many insatiable family needs that necessitate their migration so as to make extra money. But the older fishermen will cater for subsistence and for income generation for other family needs. In that case, for the old, fishing is no longer considered a stopover activity. Thus we see that age contributes to migration, which eventually impacts negatively on effective management and sustainability of Lake Victoria fisheries.

It was revealed that the fishermen's family sizes ranged from a minimum of 1 to a maximum of 26. The mean is 4, which is below but close to the average Kenyan household size with 5.2 persons (Kenya National Bureau of Statistics, 2010). In economic terms, large families suggest labour availability, which is crucial in this sector given that the fishermen employ their kinsmen. On the educational level, this study observed that 47% of the respondents have at least primary level of education while 22% are illiterate and 28.5% have secondary education and above. It was found that this case of semi illiteracy is as a result of early exposure to easy money among children around the lakeshore leading to a high rate of primary school dropouts. The fishermen agreed that the small percentage of fishermen with higher level of education is because fishing is considered a last resort and does not appeal to those with high levels of education. However, it was observed that the level of education is a less important determinant of the level of catch. This is because in fishing industry, education is not a source of the fishing skills. As revealed, education level does not contribute to skills and behaviour as there was no significant difference in the harvesting behavior in the various levels of education among the fishermen in the Kenyan sector of Lake Victoria.

Further investigation noted that the education level attained among fishermen in Lake Victoria does not contribute to effective management of the Lake fishery. As narrated, education, as a decision making variable may only be relevant in private and certain public property resources where the policies are based on market instruments of supply and demand. However, this becomes difficult in open access, common property resources such as Lake Victoria fishery. But studies have shown that education leads to better resource allocation (Mwakubo, 2005) and there should always be a positive association between education and adoption of conservation programmes. In addition to the capital returns, education is a positive externality since it increases participation in social activities and if a household head has high education level, the probability of his participation is increased by nearly 6% (Rajan, 2002). This study found out that the level of education is a prerequisite to create awareness and for sensitization of the fishermen (FAO, 2003).

Education may be specific to the fishing habits in several ways. The educated are in a better position to understand the government policy implications and the needs for sustainable use of fisheries resources. The educated are also well placed in situations when the managing institution is planning to teach certain skills and conservation programmes. This is because education influences the ability of the fishermen to acquire and analyze available information regarding the resource. In these circumstances the educated fishermen are in a better position to make relevant decision in the harvesting of fisheries resources. In addition, education creates awareness among the fishermen with the knowledge about fisheries management opportunity strategies of the Kenya Fisheries Department (Mwakubo, 2005).

Education level has a strong positive influence on resource conservation, thus the explicit consideration of the level of education is essential for assessing the degree of fisheries management and conservation. Education is also a process of acquiring knowledge and skills and creating awareness in the production sector. Public education also contributes to redistributive effects and public expenditure on education can be viewed as an excellent instrument for redistribution of income from the rich to the poor.

Human capital is the health and acquired knowledge and skills that an individual brings to an activity (Ostrom, 1997; Rajan, 2002). It is formed consciously through education and training, and unconsciously through experience. But human capital can be used for destructive purposes as well as productive ones. In addition, education only tends to contribute to resource conservation where users attach long-term discount rates.

Apparently, a large proportion of local people's income along the shores of Kenyan sector of Lake Victoria is derived from fishing related activities. This implies therefore that if fisheries are used unsustainably, or in a manner, which reduces societal net benefit, local peoples' income may eventually decline. Given that this would affect their perceived value of labour, this may further encourage more unsustainable levels of resource use, ultimately leading to the destruction of fisheries resources.

In fishing activities, people with large families are forced to intensify their abilities and even migrate to increase the chances of making more money (Ikiara, 1999). This habit directly impacts on the sustainability of fisheries resources because large families with low income will be forced to move to other productive areas. These frequent movements have negative effects on fisheries management and conservation. Daily fishing *ceteris peribus* strongly suggests over fishing, as fish is not given enough time to grow and multiply. The insatiable needs and stiff competition among fishermen negate conservation efforts. For instance, Bokea and Ikiara (2000) showed that as a result of the intensified daily fishing, currently, 30-35 percent of the landed fish are juvenile. Although the fishermen agreed that restrictions on the fishing days might improve in the management, discussions indicated that it might not contribute much with the ease of free movement and use of illegal nets not effectively restricted.

Further analysis indicated the migration habit among fishermen in Lake Victoria is in search of areas with plenty of fish, a factor, which may further limit the effectiveness of regulating the fisheries by days. The discussions with the fishermen noted that the unsustainable fishing in the Lake is partly contributed by the free movement of the fishermen. However, the fishermen argued that they not only migrate for the catches but also for other forms of welfare satisfaction.

The findings from interview with focus groups also showed that though a small percentage of fishermen migrate for social satisfaction the majority move to generate more income. In the study area therefore, fishermen migrate to secure the best possible income level, a strategy, which a fisherman may use as a mitigation strategy by varying catches and/ or when catch declines in certain areas. Migration in this case is a form of coping strategy, designed to minimize competition and the chance of a zero catch on any given day.

The fishermen agreed that migration in fishing activities leads to an improvement in income and represents a mechanism by which a fisherman can generate and accumulate wealth for themselves.

It was also revealed that in fishing, there are permanent and temporary migrants among the fishermen. The length of stay away from home determines whether the migration is permanent or temporary. In the Kenyan sector of Lake Victoria, majority of the fishermen move out of the home fishing areas temporarily to seek better incomes and eventually return home. Temporary migration is symptomatic of fluctuating catches and also a desire to avoid community responsibilities. Permanent migrants move out as a result of declined fish stocks in their beaches. However, in both cases the fishermen eventually return to their ancestral homes.

The findings indicated that even though the majority of fishermen migrate, the local fishermen are not in favour of the idea that strangers/ migrants fish and land in their beaches. The current arrangement is such that non-resident migrant fisherman arriving on beaches are obliged to introduce themselves to the beach leader and identify the type of gear and the crews they have brought with them. It is only after this identification and specification that the migrants are allowed to pay trespass fees to the beach authorities.

Discussions with the fishermen also demonstrated that some fishermen migrate so as to move away to avoid the kinsmen's demands for fish or wealth they may have accumulated. Fishermen argued that the accumulation of wealth and investment is only possible when they migrate to places where they are unknown. It was indicated that some run away to escape jealousy, which they argued was common among clan members around the ancestral homes. Seemingly, migration is also induced by the fact that those who have accumulated some wealth move out to secure their wealth because the wealthier a person, the greater his responsibility and demands from the community. Therefore, the migratory status among fishermen does not only constrain the effective management of fisheries resources but also reflects a transfer of income from home to distant places. Unfortunately, to date there is no regulation in the Kenyan Fisheries Act of 1991 addressing the geographical mobility of the fishermen.

In economics, migration is a measure of risk adjustment that a household can take especially when the income is not stable as illustrated in the direct inter-relatedness between migration and income levels. There are four kinds of household portfolios; High-average returns (high variance), High-average returns (low variance), low-average returns (high variance) and low-average returns (low variance). Normally, returns may be in surplus, deficit or stable. Households that have low average returns and high variance are the most vulnerable and disadvantaged. Such households would take measures such as negotiation, asset disposal, migration and reduction/ modification of family consumption.

In order to satisfy the household's demand, fishermen migrate to other fishing areas mainly for economic survival. Migration is therefore an economic diversification activity which is an essential component of household survival strategies (Rajan, 2002). Thus, the migratory status and the household size of the fishermen are expected to have negative impacts on resource management since in migration the fishermen develop a race-to-fish attitude (Ikiara, 1999). Although migration is positively correlated to fishermen's income, it contributes to the transfer of knowledge, wealth and labour from home to other areas where they may not be required (Harris *et al*., 1995).

The income level and migration are significant factors in determining the need to fish daily. The results show that income level is a major factor which determines the need to fish daily. This fact is driven by the motive that fishermen are often concerned with maximizing the business objectives.

It was found out that fishermen migrate in order to avoid a zero catch and also to improve the income levels.

The results show that the fewer times one has migrated the lower the need to fish daily. This observation is quite relevant to the past given that fishermen were few and movements were not quite common. But the negative coefficient found in the migration would be based on the argument that the income from fishing is not adequate and therefore fishermen have less incentive to fish daily. This can also be explained by the fact that the process of moderate catches in Lake Victoria is associated with depleted stocks which produce fewer fish (Aloo, 2003). Thus, over-fishing in Lake Victoria may also be associated with uneconomical costs where fishing becomes worth less than the cost of effort.

The negative coefficient found in the variables of migration such as age and education shows that each of these variables reduces the probability of fishermen knowledge about the fish species. The findings further show that the younger the fisherman, the lower the knowledge and likelihood about the species. But the findings further illustrate that attainment of education does not provide awareness about the knowledge since education offered does not necessarily lead to creating awareness to the fish species in Lake Victoria fisheries.

Conclusion, Policy Implications and Recommendations

The socio-economic variables of fishermen affect and contribute to the poor conditions for fisheries conservation in the Kenya's Lake Victoria fishery. The overall objective of a management policy is to promote the management and conservation of fisheries resources to sustain the Lake Victoria fishery for the benefit of the people of Kenya for the present and future generations. The policy challenge is therefore how to use the Lake Victoria fisheries sustainably taking into consideration the livelihood of the poor who depend entirely on them. There is therefore need to create public awareness to improve knowledge of the dangers of migration behaviour among fishermen towards the fisheries conservation and management.

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