



Implications Of Sand Harvesting On The Economy Of The Inhabitants Of Rachuonyo East Sub-County In Homa Bay County-Kenya

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ABSTRACT

Sand is an essential raw material in the burgeoning construction industry and its mining, distribution and use bequeaths both the rural and urban population with work as miners, loaders, transporters, vendors and builders. Sand harvesting also leads to destruction of roads, dereliction of agricultural farms since road side and onsite/farms sand harvesting is increasingly becoming popular and much easier. The business of sand harvesting appears lucrative to sand dealers not minding the effect on the environment. The study therefore seeks to unravel the intricacies associated with sand harvesting activities, sustainability of sand in line with the existing sand mining policies and how the resource can be used for economic productivity of the inhabitants of Rachuonyo East Sub County in Homa Bay County. The study was guided by the following objectives; To examine the underlying causes of sand harvesting activities in Rachuonyo East Sub County in Homa Bay County, To assess the extent to which sand harvesting activities have been carried out in compliance with the existing sand mining policies of both National and County Governments in Rachuonyo East Sub County in Homa Bay County, To evaluate the economic implications of sand harvesting activities on the inhabitants of Rachuonyo East Sub County in Homa Bay County. Literature related to the study was reviewed. The study was guided by the Sustainable Livelihoods Approach Theory. Descriptive survey was employed in the study and simple random sampling technique was used to arrive at the respondents. Data was collected using questionnaires and interview schedules. The target population was 1626 of which a sample of 489 was selected. A pilot study was conducted in the nearby Nyando Sub-County in Kisumu County. Data was analyzed using descriptive statistics with the use of frequency counts, percentages, means, tables and graphs. Data was analyzed using SPSS version 18.0 computer programme. The study found out that the main reasons for involvement in sand harvesting activities were to obtain both primary and secondary needs by the inhabitants. The inhabitants were never satisfied with the returns they get from sand harvesting

business as the cost of living was exponentially swelling against the dwindling sand prices. It was evident from the results of the study that the compliance level was still very low hence sustainability of sand resource is at risk. The research study also unmasked that the county government of Homa Bay is yet to enact laws/legislation on sand harvesting activities in the region. This was identified as a big gap and a vacuum to be filled by the study. It was concluded that for easy and quick compliance with the existing sand mining policies/regulations, there should be creation of timely awareness, formulation, rolling out and implementation of the policies/regulations in consultation with all the stakeholders as one of the best transformational processes. It was recommended that serious, well organized, recognized and operational cooperative societies be formed in order to boost the economic standards of the inhabitants and to act as the accountability structures to help curb the negative sand mining practices. This accountability structure will also equip the county government with the best way of maximizing revenue collection. Diversification of the sand dealers' economy to help minimize overdependence on sand resource thereby sustaining their sand was also a landmark recommendation. The results of the study was found to be significant to policy formulators for good governance of sand resource, environmentalists to ensure sustainability of sand, to the inhabitants for better economic productivity, and finally to county and national government for improved revenue collection.

Key Words: Implications, Sand harvesting, Economy, Inhabitants, Rachuonyo East Sub-County, Homa Bay County, Kenya.

INTRODUCTION

Background of the study

Sand is a rock that is ground more finely than gravel, but not as fine as silt with a light beige colour. Sand is used in the construction industry, aeronautics, electronics, and for glass and tile making. Geologically, sand is a particle from 62.5 microns to 2 mm in diameter, following the Wentworth scale. Sand and gravel are mined world-wide and account for the largest volume of solid material extracted globally. Formed by erosive processes over thousands of years (John, 2009), they are now being extracted at a rate far greater than their renewal. Furthermore, the volume being extracted is having a major impact on rivers, deltas, coastal and marine ecosystems which results in loss of land through river or coastal erosion, lowering of the water table and decreases in the amount of sediment supply thus making sand rarer than one may think (Peduzzi, 2014). Sand harvesting is a practice that is used to extract sand mainly through open pits. Sand is also obtained from beaches, inland dunes, ocean beds and river beds.

Muhammad et al., (2011) define the practice of sand mining as the removal of sand from their natural configuration. The Kenya National Sand Harvesting Guidelines (2007) define the practice as the removal, extraction, harvesting or scooping of sand from the designated sites. Sand harvesting has been seen over years and colossal quantities of sand are being extracted from the earth due to increasing overdependence on sand and the significant impact that its

extraction has on the environment is an issue that has been mostly ignored by policy makers and remain largely unknown by the general public. In fact, it is a sad reality living with us that more sand is still required for the rapidly burgeoning construction industry. In line with this the very difficult question to answer is about the level of sustainability of sand. Some countries in partial way to answer this question have opted to import sand from other countries while sustaining theirs to protect the environment. The best example of such countries is Singapore which imports sand from Indonesia (Guerin, 2003). Homa Bay County does not have the capacity to import sand, thus the inhabitants can sustain their sand only through controlled and monitored sand harvesting practices, selling sand through Cooperative Societies that improves bargaining power alongside strong legislation to curb private sale that promotes negative sand harvesting practices. They may also diversify the economy to agricultural activities by embracing the new technology in farming.

River sand is an essential raw material in the construction industry and its mining, distribution and use bequeaths both the rural and urban population with work as miners, loaders, transporters, vendors and builders. Sand is a resource that can be freely accessed and mining activities have expanded drastically in some river basins by 2.5 times more than the number of original sites (Gunaratne, 2011).

The demand for sand is growing around the world, particularly in the developing countries such as India, China, and Kenya where the rapid economic development causes strong growth of construction industry (Muendo, 2015).

As cited by Gayathri (2012) coastal erosion, water logging, saline water intrusion, degradation of surface and sub-surface water quality, loss of biodiversity, loss of agricultural biodiversity, degradation of wetlands, siltation of canals and traditional water harvesting structures, lime shell mining, sand mining, clay mining, land diversion from food crop to non-food crop and/or other use are some of the environmental problems encountered in Kerala.

Indiscriminate river sand mining, due to the recent boom in the construction industry in Sri Lanka, has created a number of environmental and social problems. Unregulated and unmonitored sand mining has taken place without a clear regulatory framework and this has aggravated environmental problems. In addition, sand prices have increased several times over thanks to a ban imposed on traditional sources of supply. Increased sand prices have driven the exploitation of sand from fragile and remote places, causing more damage to the road infrastructure due to heavy loads

carried on weak rural roads. This situation has been further complicated by politics. No tangible benefit can be derived from current institutional activities unless there is a mechanism that meets both demand for sand and the need for conservation goals. In addition, the needs of the rural poor, who benefit from river sand mining, need to be considered (Gunaratne, 2011). Rachuonyo East Sub-County inhabitants also suffer from the same problems above prompting this study to be conducted in the area.

Kamaladasa (2008) reported that the amount of sand being extracted from the main rivers along the west coast of Sri Lanka is far in excess of the supply of sand from the upper parts of the catchment, causing the lowering of riverbed levels – in some cases the riverbeds have been lowered by up to 7 meters. He described further consequences of the lowering of riverbed levels as salt water penetrates inland, affecting the drinking and agricultural water supply and lowering the water table near rivers, which in turn lowers water levels in wells. The drying up of irrigation channels has reduced the flooding of paddy fields with nutrient-laden water and increased the unsteadiness of the banks of rivers.

Mutisya (2006) indicates that in Kenya the rapidly growing populations in urban areas have contributed to an unprecedented demand for sand to meet the ever increasing needs of the building and construction industry. To meet this demand, sand harvesters have decided to invade seasonal rivers in Kenya's arid and semiarid areas, particularly those neighboring the big cities in search of this precious commodity called sand (Mutiso, 2015).

A survey done by Tariro (2013) shows that many villagers (49.4%) visit sand and gravel mining areas regularly for various reasons. Most respondents who indicated that they visit extraction sites were men, fifty years and above who go to the farming lands as well as herding livestock. There were many respondents below 30 years who indicated that they never visit extraction sites. This is because it is most likely that some are schooling and have little interest in mining as an activity. Few respondents below thirty indicated that they visit mining sites because they are seeking or on part time jobs to load tipper trucks manually. Women rarely dominated the trade probably because they are ever occupied by other duties in homes and are not involved much in sand mining activities. However, Rachuonyo East Sub County has a different case where women are also involved in sand harvesting business especially the special type of sand used for glass and tile making.

Kivuva (2014) argued that sand scooping adversely affects surface water quality and quantity and damages the aquatic ecosystem. Haulage of sand by heavy trucks causes environmental degradation by accelerating soil erosion and affecting soil stability. Storage of sand causes destruction of surface areas through clearing of vegetation and uses land that could be used for agriculture.

Findings by Tariro (2013) suggest that solutions to uncontrolled mining include 24 hour security and regular raids on illegal miners. The argument recommends that heavy penalties should be imposed to curb illegal mining. High level decision making forum involving all stakeholders is necessary to discuss problems of illegal mining and how to limit negative impacts. Department of Mines need to develop an Environmental Management Plan and a close monitoring program nationwide.

In his argument, Kivuva (2014) indicated that related social and health problems include prostitution and high school drop-out rate leading to serious social and health problems. The beneficial effects of sand harvesting include local employment. However, the share of monetary benefits to locals is minimal. He further adds that the local community gains the least from sand harvesting, but stands to suffer the most if the degradation of the river system continues. Suggestions are made for safe and sustainable methods of managing sand harvesting, in which greater local involvement and stricter enforcement of regulations to protect the environment are vital. Therefore, the protection of water resource from destruction through activities such as sand mining is paramount for the survival of both present and future generations. He further points out that local people hardly benefit from this activity. They are paid very little which is not enough to sustain the natural resource. The County Environmental Committee has however made some efforts to bring some sanity in the utilization of the resource. Homa-Bay County and Rachuonyo East Sub-County Environmental Departments do believe that stronger and stricter legislation should be enacted to ensure that the local people gain significantly from sand harvesting business as observed in other regions of the world. This study therefore seeks to unravel the intricacies associated with sand harvesting activities, sustainability of sand in compliance with the existing sand mining policies and how best the resource can be used for the economic productivity of the inhabitants of Rachuonyo East Sub-county in Homa-Bay County.

Statement of the Problem

Sand is an essential raw material in the burgeoning construction industry, used in aeronautics, in electronics and in glass making. The mining, distribution and use of sand provides both the rural and urban population with work as miners, loaders, transporters, vendors and builders. Sand is a resource that can be freely accessed and mining activities have expanded drastically in most river basins by 2.5 times more than the number of original sites across the world (Gunaratne, 2011). Similarly, sand harvesting has become increasingly popular among the inhabitants of Rachuonyo East Sub-County of Homa-Bay County. There are several people engaged in the sand harvesting activities these days and this may apparently cause imbalance in the environment if less attention is given. There is, however, no empirical data to show the implications of sand harvesting activities on the environment and on the economy of the inhabitants of Rachuonyo East Sub-County. It is therefore necessary and imperative that this painstaking research be carried out in this region.

The study therefore sought to unravel the intricacies associated with sand harvesting activities, sustainability of sand in compliance with the existing sand mining policies and how best the resource can be used for the economic productivity of the inhabitants of Rachuonyo East Sub-county in Homa-Bay County.

The Purpose of the Study

The purpose of this study was to examine the economic implications of sand harvesting activities on the inhabitants of Rachuonyo East Sub County in Homa-Bay County

Objectives of the Study

This study was guided by the following specific objectives:

- i. To examine the underlying causes of sand harvesting activities in Rachuonyo East Sub County in Homa Bay County, Kenya.
- ii. To assess the extent to which sand harvesting activities have been carried out in compliance with the existing sand mining policies of both National and County Governments in Rachuonyo East Sub County in Homa Bay County.

- iii. To evaluate the economic implications of sand harvesting activities on the inhabitants of Rachuonyo East Sub County in Homa Bay County.

Research Questions

The study was guided by the following research questions

- i. What are the underlying causes of sand harvesting activities in Rachuonyo East Sub County in Homa Bay County?
- ii. To what extent has sand harvesting been done in compliance with the existing sand mining policies in Rachuonyo East Sub County in Homa Bay County?
- iii. What are the economic implications of sand harvesting activities on the inhabitants of Rachuonyo East Sub County in Homa Bay County?

Significance of the Study

The study will be important to the policy formulators to come up with the best policies that govern sand harvesting activities in the county. It will also be important to environmentalists to put in place best environmental conservation practices to be followed to ensure the sustainability of sand in Rachuonyo East Sub-county in Homa Bay County. The residents will also be able to use the findings from the study to identify how best they can benefit from the sand harvesting activities. The County Government of Homa Bay may also use it to improve revenue collection from sand harvesting business. The entire Kenya Government may also benefit from revenue collection in other areas. The research findings will also be used by other researchers to do further study on the same.

Justification of the study

The study will contribute to the existing knowledge on the damage done to the environment due to sand harvesting activities. It will also add value to policy makers like NEMA and county governments to protect the environment. The study will as well empower the economic status of sand harvesting regions in other parts of the country.

Scope of the Study

The study was conducted in the sand mining regions of Rachuonyo East Sub County especially the river beds, road sides, own farm sites and river banks. Sand harvesters/owners, sand loaders, transporters and the relevant government authorities were also involved in the study to furnish the researcher with the required information.

Operational Definitions of Terms

Burgeoning – Means swell to the point of bursting

Sand dealers – Those legally accepted by the law to operate the sand business.

Sand harvesting/mining- The activity of extracting sand for the purpose of selling to get profit

Vendors – Those who are involved in buying and selling sand.

Wetlands – A place where the land is covered by water, either salt or fresh egg in marshes or ponds or mouths of rivers.

Marinas – Harbor for small boats

Panchayat – Village Council or Local Government in South Asia

Sustainability – refers to simultaneous pursuit of sustained or enhanced environmental quality, economic growth, and social justice (Eggert, 2006).

Commune- A small community often rural, whose member share in the ownership of property and in the division of labor.

Chugging- Laboring engines while in locomotion.

Mafias- Organized group controlling the arena of sand harvesting.

Coastal accretion- Addition of sand on the coast to cause unnecessary swelling.

Artisanal mining- Extraction of minerals by individuals, groups, families or cooperatives with minimal or no mechanization often in the informal sector; it is practiced all over the world more often and undertaken through rudimentary processes (Lei Shen & Aaron, 2004).

Guardian Angels – Protector or guide of sand harvesting activities or expected to play the role of custodian and watch dog in the sand harvesting industry.

Catholicon – Universal remedy / cure all to challenges of sand harvesting business.

Unabatedly – With full strength / intensity.

Deputed – To assign someone to do a task or delegate to somebody some work.

Land owners - Also means sand owners or sand harvesters.

Vote off – To eliminate

Theoretical Framework

This research study was guided by Sustainable Livelihood Approach Theory which has been proposed by Chambers and Gordon (1992) suggesting that sustainable rural livelihood has been applied most commonly at the household levels and to some extent community levels. A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable when it can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term.

According to this cited theory sand harvesting activities is applicable as it is an economic base and a major contributor to the development of livelihoods of most families in Rachuonyo East Sub-County. Sand harvesting activities impact in a greater way on the local economy of the inhabitants of Rachuonyo East Sub-County that in turn affects the livelihoods both at community and household levels. Therefore, this theory is adopted by the research study since it

can be found relevant to the research process and findings. The theory was used to help study, analyze and understand the implications of sand harvesting activities on individual household and then to the whole community before getting involved in the sand harvesting activities, and after getting involved in the activities of sand harvesting. The indicators used included types of schools that their children attend, types of meals/living standards, health care facilities/services provided in the area, among others.

According to Scoones (1998) who also concurs with the theory of sustainable livelihood approach, he proposed that policy and governance as they impinge on people's livelihoods must be addressed. The various support activities to sand harvesting activities must be organized and usually implemented at sub-county level with ramifications at the community and household levels. He avers that to understand the complex and differentiated processes through which livelihoods are constructed, it is insufficient just to analyze the different aspects; one must also analyze the institutional processes and organizational structures that link these various elements together. To do this, it is essential that sustainable livelihoods analyzes fully the involvement of the local people to let their knowledge, perceptions and interests be heard. This is relevant to the sand harvesting activities in the research study region as it will enlighten and empower the sand dealers and the community at large to understand and appreciate all the processes of sand harvesting activities. The formation of cooperative societies, community based organizations, self-help groups, policies framework among others will take centre stage in this case of sand harvesting activities. This will ensure that the sand resource base of the inhabitants' economy is sustained in the long run according to the above theory, hence sustaining the livelihoods in Rachuonyo East Sub-County in Homa Bay County.

The sustainable livelihood approach theory may also facilitate the understanding of the underlying causes of low economic productivity of the research study region of Rachuonyo East Sub-County by focusing on the varieties of factors, at different levels that directly or indirectly determine or constrain poor peoples' access to natural resources like sand. Finally, it provides a more realistic framework for assessing the direct and indirect effects on people's living conditions as they venture into the exploitation and utilization of sand resource as their economic base.

RESEARCH METHODOLOGY

Research Design

Descriptive research design has the benefit of combining both qualitative and quantitative methods, and using smaller groups of people to make inferences about larger groups that would otherwise be prohibitively expensive to study (Holton & Burnett, 1997).

The study therefore adopted the descriptive survey research design. This was because the study involved collection of data on more than one case and at a single point in time in order to collect a body of quantitative data in connection with two or more variables, which are then examined to detect the patterns of association (Brynan, 2004)

Target Population

Rachuonyo East Sub County has a total of 11 locations. The main locations that have sand harvesting as the main economic activity are two namely; Kokwanyo and Ramba Locations. The population of Ramba Location is 13498 persons while Kokwanyo Location has 12973 persons making a total of 26471 people. Out of these, approximately 900 are land/sand owners, 600 are sand loaders, 120 are sand transporters and about 6 are NEMA/County Government officers (Ministry of Finance and Planning, 2013).

Sample Size and Sampling technique

Sampling is described as a deliberate rather than haphazard method of selecting subjects for observation and analysis. Stratified random sampling refers to selecting a number of subjects or a sample from the whole population in such a way that all the characteristics of each of the units of the sample have an equal chance of being considered (Borg & Gall, 2006). Simple random sampling was therefore used to arrive at the right sample for respondents in the study. According to Best and Khan (2004) sample size of 30% of the population is considered statistically significant. The sample size calculation is as shown below;

$$\frac{30}{100}xN = \text{Sample size}$$

Where N is the target population

Table 3.1 Target population

No	Population sub groups (strata)	Target population	Sample size
1.	Land owners	900	270
2.	Loaders	600	180
3.	Transporters	120	36
4.	NEMA/County Government officers	6	3
	Total	1626	489

Source: Ministry of Finance and Planning (2013)

Research Instruments

Data for this study was collected using questionnaires and interview schedules. Sand owners, loaders and NEMA/County Government officers were asked to respond to questionnaires while transporters was asked to respond to interview schedules. The questionnaires for the sand owners and loaders were administered by the researcher himself since some respondents probably had low literacy skills while the NEMA/County Government officers managed to complete the questionnaires by themselves. Therefore, the questionnaires were sent to the officers in good time by the researcher to allow them adequately understand and respond to questions appropriately. With questionnaires, information can be collected from a large sample and diverse regions (Kombo & Tromp, 2006). There is likely to be no bias on the side of the researcher and the respondents. Structured interviews are reliable since each informant is subjected to similar questions with the others. It is also systematic, time saving and comprehensive.

Data Collection Procedures

After getting a letter of transmittal from the national council of science and technology, the researcher sought authority from the County Governor of Homa Bay to conduct research in Rachuonyo East Sub County. The sites were visited to inform the residents that the study would be carried out in their area. A brief introduction was done with the respondents before administering the questionnaire. The questionnaires for the NEMA/County Government officers were sent and distributed to the respondents accordingly in time by the researcher since they were self administered while the questionnaires for sand/land owners and sand loaders were administered by the researcher himself and information recorded. The interview schedules for the sand transporters were administered by the researcher himself

as well. The questionnaires from the officers were then collected from the respondents and put together with the researcher administered questionnaires plus the interview schedules for final analysis.

Data Analysis

After data collection, the responses to the questionnaires and interview schedules were coded, and then data was entered into the computer for analysis. Data was entered according to respondents' identification number based on the locations. The data largely came from individual respondents and was analyzed by using descriptive statistics. Frequencies and percentages were used in this case to carefully analyze the data. The Statistical Package for Social Sciences (SPSS) version 18 was the computer programme used for the analysis of the data.

RESULTS AND DISCUSSION

Underlying Causes of Sand Harvesting in the Area of Study

The research study managed to unravel most of the complexities associated with sand harvesting activities. Findings revealed that majority of the inhabitants involve in sand harvesting activities because of the following reasons: Belief that sand is ubiquitous and can freely be accessed at will and at any given time therefore necessitating its harvest and sale. The ever ready market/high demand for sand due to the burgeoning construction industry was a conspicuous factor. This makes the business of sand dealing so lucrative for most of the sand dealers.

Poor yields from agriculture due to infertile sandy soils coupled with low and unreliable rainfall in the study region and lack of other viable economic activities in the study region were also cited as reasons.

Another sensitive but silent reason was the dwindling fish stocks in Lake Victoria which really has left many inhabitants jobless hence resorting to the only readily available economic activity of sand harvesting business. Brutal and accelerated attacks, harassments, arrests and torture of Kenyan fishermen by the Ugandan security forces have also significantly contributed to the abandonment of the alternative viable economic activity thereby leaving the majority of the inhabitants with no option but to earn their daily bread from sand harvesting business, and finally, the water hyacinth menace in Lake Victoria also has not spared them either.

However, much has been put in place by the authorities as regards environmental protection, there are still some pitfalls found to exist in the region. This includes but not limited to deaths and accidents at the sand mines.

Women were found to have become the catholicon or game changer in the sand harvesting industry something which other research studies have rarely found to be a fundamental reality. The special type of sand for glass and tile making harvested by women fetch fairly higher price as compared to the normal sand for the usual use. This was found to be a milestone achievement in the economy of the inhabitants of Rachuonyo East Sub County. This is in total disagreement with the findings of Tariro (2013) who observed that women rarely dominated the trade because they are engaged in duties at home.

The research study found out that there is weak law enforcement thus providing a fertile breeding ground for illegal sand mining practices, and it also as well encourages noncompliance to the existing sand mining policies and regulations.

The findings of the study profoundly discovered and established that sand harvesting as a key resource base in this region sustains the survival of other sectors like bodaboda transport, opening kiosks, hotels, cloth selling business, Mpesa shops, among others, thus having a positive implication on the growth of the economy of the inhabitants. The research study also unmasked that the Homa Bay County Government is yet to legislate on the laws/regulations/policies on sand harvesting business in the county. This provides a very big gap and indeed a vacuum in the general management of the sand resource in the region. The county government is therefore as a matter of fact crippled and only takes advantage with the enforcement of EMCA regulations which might not apply holistically to the county, or may not be effective for full realization of the expected economic growth in the region.

The prolific research study results unearthed that there is no established forum where the NEMA officials and the county government officials meet to discuss and to jointly chart way forward for the effective and efficient management, and by extension do collective stock taking of the sand resource harvesting activities in the region. This disconnect is the real missing link in the chain. In fact, to be sincere, the two guardian angels of the sand harvesting business are pulling apart and sometimes are unfortunately engaged in supremacy battles and chest thumping. This is not healthy for meaningful economic development, sanity of this delicate and fragile sector, sustainability of sand

resource, effective revenue collection, accountability issues, and by and large the general protection of the environment. In summary, it should be all systems go.

Another one serious and very much sensitive factor that the study exposed which cannot be ignored by any fair reasoning was the escalated political interference from interested politicians in the region who would always want to overprotect their perceived electorates when apprehended for involvement in illegal sand mining practices hence jeopardizing the course of justice. This is a major stumbling block to the total compliance with the existing sand mining policies in the region. The politicians are always synonymous with the opportunity of gaining political mileages even when they are quite aware of the looming dangers.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Even though Chapter Five –Land and Environment -of the promulgated Kenyan Constitution of 2010 clearly directs that all natural resources in the country must be utilized and developed in a manner that is beneficial to all the people of Kenya and bearing in mind the sustainability of the resource for future generations, the law is silent about the procedures and modalities of achieving that aim. Therefore, the research study gives out a clear framework on how to do it. Creating timely awareness, formulating, rolling out and implementing the policies in consultation with all the stakeholders is one of the best transformational processes to be adopted. The whole door of the economic growth and sustainability measures of the sand dealers hinges on the creation of general awareness on the pros and cons (benefits and dangers) of sand harvesting activities, the general management and the intervention measures provided by the relevant authorities.

Sand is not a ubiquitous natural resource as the respondents in this region do believe. It is rarer than one may think (Pedduzi, 2014). Therefore, it must be utilized cautiously with a lot of restraint for its sustainability and the general sustainability of the lives that directly or indirectly depend on it. Its extraction must be done in a manner that is eco-friendly and with assurance that the whole community significantly get a share of its proceeds as clearly spelt out in

Chapter Five of the Kenyan Constitution (2010). The chapter also stresses that the natural resource should be preserved for the future generations.

The law enforcement agencies of both County and National Governments should be consistent with the duty of surveillance in order to effectively curb the illegal sand mining practices as recently witnessed in the region. New technology in farming should be adopted to help the inhabitants quickly and easily diversify their economy to agriculture thus reducing overdependence on sand resource and allowing for sustenance of sand for future generations. This is well echoed in the Theory of Sustainable Livelihood Approach. The classic example of new technology can be the use of green houses, irrigation, drought resistant crops like cassava, sorghum, among others to be provided by the governments and the NGOs around.

Recommendations

Based on the findings it was recommended that:

1. The sand dealers should be made to understand that sand is not ubiquitous as they believe, but it is rarer than one may think since the processes involved in its formation are far much slower than those into which it is being scooped from the earth. Therefore, they must minimize over dependence on the sand resource that would otherwise get depleted. A lot of emphasis should be made on the alternatives of diversification of the sand dealers' economy to other viable economic activities like agriculture while embracing the use of new technologies.
2. There should be well designed blue print for formulation, rolling and implementation strategies of the regulations of sand harvesting activities as this would play the role of the guardian angel to ensure achievement of almost the total compliance with the existing sand mining policies in the region.
3. The political class should stay away from interference with the course of justice during the struggle to bring sanity in this delicate and fragile sector of economic development. On the same note the law enforcers should also stop subjugating on the people very draconian policies and laws that can cause misunderstanding between them and sand dealers.

4. There should be systematic and timely creation of awareness about the general understanding of earth processes that are associated with environmental degradation and climate change due to sand harvesting activities.
5. The County Government of Homa Bay should unabatedly expedite the enactment of laws/regulations/policies regarding sand harvesting activities in the county to eliminate the vacuum in the effective, efficient, relevant and holistic general management in this sleeping giant sector of economic development.
6. Both the NEMA and County Government officials should pull together, organize for joint forums to collectively chat way forward and do stock taking on this sensitive sector of economic development of sand harvesting. Unnecessary chest thumping and supremacy battles may be dangerous to everyone. ‘All systems go’ is what is needed for the promising and brighter future of the present and the generations to come.
7. After having carefully and critically analyzed the cost at which the sand owners sell their sand to the transporters and the cost of sand at the destination, it would be prudent and economically viable for the sand owners to source for their own transport mechanisms in order to maximize their profit and to an extent eliminate the unscrupulous businessmen who overexploit them. This would improve the economic base and help alleviate poverty in the region. Their own transport means will make it economical in transporting soil back in return journey to fill the hollows left after scooping sand to help in reclaiming the agricultural land that would see reduction in overdependence on sand resource and answering the key disturbing question of sustainability of sand in the region. Tractors/lorries may also be offered for hire by other users hence fetching them profits. Finally, the profit earned from transport should be ploughed back to help in starting businesses, establishing health centers, paying school fees, repairing roads, among others.
8. Active and serious cooperative societies should be formed and registered by both the sand owners and the loaders to oversee all the activities of sand harvesting. This will increase their bargaining power which hitherto is expected to be the strong hold of their economic base. More importantly, the properly organized cooperative societies will act as the accountability structures in the general management of sand harvesting business as every member will be deputed the role of supervising the other following the clear regulations of the society. Cooperative societies bequeath both direct and indirect employment opportunities to the inhabitants in different capacities, that is, those involved in the actual management and the suppliers of materials. The savings can be

- used to acquire tractors/lorries from institutions like banks hence solving the problem of transport. Dividends can be used as capital to start businesses like mpesa shops, kiosks, hotels, bodaboda transport, poultry farming, fish selling, among others.
9. Serious CBOs should be formed in the region to sensitize the entire community on the utilization of natural resources that include sand. This awareness campaign need to be carried openly in a well guided forum. The CBOs are also expected to trap the proceeds of the sand harvesting activities so that the whole community may also have a gist of the low lying fruits of sand harvesting activities.
 10. The county government and other agencies should freely provide tree seedlings for the inhabitants to plant in order to help them protect the environment and to attract rainfall as well in the region. Presence of rainfall attract agriculture.
 11. Fish fingerlings should also be provided by the county government and other agencies for those willing to diversify their economy to fish farming since fish stocks in Lake Victoria was found to be dwindling coupled with the attack from the Uganda soldiers.
 12. A management committee should be formed comprising of members from the community where sand harvesting activities is taking place, county, sub county officials, chiefs and village elders to provide necessary ideas and to oversee the progress of the activity viz a viz the existing policies and regulations as this would be the only perpetual way to bring home grown solution to the challenges of sand harvesting activities in the county at large.
 13. Rampant corruption should be dealt with at all cost at whatever levels of sand harvesting activities as it provides a fertile breeding ground for illegal sand mining practices.
 14. Taxes department should be consistent in their work in order to minimize the practice of tax evasion. Nonetheless, they should also give accurate information on the dues collected since some percentage of it are expected to be used to start projects in the region as is required by the Kenya constitution.
 15. There should be vigilant security surveillance operating 24 hours in order to deal with the laxity in law enforcement in the sand mining industry that have been witnessed in the recent past.

16. The procedure involved for one to become an authorized sand dealer is lengthy, tedious and discouraging hence promoting illegal sand mining practices. This should be revised in a manner that is workable for all stakeholders.
17. The transporters should be given clearance sticker of compliance with the regulations to avoid the unnecessary harassment by the law enforcers that would otherwise create a fertile breeding ground for corruption as the victims fear falling into the trap of the long and cruel hand of justice.
18. Operation hours of sand harvesting activities should be increased from 6.00 antemeridian to 6.00 postmeridian to 24 hours since the Kenya government in its vision 2030 agenda advocates for 24hours in 7 days economy. Sand harvesting industry is one such busy economic sector which cannot be ignored in such quest.

Suggestions for further study

Taking into consideration the limitations and delimitations of the study, the researcher also makes the following suggestions for further research:

1. Assessment of the impacts/influence of the sprawling neighboring towns like Kisii and Nyamira on sand harvesting business in Rachuonyo East Sub County in Homa Bay County.
2. Assessment on the current trend of vast number of woman involvement in sand harvesting activities in the region and maybe other regions of similarity.
3. Investigation on to the relevance of some of the permanent regulations and policies of sand harvesting business on the economy of sand dealers in this century.
4. Assessment of the sand harvesting activities on climate change in the sand harvesting regions of the country.

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