

# Economic Implications of Sand Harvesting in West Pokot County, Kenya

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## ABSTRACT

Sand harvesting is a worldwide activity in both developed and developing countries. The leading nations in sand harvesting are United States of America, Australia, Austria, Belgium, Brazil, India, Spain, Nigeria, Kenya and South Africa. In Kenya sand harvesting is practiced in counties proximate to major urban centers such as Machakos, West Pokot, Makeni, Kajiado and Kitui. Sand harvesting is a commercial activity that has continued to be practiced amidst the rapidly growing populations in urban areas and upcoming construction industry. This has largely contributed to an unprecedented demand for sand to meet the ever-rising needs of the building and construction industry. 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. This paper therefore seeks to unravel the economic implications of sand harvesting among inhabitants of West Pokot County, Kenya. Data was collected using a questionnaire, direct observations and in-depth interviews. A total of 368 participants took part in the study. Findings of the study indicated mixed results. The economic implications showed sand harvesting as a source of employment 325(91.3%), low product price 295(82.6%), creates market for other goods and services 264(74.1%), and the  $R^2$  value for the structural model was .404 implying that 40.4 % of the variance in livelihood security is explained by economic factors. Meaning that despite the abundance availability of sand and the enormous harvesting activities of the sand by residents of Pokot West County, these activities were yet to translated into meaningful economic returns to support livelihood and development in the study area.

## INTRODUCTION

Natural resources are the basis of human life and are manifested in various forms including sand, gold, diamond and oil (Hackney *et al.*, 2021). Natural resources can generate economic development if exploited sustainably. Sand harvesting entails a type of open cast extraction, which involves the actual removal of sand in their natural configuration from streams, creeks, beaches, rivers and lakes; it is also harvested from inland dunes from ocean beds (Filho *et al.*, 2021). Sand is used in the construction industry, water filtration, aeronautics, electronics, and for glass and tile making (Ahlbrandt & Thomas, 2021). A report from the UN (2020) estimated that between 32 and 50 billion tons of river sand and gravel are harvested annually worldwide, making the sand and gravel a key contributor to Gross Domestic Product (GDP) across the globe. Sand is an increasingly valuable resource and is essential for the continued growth of economies around the globe (Filho *et al.*, 2021). Many countries are extracting sand at unhealthy levels that exceed the replenishment rates (Musa, 2020). The global demand for sand stands at 40-50 billion tons per year and could increase to 60 billion tons by the year 2030: increase in human population, rapid urbanization, and infrastructural development has led to increase in demand for sand over the last three decades (UNEP,

2019). The huge demand for sand has resulted in increased sand mining, affecting human livelihoods, and with diverse economic effects. While underscoring the significance of sand harvesting as a vital activity in the development of the society. This paper is an output of a study that was conducted by the authors in the study area, whose purpose was to examine the socio-economic and environmental implications of sand harvesting on livelihood security in West Pokot County. A total of 368 households participated in the study through the use of a questionnaire, key informant interviews, focused group discussions and direct observation techniques of data collection. West Pokot County is one of the 14 Counties in the Rift Valley region of Kenya. It is situated in the North Rift along Kenya's Western boundary with Uganda border. It borders Turkana County to the North and North East, Trans Nzoia County to the South, Elgeyo Marakwet County and Baringo County to the South East and East respectively. The County lies within Longitudes 34° 47' and 35° 49' East and Latitude 1° and 2° North and covers an area of approximately 9,169.4 km<sup>2</sup>. West Pokot County, whose Headquarters is Kapenguria, is mainly inhabited by Pokot community and minority community of Sengwer. The County is known for its rich cultural heritage, agriculture and livestock. Agriculture and livestock sector is the backbone of the county's economy with more than 80% of the population engaging in farming and related activities. The county is characterized by a variety of topographic features. On the northern and north eastern parts are the dry plains, with an altitude of less than 900 m above sea level. On the southeastern part are Cherangani Hills with an altitude of 3,370 m above sea level. Landscapes associated with this range of altitude include spectacular escarpments of more than 700 m. The high-altitude areas have high agricultural potential while medium altitude areas lie between 1,500 m and 2,100 m above sea level and receive low rainfall in addition to being predominantly pastoral land. In West Pokot County, sand harvesting is carried out in most parts of the County, but mainly in West Pokot Sub County along river Kongelai. This also include rural areas like Atacha, Serewo, Konyanga, Mtembur and Chesra (County Government of West Pokot, 2018). According to the Kenya Legal Notice No. 67 of 2017 and section 6 (1) of the Mining Act, 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. The authors conceptualize economic impact of sand harvesting as the real and potential economic benefits of engaging in sand harvesting by residents of West Pokot County. They include but not limited to infrastructure development, creation of employment opportunities, increase in resource value like land, expansion of other service businesses, growth of centres, among others.

## METHODOLOGY

The study was conducted in West Pokot County, which is one of the 14 counties in the Rift Valley region. It is situated in the North Rift along Kenya's Western boundary with Uganda border. It borders Turkana County to the north and north east, Trans Nzoia County to the south, Elgeyo Marakwet County and Baringo County to the south east and east respectively. According to 2019 census, the total population of West Pokot County stood at 621,241. This population comprised of 307,013 males and 314,213 females. The County has a density of 56 people per square km and a total of 93,777 households. Sand harvesting is carried out in most parts of the county but is mainly in West Pokot sub County (Spatial Plan: 2018-2028). This study focused on three sand harvesting site, which include Serewo, Kanyarkwat and Mtembur. Mixed methods approach involving both quantitative and qualitative techniques was employed. The study adopted a descriptive survey design. The target population in the study comprised of all the 9995 households in the three sand harvesting areas of Serewo, Kanyarkwat, and Mtembur. The study participants included households' heads, government officials from NEMA, County Natural Resource Officer, County Revenue Officer, 3 land owner's – one from each region, 3 Chiefs, and 3 drivers one from each site and 3

chairpersons from the community groups in the study areas. The study employed Robert Krejcie and Daryle Morgan’s Table (1970) to determine the sample size. This is a Table of predetermined population and their corresponding recommended sample sizes. For this study, the corresponding sample size for the 9995 households were 368. The study employed the use of the following data collection techniques: a questionnaire, key informant interviews, focus group discussions, and direct observation.

## RESULTS

Economically, sand harvesting is a source of livelihood through the provision of incomes and employment opportunities. This section describes findings that relate to economic implications of sand harvesting activities in the following categories: Economic financial support, economic activities, economic infrastructure and economic investment.

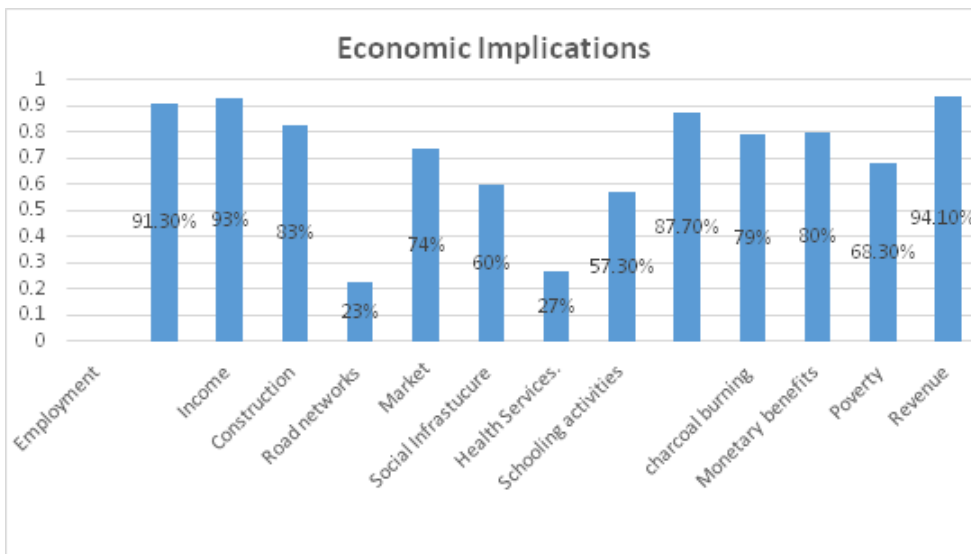


Figure 1: Economic Implications of Sand Harvesting

### Economic Financial Support in Sand Harvesting

The results indicated that as much as sand harvesting contributes a beneficial share to the general economy, the monetary benefits to the local economy is minimal 283(80%). A focused group discussion (FGD) confirmed that although the community is endowed with sand resources the monetary value from the sales is very low. This could be attributed to the low price of K.Sh 4000 paid per lorry of sand at the site yet the same fetches between K.Sh 30,000 to K.Sh 40,000 in Kitale, Eldoret town and beyond. Similarly, the results showed that high levels of poverty persist despite engagement in sand harvesting activities 243(68.3%). This clearly indicates that the community has not been able to break the cycle of poverty as much as they are endowed with the sand resource. One participant stated that: Those buying our sand are making huge profits in towns like Kitale and Eldoret... while us who are harvesting and loading the sand into lorries are going hungry. We cannot afford to eat two meals in a day, we cannot pay fees for our children, we have many problems (14<sup>th</sup> June, 2020).

### Economic Activities in Sand Harvesting

It was found that there is cheap sand for construction 295(82.6%) in the study. This implies that the community has the opportunity to use the available resources to construct their own houses, social amenities and rental houses. From observation, most of the harvested sand is not utilized for construction within the community and this can be attributed to high level of poverty (57.3%) and high prices of the other

construction material like stones/ bricks and iron sheets. Additionally, sand harvesting has created a market for other goods and services 264(74.1%). Other businesses have come up to provide services to the sand harvesters for example food kiosks, truck washing points and shops. According to *Anokye, et al, (2023)* sand and stone mining leads to increased sales of goods and services such as selling of water and foodstuffs. The results also reveal that sand harvesting is an alternative source of livelihood 312(87.7%). This implies that the income from sand has enabled some to engage in alternative sources of livelihood like animal and crop farming as indicated in earlier findings on economic activities. Based on research findings, sand harvesting engagement has led to reduced charcoal burning business 281(79%). Many residents who would otherwise be engaged entirely on charcoal burning have shifted to sand harvesting thus, minimizing the destruction of forests. Though from observation, charcoal selling is still an alternative source of livelihood for some of the residents.

### **Economic Infrastructure and Sand Harvesting**

The findings show that sand harvesting activities has not improved road networks 82(23%). It was observed in Serewo as shown in Plate 1 below that roads leading to the harvesting sites have been adversely affected by soil erosion.



**Plate 1: State of the road in Serewo**

The road to Mtembur sand harvesting site was not in good shape. Neither had the county government maintained it to the expected standards. See Plate 2 below.



**Plate 2: State of the road in Mtembur**

In addition, the road in Kanyarakwat was in a bad state as shown in plate 3 below.



**Plate 3: State of the Road in Kanyarkwat**

A key informant reiterated that there was poor road maintenance in the sand harvesting sites by the concerned authorities yet the County Government collects revenue from sand harvesters. The findings contradict with those of Lucia and Sala (2018) who opine that the presence of a mine in the territory can contribute to local development, when mining companies engage in providing and improving local infrastructures (e.g. road network, power and water supply), which in turn allow local populations to access health and education services. Furthermore, the study found out that sand harvesting is a source of funding to community projects like schools and dispensaries 199(60%). For example, from the focus group discussions in Mtembur, it was ascertained that the private fee collected by the community based organizations was used to fund community projects like construction of class rooms in Mtembur mixed day school.



**Plate 4: A classroom funded by Mtembur CBO**

The findings indicates that a small percentage of 96(27%) agreed that sand harvesting has led to access to better health services. From key informant interviews it was noted that not much has been done to improve

the health services infrastructure in the region. The income from sand harvesting has enabled some of residents to pay for better health services at an individual level. A discussant in a focus group discussion asserted that: *Money from the sand business is good...we have been able to improve the school by constructing classrooms...at least we can now access bursaries. Health services are still not adequate...the money from the sand harvesting should be well managed by the County government* (FGD Mtembur 14<sup>th</sup> June, 2020). Sand harvesting activities have enhanced schooling activities. An FGD at Kanyarkwat revealed that income from sand harvesting has enabled community members to buy uniforms, stationery and pay schools fees for their school going children. Ayenagbo *et al.*, (2011) argues that the income from sand harvesting is used to meet the basic needs of the family including food, paying tuition for children and even for entertainment.

### Sand Harvesting and Economic Investment

The results show that sand harvesting is a source of employment 325(91.3%). Sand harvesting provides many casual job opportunities to those who are involved like the sand loaders, harvesters and drivers and the many who are engaged indirectly to sand harvesting-related activities. The key informant interview revealed that many youths are engaged in sand harvesting in the study area due to free entry and exit in the mining activity. It only required ones physical ability and willingness to work. It was the main source of disposable cash.

### The Relationship between Economic Implications and Economic Livelihood Security Structural Model Economic Implication and Livelihood Security

The study sought to establish relationship between economic implications of sand harvesting on livelihood security. As shown in Figure 1. below, the R<sup>2</sup> value for the model was .404 implying that 40.4 % of the variance in livelihood security is explained by economic factors.

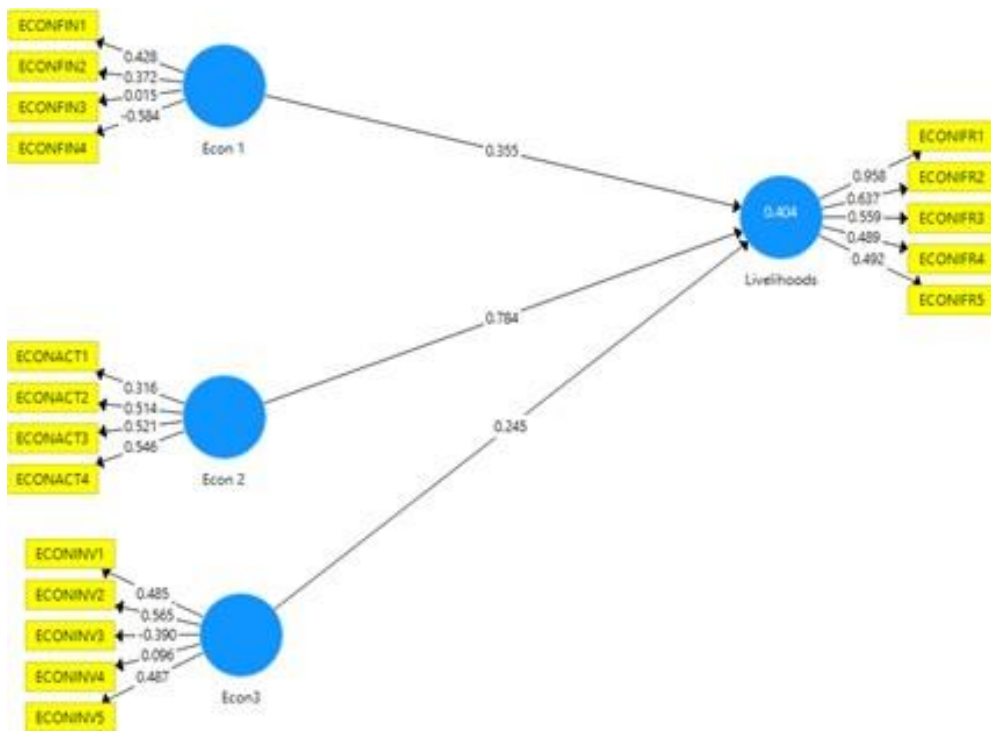


Figure 1. Structural Model of Economic Implication and Livelihood Security

Further analysis is summarized in Table 1 below.

**Table 1. Relationship between Economic Factors and Livelihood Security**

	<b>Original Sample (O)</b>	<b>Sample Mean (M)</b>	<b>Standard Deviation (STDEV)</b>	<b>T Statistics ( O/STDEV )</b>	<b>P Values</b>
<b>Econ 1 -&gt; Livelihood</b>	0.173	0.172	0.059	2.906	<b>0.004</b>
<b>Econ 2 -&gt; Livelihood</b>	0.249	0.255	0.056	4.420	<b>0.000</b>
<b>Econ 3 -&gt; Livelihood</b>	0.237	0.246	0.049	4.886	<b>0.000</b>

Findings in As it can be seen from the table, all the factors were statistically significant ( $p= 0.004, 0.000$ , respectively at  $p<0.05$ ). Econ1 included factors such as investment programs, Econ 2 included factors related to economic activities and Econ 3 dealt with factors related to economic infrastructure. It can therefore be observed that sand harvesting activity has a positive impact on investment programs, economic infrastructure and is a stimulant for economic activities in the study area. Ho2: There is no significant relationship between economic implications of sand harvesting on livelihood security.

## DISCUSSION

The findings in the current study agrees with Lucia *et al.*, (2019) who pointed out that increased poverty can occur, if the local population loses traditional means of livelihood, and when governments fail in reinvesting revenues from mining. The findings further indicated that sand harvesting is a source of revenue to the County Government 335(94.1%). For example, a key informant in Mtembur explained that the County collects Ksh 3000 Cess fee per lorry and there is an average minimum of 40 lorries per day per site translating to Ksh 120,000 per day from one harvesting site. This agrees by CCSI, SDSN, UNDP and WEF (2016) who opine that sand mining can contribute to sustainable development, particularly to its economic dimension. It can fetch fiscal revenues, drive economic growth, create jobs and contribute to infrastructure development. As to whether the income translate into substantive economic transformation or not, was another aspect of concern that the author observed. The findings concur with those of Lucia and Sala (2018) and Saviour (2012) who found out that sand harvesting has a positive impact on rural livelihoods since it is an activity that employs many due to the minimal barriers to entry, low technology, capital and limited specialized skill requirements. According to Ayenagbo *et al.*, (2011) through sand harvesting a large number of the youths are employed and other casual labourers who sell food stuffs to the harvesters. They further opined that sand harvesting contributes significantly to economic development through the creation of employment opportunities, creation of local supply of raw materials for industry, generation of export revenues and alleviation of poverty. The results also indicate that sand harvesting is a source of constant income to land owners, loaders, harvesters, transporters and those who are indirectly involved 331(93%). The FGD revealed that each truck has 4 harvesters who are paid Ksh 400, 8 loaders who are paid Ksh 1600, the land owners are paid Ksh 1000, the community are paid Ksh 1000 and the County Government Cess collection is Ksh 3000 this indicates that sand harvesting enables those who are involved to earn income. The harvesters and loaders have a clearly stipulated way of dividing money amongst themselves. Rais *et al.*, (2019) indicates that the direct economic impact of sand mining is more constant income. In addition, Ingram *et al.*, (2011) found out that artisanal and small scale mining generates income because minerals provide higher income than other traditional activities within rural mining communities in the Sangha Tri National landscape in central Africa.

## CONCLUSIONS

Economically, sand harvesting is a source of livelihood through the provision of incomes, employment opportunities and revenue for the county government. On the contrary, most of the harvested sand is not utilized for construction within the community. Sand harvesting often gives stimulus to the local economy, increases population income and business opportunities. However, income inequality, an unfair distribution of the benefits coming from resource extractions and corruption due to the bad management of sand wealth, are obstacles to sustainable economic benefits.

Based on the findings and conclusions derived so far, the following are the recommendations;

1. The County government should prioritize supporting sand harvesters to form and strengthen community based organizations and mining cooperatives to enhance their collective power for bargaining for better prices, competitive mining and access to remunerative external markets.
2. The County Government to develop a legal framework and effect regulations that enforce sustainable sand harvesting activities.
3. The County Government should invest in the support infrastructure to reduce the cost of doing sand business.
4. There is need for community sensitization on the economic costs and benefits of sand harvesting in order for them to make informed choices.

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