

Sand Harvesting, Environmental Degradation and Livelihoods in North Rift Kenya

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ABSTRACT: In Kenya, thousands of households rely on sand harvesting as their main source of livelihood. Sand harvesting is common in Kenya's arid and semi-arid areas, but left uncontrolled it depletes water catchment areas, and thus, the need to promote sustainability by striking a balance between it and environmental conservation. This paper illustrates how sand harvesting is affecting the environment in West Pokot County. Findings indicate that sand scooping reduces surface water quality and quantity 251(61%), leads to river bed degradation 311(87.4%), sand harvesting increases erosional valleys 308(86.6%), there is contamination of water and scarcity of water due to sand harvesting 289(81.1%), sand harvesting affects the flow of the river downstream 280(78.7%), reduces land for farming 145(40.7%), storage of sand causes destruction of vegetation cover 214(60%) and destruction of the forest cover 206(48%). The paper concludes that sand harvesting is accompanied by disastrous environmental effects, which raises questions on the cost-benefits and sustainability of the sand harvesting activities in the study area. Consequently, the paper recommends for measures to be put in place to surmount the hazardous environmental effects and enhance the multiplier effects of sand harvesting on livelihood security.

INTRODUCTION

Sand harvesting has become a vital activity in development of the society; however, unsustainable harvesting has resulted in significant livelihood and environmental implications (Gavriletea, 2017). Sand harvesting has led to social, economic and environmental implications, which are both positive and negative (Koehnken *et al.*, 2020). Environmental implications are depicted by decrease of water quality; damage of aquatic ecosystem, air pollution and noise from the activity. Moreover, it leads to loss of agricultural land accompanied by other risk effects like, formation of deep holes and hollows that frequently collapse leading to injury and loss of lives to human beings and animals.

Sand harvesting constitute a major livelihood activity among residents of West Pokot County. However, it is evident from practical observation that if not well guided and managed, sand harvesting has a greater potential for environmental depletion than the economic gains that may accrue.

According to the Legal Notice No. 67 of 2017 and ssection 6 (1) of the Mining Act (Republic of Kenya, 2018), sand is vested in the government like other natural resources such as fisheries, minerals, geothermal resources, renewable energy sources, water and public forests. Despite the state ownership of sand under the Mining Act, the exploitation of sand in West Pokot has adopted an open access approach. This has led to the 'tragedy of the commons' in many areas as predicted by Hardin (1968). The free access especially to public lands (rivers and riverine) creates a situation of low risk and low cost for a product that is in high demand, thereby creating a competitive race to the bottom scenario where there is no incentive for sand harvesters or dealers to manage or conserve the resource.

This paper is an output of a study on implications of sand harvesting on livelihood security in West Pokot County, Kenya. In the study, one of the objectives was to evaluate the environmental implications of sand harvesting on livelihood security. Data was collected through the use of a questionnaire, key informant interviews, focused group discussions and direct observations. The study engaged 368 participants. It is in line with this objective that this paper seeks to demonstrate how sand harvesting has affected the environment in West Pokot County, Kenya.

RESULTS

This section describes findings that relate to environmental implications of sand harvesting on livelihood security. The findings have been summarized in the Table below.

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Table 1: Environmental Implications

	Environmental Factors	Frequency	Percentage (%)
1.	Lands for farming reduced because of sand harvesting activities.	145	40.7
2.	Storage of sand causes destruction of vegetation cover	214	60
3.	Sand harvesting destroys underground aquatic ecosystem	242	67
4.	Sand scooping reduces surface water quality and quantity.	251	61
5.	Sand harvesting leads to destruction of the forest cover	206	48
6.	Sand harvesting is associated with increased dust pollution	207	57
7.	Sand harvesting leads to river bed degradation	311	87.4
8.	Sand harvesting increases erosional valley	308	86.5
10	Many pits are left uncovered and becomes dangerous to both people and livestock.	318	89.4
11	Accumulation of water in open burrow pits creates an environment for mosquitos breeding which spread malaria.	306	86
12.	There is contamination of water and scarcity of water due to sand harvesting	289	81.1
13.	Removal of river sand reduces siltation of rivers which increase the rate flowing water.	261	73.3
14.	Widening and deepening of rivers affect river flow downstream.	280	78.7

From the above results, sand harvesting activities destroy the underground aquatic ecosystem 242(67%). According to Lawal (2011), Ambak and Zakaria (2010), stream sand mining results in the destruction of aquatic ecosystems and the scooping of sand from the ground destroys the vegetation cover and the soils, which serve as the habitat for wildlife. This situation destabilizes the ecosystem of living organisms thereby threatening their lives. In addition, sand mining operations also result in deforestation, habitat destruction and biodiversity erosion in ecosystems (Saviour, 2012).

Furthermore, the findings show that sand scooping reduces surface water quality and quantity 251(61%). According to a key informant the sand dams are destroyed during the dry seasons and this affects the water catchment ability and retention enhancing water shortage in the region as well as the water quality. Sand mining diminishes water clarity and quality due to high turbidity levels, reduction of dissolved oxygen and high temperatures in such water bodies (Reid, 2006; Kondolf, 1994).

The practice of sand harvesting leads to river bed degradation 311(87.4%) resulting from the deepening and widening of the river beds as more sand is scooped to meet the rising demand. Enhanced soil harvesting causes soil erosion, disturbance of groundwater and changes the river course as evidenced in following Plate 1.



Plate 1: Photo of Degraded River Bed in Mtembur, West Pokot County, Kenya

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According to Bagchi (2010), environmental land and surface degradation is a serious impact of sand harvesting on Indian rivers since it damages the river banks and general ecosystems due to access ramps to the riverbed. Likewise, the research findings reveal that sand harvesting increases erosional valleys 308(86.6%). This has negative effects on other livelihood activities and renders the land redundant as illustrated in Plate 2 below.



Plate 2: Photo of Erosional Valleys in Serewa, West Pokot Count, Kenya

Results also indicated that there is contamination of water and scarcity of water due to sand harvesting 289(81.1%). Pereira (2013) argues that certain magnitudes of the sand extraction may result also in the lowering of the water table and subsequently water security issues. The findings further indicate that removal of river sand reduces siltation of rivers which increase the rate of flowing water 261(73.3%) and thus, erosions as can be seen in Plate 3 below.



Plate 3. Ground with High Water Run-Off Potential at Serewo

The study results also show that sand harvesting results into the widening and deepening of rivers. This affects the flow of the river downstream 280(78.7%), destroys the river bank, the river course and the vegetation around it, thus enhancing the soil erosion and flooding possibilities being hazardous to the communities around.

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Plate 4. Widened River Banks in West Pokot County, Kenya

Extraction of sand is more likely to have ramifications around the environments of their occurrence. Extraction of sand from rivers, streams, flood plains, and channels conflict with the functionality of riverine ecosystems and some of the disturbances are from the mining methods and machines used (Kori and Mthanda).

The findings further indicated that land for farming has reduced due to sand harvesting activities 145(40.7%). The farming in West Pokot is mainly done along the river beds due to fact that the area is semi-arid. Increased sand harvesting activities create competition for the same land by reducing the arable land.

Likewise, 214(60%) of the respondents agreed that storage of sand causes destruction of vegetation cover. It was however, observed during the field study that it is not a common practice to store sand in specific places for long because many transporters collect the sand from the rivers directly especially in Mtembur and Serewo. The lorries move into the river bed as illustrated in Plate 5 below.



Plate 5. Loading of the sand in the Truck at Mtembur

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A focused group discussion (FGD) in Kanyarkwat revealed that sand is stored along the roadside away from the mining sites during the rainy season due to the bad state of the access road to the mining sites. The results agree with the findings of Aromolaran, (2012) and Hedge, (2011) who found out that the activities of sand mining lead to the destruction of vegetation, agricultural and non-agricultural lands.

Sand harvesting leads to destruction of the forest cover 206(48%). It was observed during the data collection period as shown in Plate 6 that forest cover has been destroyed. The mining sites are always changing and in the process of creating new mining sites and new access roads more vegetation is cleared, thus, affecting the forest cover.



Plate 6. Destruction of the Vegetation Cover by Sand Harvesting at Serewo

In addition, sand harvesting is associated with increased dust pollution (207(57%). The dust pollution is enhanced by the eroded forest cover, which would have acted as wind breakers.

Further evidence from the study showed that many pits are left uncovered and become dangerous to both people and livestock 318(89.4%). The focus group discussions indicated that sand harvesting pits divert the river course and renders the area risky for other livelihood activities due the fear of drowning and impassibility of the roads. The trucks ferrying the sand frequently get stuck during the rainy season and in the process of unstucking them more pits after left behind. One responded reiterated that: *...these lorries get stuck everyday the young men are paid to scoop the sand around the tyresmore holes are left everywherethe terrain and mining sites are continually damaged and the government is just looking* (FGD Kanyarkwat, 16th June, 2020). On the same note accumulation of water in open burrow pits creates an environment for mosquitoes breeding which spread malaria 306(86%). The results are consistent with Jonah *et al.*, (2015), Narh, (2016) and Baba n(2017) who observed that abandoned pits act as breeding grounds for water-induced diseases and death-traps.

CONCLUSION

Sand harvesting is accompanied by disastrous environmental effects, which raises questions on the cost-benefits and sustainability of the sand harvesting ventures. This also impacts negatively on livelihoods around the mining sites. The rate at which sand is harvested contributes to the depletion of the resource and the rapid spread of the environmental effects as the harvesters migrate from one site to the other in pursuit of more quantities of sand. Consequently, the paper recommends for measures to be put in place to surmount the hazardous environmental effects and enhance the multiplier effects of sand harvesting on livelihood security.

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