

Selling Water to Buy Hydrologic Drought in the Rangelands: A Conspiracy between Covid-19 and Education

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ABSTRACT

In March 2020, the Kenyan government indefinitely closed teaching and learning institutions in response to the Covid-19 pandemic, disrupting nearly 17 million learners countrywide, and resulting in limited learning. In the country's arid and semi-arid lands (ASALs), the closure offered a fair share of the deleterious consequences as it not only affected the learners and teachers but also brought forth numerous economic and social crises, including water environmental challenges, increase in teenage pregnancies, and amplified financial costs at households. The nucleus of this study was therefore to explore the influence of the pandemic restrictions and the consequent suspension of face-to-face primary schools' operations. A case study of Kajiado County was taken, with the specific objectives being to establish the drivers of the pupils' engagement in sand harvesting, and examining the likely contribution to the local hydrology. Structured questionnaires were used to obtain data, targeting teachers, pupils, parents and sand loaders. Descriptive statistical analysis was applied to the collected data. The study found that boys immersed in sand harvesting essentially to earn an income, levitating the quantities of water trucked out of the seasonal rivers. As a result, it is recommended that education stakeholders have an integrated intervention to evaluate the pastoral education system to establish and actualize measures that can allow pupils appropriately access learning in case of crises, and lowering their involvement in social and economic activities that exploit their energies and moral beings.

Keywords: Pandemic; Pastoralist; Hydrology; Stakeholders; Sand harvesting.

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Introduction

Adolescents represent a critical part of any country's future because of their latent transformative potential to ensure achievement of aspirations and goals. The demography has an intergenerational impact because, whilst they are still needing to learn from parents and the

society, they are also on the brink of adulthood and trying to exert their independence. The population cadre therefore epitomizes a precious human capital that hankers to be prioritized, and environments created to allow them to flourish at home and in the community, to explore their gifts, to grow in potential and to experience the fullness of life envisioned in the Sustainable

Development Goals (SDGs). Education is universally recognized as a fundamental human right whose protection is enshrined in several pieces of legislation and statutes geared towards enhancing children participation, retention and completion. However, the number of pupils enrolled and retained in schools in many instances is normally at variance with the number of pupils who attend classes on a daily basis. The International Labour Organizations attribute the prevalence of poor involvement in education to child labour arising out of tendency for children to drop out of school and enter into full-time employment which interferes with their mental, physical, social and moral wellbeing (ILO, 2012). One in four children in the world's poorest countries are engaged in child labour, the highest number of 29% being experienced in sub-Saharan Africa (UNICEF, 2013).

In Kenya, about one in every five girls between 15 and 19 years is either pregnant or already a mother, showing the country to have the third-highest teen pregnancy rates, with teenage girls dropping out of school annually because of pregnancy (KDHS, 2014). School examination reports inform on girls failing to sit their final examinations while others write examinations in maternity wards. Notably, Kenya is a signatory to several national, regional, and global commitments that impact the welfare of children and young people. The commitments form a critical basis for laws, policies, national strategies, investment and development decisions. While the Kenyan government has significantly improved school enrollment, vast disparities remain between well to do areas and the marginalized rural regions. Wealthier households access well-resourced private institutions, leaving lower-income children in public schools plagued by underfunding and resource gaps.

The Kajiado County Maasai pastoralists milieu is changing rapidly. Some of the changes and associated challenges pose monumental difficulties to the local pastoralism, making its future precarious. Among the key drivers of change are environmental factors such as frequent and severe droughts, land use and tenure changes. Ongoing land privatization accelerates land fragmentation and conversion to non-pastoral uses thereby weakening the viability of pastoralism as an exclusive livelihood practice that is most viable in the region (Archambault, 2011). Additional key drivers of change are human population growth, political and economic marginalization, and land dispossession by

colonial and post-colonial governments. Although social change is a continuous process and difficult to measure for such complex social units as communities, the dynamism of the Maasai pastoral socio-economic and policy environments is accelerating change and pushing more pastoralists out of their traditional ways of life. This is being experienced in exacerbating poverty and vulnerability to biophysical and other shocks, fundamentally altering the lives and livelihoods of many of the pastoralists. The changes increasingly strain the pillars that have supported the Maasai pastoralism for epochs. Family-supplied labour for herding is declining as more youth get enrolled in schooling and therefore unavailable for long periods of their youth when they are most needed for herding (Spencer, 1998).

Land tenure changes in Kajiado County have contributed most to the social, economic and environmental changes in the Maasai pastoral setting. The post-colonial land tenure system was a carry-over from the colonial system rooted in western theories of land tenure which exalt individual title above other modes of ownership. In the post-independence period, uncontrolled land use and demand for land by an exponentially growing population have led to the loss of most of the dry season grazing lands to cultivation, fences and settlements and unviable land sub-divisions. Land privatization has led to dispersal of family members so that each one of them lives on their own land parcels as opposed to the traditional way where an extended family and other relatives congregated in one settlement.

With land tenure changes, climate change and weather vagaries and pressure from population upsurges, the inhabitants are continuously made to seek livelihood diversification opportunities as livestock alone is no longer taken as the sole livelihood strategy. The departure from traditional strategies that ensured a stable supply of labour for the different herds, and embracing modern ways of dealing with herding labour shortages herald new challenges and opportunities for the pastoral community.

The transformations taking place among the Maasai pastoralists reveals that most of the households to experience a rising demand for money that is often unmatched by the available cash income sources, primarily from livestock sales. The social and economic structures such as norms of reciprocity between friendship and kinship ties ensuring mutual support in times of difficulties that have traditionally supported less

endowed members of the Maasai community are also weakening. Subsequently, the trajectory of change is tending away from the time-tested traditional ways into manifold livelihood strategies. Diversification of livelihood options beyond livestock-keeping is now widespread. The choices range from petty trade, charcoal burning, wage employment, cultivation, building rental houses in shopping centres and leasing out land to other people for conservation and farming to various types of business. Other people are engaged in mining, land speculation or brokerage activities. The effects of the changes are amplified by increasing climatic variability and government land use policies that have historically favoured agriculture over pastoralism, coupled with rising demographic pressures on the land. However, the transition from tested ways to new untested ones is fraught with difficulties and uncertainties so that many families find it increasingly difficult to avoid or escape once they fall into the poverty trap. One of the escape routes is sand harvesting which has proved to offer easy cash for individual, households and community sustenance. In it, people of all ages make income either as loaders, transporters, brokers or sellers.

When Covid-19 struck Kenya in early months of 2020, nobody realised what seismic shifts it would trigger in the entire spectrum of the peoples' lives. The pronouncement of the first Covid-19 case in the country triggered strict containment measures which included curfews, lockdowns and cessation of local and international travel. A dark cloud drooped over the nation, with every sector of the economy reeling from sudden stoppage or slowdown of business activity. Unprecedented protocols were introduced to govern social interactions. All learning institutions were closed from March 2020 until January 2021. During the prolonged school closure, young people lost precious learning time as, they no longer had the safe school environment managed platform to socialize, learn and explore their identity. There were, however, no deliberate and all round access-sensitive actions directed at the likely consequences on the education of youngsters. As parents and guardians of school going children faced dwindling incomes in the resource constrained environment, adolescents experienced lessened economic support. A resultant effect was that many were exposed to emotional and physical problems, while others became vulnerable to personal and social risks such as teenage pregnancy. It is against this backdrop that this study was put forward to understand the 2020 Covid-19 pandemic related impacts, with specific attention to primary

school-going adolescents. The outputs targeted to inform, and catalyze discussion on measures that could be sustainably taken to minimize long term negative impacts on adolescents' lives in case of a crisis. A sample of 31 schools among the Maasai pastoralist community was taken to build an understanding of the factors that influenced adolescents' involvements in sand harvesting activities and the consequences of the practice in social, economic and environmental terms.

Research Methodology

Study Location

The Iloodokilani and Imbirikani/Eselenkei Wards of Kajiado County constitute part of the 25 county assembly electoral areas. The two areas were chosen because of their high prevalence of sand harvesting as a livelihood, and the desire to have a comparison between nomadic and sedentalised pastoralism settings. The study area is predominantly occupied by the Maasai pastoralists, whose primary source of livelihood is livestock keeping, and experiences rapid population growth laced with immigration of non-pastoralists, land privatization, land use and land cover changes. Poverty and hunger are high, and aggravated by climate change, frequent droughts and a low livelihood diversification. The Iloodokilani and Imbirikani/Eselenkei Wards face erratic and a bi-modal rainfall distribution, with the long one falling in the March–May period and the short in the October–December period. The rainfall seasonality and recurrent droughts force pastoralists to move their livestock periodically in search of water and pastures.

Kajiado County has one of highest teenage pregnancy rates in Kenya (KNBS, 2014). It is argued that the individual, social, cultural and economic factors shape the youth's sexual behavior and may help identify the drivers of the high rates of teenage pregnancy.

Although some of the factors that influence teenage pregnancy are well understood, less is known about others such as girls' decision-making processes in relation to sexual relationships with boys and men. Adolescents' access to sexual information, education and services are generally limited.

The study area provides sand for the Nairobi city's rapid construction boom has created an immense demand for river sand. The proximity-based demand has spurred significant socio-economic activities, and provides immediate cash flow for many residents, particularly

those struggling with agricultural losses. The high volume of sand extraction creates peripheral jobs in loading, transporting, and supplying local markets. However, the uncontrolled extraction accelerates soil erosion, lowers water tables, and degrades local vegetation.

Research Methodology

The study was undertaken on pupils sampled from 31 primary schools and, 11 sand harvesting sites located on the local seasonal rivers of Toroka, Mokuan, Kilonito and Eselenkei. 38 class teachers and an equal number of parents and 22 adult sand loaders were interviewed through use of a structured questionnaire that captured data on school going children relationship to sand harvesting activities and the resultant consequences in light of the occurrence of Covid-19 pandemic. Descriptive statistics were used to analyze the accrued data.

Results and Discussion

Drivers of Sand Harvesting

The study found that the booming construction industry particularly in Nairobi and its environs put unprecedented demand on sand, prompting exertion of pressure on its sand producing areas. School-going children often engage in sand harvesting due to economic inadequacies, as the informal trade provides a quick source of daily cash for basic needs. Primary school pupils embraced the sand trade as a source of earning quick money, owing to the fact that the activity does not require initial heavy investment to allow participation in scooping, gathering or loading onto the transporting vehicles. Sand harvesting also requires no specialized skills or financial capital to start, making it an accessible, informal source of instant cash for children.

With the onset of Covid-19, activities in sand harvesting became an important avenue for the school going pupils to use the lock down period to earn a living. Though online learning was offered in the period, 82% of the pupils attest that they never attended any of the virtual classes due to lack of interest (68%) and appropriate facilities (89%). The few pupils who accessed some form of remote learning complained of multiple challenges, which included mandatory household chores and distractions in the home environment limiting the quality of their learning. Overall, girls had less time for learning

compared to boys, and were also less likely to access resources for remote and online learning.

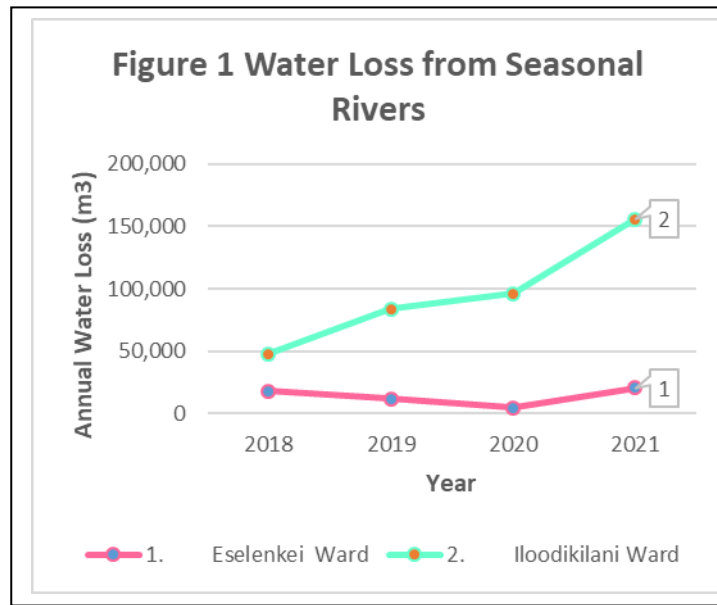
3% of all the boys in public primary schools got absorbed in regular sand harvesting. Before the Covid-19 period, sand harvesting activities only attracted the youths aged above 15. The lockdown however attracted younger boys. Some parents (13%) enlisted their children to provide for the family through sand harvesting, heightening the realization by children that sand harvesting is an easier way of earning their own money. Families living in poverty were indicated to often push their children to harvest sand to supplement household income and afford food.

Sand Harvesting and Water Loss

The sandy seasonal river system traversing most of the Iloodokilani and Imbirikani/Eselenkei Wards are an important source of water to the local communities and their economic mainstays. The rivers store a significant volume of water in their sandy channels, which are, however, under threat from a wide variety of factors, among them the uncontrolled sand harvesting, pollution from point and non-point sources, and the changing patterns of precipitation. For generations, the inhabitant pastoralists have survived by scooping water-holes in the sand-rivers, sometimes as the only water source.

The natural set up is complemented by sub-surface and construction of sand dams. Storing water in the sand helps to clean the water when it reaches the dams, and reduces the rate of evaporation, enabling the water to last longer than it would in an open area.

There is unanimity in the study responses that any volume of sand exported from streambeds causes a loss of water to the system. Any sand volume taken away has 35% accessible water. Dredging results in lowering the alluvial water table which, in turn, directly affects groundwater storage capacity, implying a rise in water costs, ultimately restricting access to only those who can afford it. The killing of micro-organisms affects the riparian habitat, flora and fauna. Severely degraded channels have been associated with lower land and aesthetic values. Sand harvesting activities also impact upon the river's water quality including increased short-term turbidity, sedimentation due to stockpiling and dumping of excess harvesting materials and organic particulate matter and oil spills. These, aggravated by effects of climate change, lead to loss of livelihoods.



The period between 2019 and 2020 saw an increase of 14% in the number of sand seeking trucks in the Iloodokilani Ward which was a 76% upturn of the 2018-2019 period (Figure 1). The first 63% in trucks receipt by the end of the year.

Taking an average of 14 ton trucks, it implies seven months of 2021 exhibited an average of 2,343 lorries per month, forecasting an upswing of that in 2020, about 242,000 tons of sand were collected from the seasonal rivers of the Iloodokilani Ward, the implication being that about 100,000m³ of water was lost, enough to provide a daily supply of 20 litres of water per person for a year in each of the electoral wards.

The Imbirikani/Eselenkei Ward situation demonstrates that the five sand collection camps received a total of 8,312 sand trucks between 2018 and August 2021 with the year 2020 experiencing the lowest flow in the four years' period, falling by 61% from the previous year. This means that the year 2020 Covid-19 restriction period lost less water (4,500 m³) compared to 11,600 m³ in 2019.

Supplementary Aftermaths

The advent of Covid-19 caused disruptions to the school calendar and the prolonged lockdowns led to severe economic and social vulnerabilities, with child labor and teenage pregnancies emerging as two of the most other devastating outcomes.

Teenage Pregnancy

With the backdrop of school closures, economic challenges occasioned by the Covid-19 pandemic, and idle time on their hands, numerous adolescent girls experienced teenage pregnancies and early marriages. When school learning was halted during the 2020 covid-19 period, 43 (5% of all the girls) primary school teenage girls in Imbirikani/Eselenkei area got pregnant while Iloodokilani had 163 (5.1%).

Most adolescent girls' sexual partners were boys of the same age group. The sedentalised pastoralists were found to be more willing to share on paternity aspects by associating friendships with the teenage pregnancies. A total of 57% of the teenage girl pregnancies in Iloodokilani Ward were associated with sand harvesting boys. In both areas, the teenage pregnancies were never planned but a result of among other things, the lack of adequate information about sexual and reproductive health and rights, inadequate access to services tailored to young people, media influence, community social pressure, limited capacity to negotiate for safe sex and consent and, lack of role models. Other factors contributing to the high incidences of teenage pregnancy were poverty at the household level and threats to livelihood, peer pressure, and certain cultural practices. In addition to the basic needs, girls were often reportedly wished to dress and style themselves fashionably, which increased during adolescence. One manifestation of this was transactional sex, where gifts or money were

exchanged for sex. 87% of the teenage girls who got pregnant expressed apprehension on the future of their education. 53% of the girls indicated that their needs were unmet in the Covid-19 period partly due to loss of income by parents and guardians, who could not maintain the lifestyles that the adolescents were used to. This partially explains the acceptance of gifts from boys as being to meet basic needs.

All respondents agree that the closure of schools due to Covid-19 occurrence afforded adolescents time to interact and form relationships with the opposite gender. Others had unrestricted access to indulge in activities they would not have had while at school. Up to 73% of parents and 69% of teacher respondents described adolescents as being idle and bored in the period the schools were not running and having the opportunity to do whatever they wanted, ultimately engaging in activities that were not the norm. 23% of the respondents mentioned that sexual activities for the adolescents were a form of leisure to break the monotony and boredom of life at home, finding access to phones to have enabled adolescents to communicate with the opposite gender to secretly meet for sex. 19% of interviewees thought that by spending a lot of time on social media and TV, adolescents were exposed to content that promotes and heightens interest in sexual involvement. 32% of parents agreed with this observation, adding that adolescents experienced peer influence physically or virtually through social media.

The adolescents often formed peer groups where relationships eventually led to pregnancies. 51% of the girls interviewed agreed with this school of reason and noted that the peer groups and friends pressured others to engage in sexual relationships in exchange for money or clothing and beauty products. 11% of parents blamed adolescents from the urban areas for creating negative influence and peer pressure on those living in rural areas, qualifying the observations by saying that since the urban adolescents were more exposed to sexual relationships, they influenced the same behavior among rural adolescent girls. 33% of the respondents described pregnant adolescent girls as feeling ashamed and uncomfortable around their peers. Inadequate access to family planning services, ignorance, and fear around contraceptives was cited by 31% of the interviewed girls as contributing to pregnancies during the schools' closure period with 8% of the teenage girls indicating encountering health workers who were unwilling to issue them with contraceptives because of their age. Some

14% adolescents expressed fear of contracting COVID-19 if they visited public health facilities for contraceptives, while 21% were shy because of their youthful age and feared rebuke from health workers.

Child labor

As household incomes plummeted, some of the children went into informal labor to support themselves or supplement family income. Majority of the children took on work in livestock while others went into tending sand harvesting. Both proved to be exploitative, and significantly hindered the children's ability to focus on their e-learning that was then available. The increasing demand for sand has heralded in illegal extraction activities that embrace child labor.

According to 65% of the respondents, the practice and the absence of appropriate management stands to destroy the already fragile ecosystems and have huge negative impacts on water availability, showing that the rules as laid down by the National Environmental Management Authority (NEMA) are not adhered to, including those touching on the involvement of adolescents in sand harvesting.

Communal land tenure arrangement testified to a smaller number of boys participating in sand harvesting business, with most assisting in household grazing. In both the communal and individual land tenure locations, no teenage girls participated in sand harvesting activities when the face-to-face learning was brought to a halt. In both Iloodokilani and Imbirikani/Eselenkei Wards, a total 146 out of the 4591 adolescent boys engaged in sand harvesting. While 85% were attracted into the trade purely by the expected monetary gains, 6% were driven by the same but with influence from friends and neighbours, 3% by idleness, 2% by the desire to adventure into new things and, 13% by household poverty levels.

The children earned about 30USD per day, which, was more than that received by their teachers. However, the increased availability of school going boys in sand loading in the Covid-19 restrictions period opened their exploitation by the sand buyers, with some of the truck drivers engaging the young boys as a way of avoiding the conventional sand loaders' associations in order to pay less than the normal fees. The sand was largely transported away for sale to construction entities with each trip fetching between 40,000 and 60,000 Shillings at

the destination, meaning that the children were heavily underpaid. The low payments situation was blamed on the unregulated, and informal sand collection. Responses indicate that the money earned by the adolescent boys was largely used to acquire items that the parents and guardians were not able or willing to easily provide. The income was found to be applied in buying cloths (68%), procuring food for families (38%), purchasing phones (96%) and obtaining own goats and sheep (19%). On resumption of schooling, a small fraction (6%) of the sand loading boys spent the money in paying for schooling requirements. 9% of the pupils indicated that in addition to catering for their personal items such as clothes and phones, they used it in procuring alcohol and *miraa* (khat). Since girlfriends could not participate in sand harvesting, the boy friends used their earnings to meet the girls' needs.

The re-opening of schools saw most adolescents returning to school. However, 38% boys in the Imbirikani/Eselenkei Ward involved in sand harvesting opted not to go back to school, instead clinging to the sand business. Iloodokilani Ward recorded 22 out of the 138 boys participating in sand harvesting failing to resume the January 2021 face-to-face learning. Up to 24 boys continued with sand loading activities in non-schooling hours such as in the morning before going to school, weekends and school holidays, in the efforts to earn income. 73% of the teachers opined that sand harvesting was considered by pupils as an easy way of making money, rating the practice as the top cause of boy's failure to turn up in school, to be attentive in class, and drop out from school. The boys were found to be also more likely to indulge in drugs and alcoholism as they interact with other older sand harvesters. The money economy thus exposed the children to many luring habits that negatively impacted their academic performance. The teachers explained that the sand harvesting work interferes with schooling as balancing the demands of work and education places physical and psycho-social strain on the adolescents, often leading to low school participation, poor academic performance and, eventually, dropping out.

Conclusion and Recommendations

The study concludes that benefits accrued from sand harvesting by adolescents can negatively impact on the age category wellbeing, education and contribute to environmental destruction. The heightened attraction to

sand harvesting by the adolescent boys because of financial gains contribute to increased sand harvesting, with the resultant effect of water loss in the seasonal rivers. The financial gains directed to luring girls into sex result in unprotected sex and teenage motherhoods that ultimately lead to missing out on formal education. In the light of the findings, the study recommends an integrated and multi-sectoral approach interventions to alleviate the adolescents' social and economic challenges to ensure sustainability in their education. Stakeholders need to ensure provision of an ecosystem that the adolescent can thrive in and avoid teenage pregnancies, and instead concentrate on education. This is can be achieved through awareness creation to enrich them with value chain on the disadvantages of transactional sex, early pregnancies, and consequences of not achieving formal education goals. Age-appropriate sexuality education must deliberately cover topics such as sexual consent, safe sex negotiation, healthy relationships, sexual and gender-based violence and reporting during the pandemic and beyond. Catching them early on environmental conservation will prepare them for eventual conservation of the environment to the advantage of water provision.

Conflict of Interest

The author declare no competing interests.

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