


How do commodity chains stabilize? Governing Kenya's sand trade

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ARTICLE INFO

Keywords:

Commodity chains
Sand extraction
Kenya
Resource governance

ABSTRACT

The organization of sand extraction and trade in Kenya significantly impacts the nation's economic development and the livelihoods of tens of thousands of Kenyans. This article aims to contribute to the emerging discussion on how sand commodity chains are negotiated and governed in contexts with absent or ineffective regulation. The sand trade is characterized by a range of informal yet effective rules and institutions, although these rules may be subject to the influence of economic and political dynamics elsewhere.

Based on field research at trade routes along three prominent sand extraction sites—Kajiado, Kilifi, and Kedong—we identify the key actors, map the main value streams, and examine the rules and norms underpinning the Kenyan sand economy. Drawing on the scholarship on resource governance, this paper identifies pivotal mechanisms that regulate access to benefits in sand extraction and transportation. Social status, such as that of elders or brokers, sophisticated bottom-up labor organization, and access to wealth provide important impetus for making the sand trade in Kenya a contested yet surprisingly predictable venture. The resilience of the trade hinges on this structured informality, where every actor plays a part in sustaining a market that remains simultaneously regulated and unruly

1. Introduction

During the last two decades, sand extraction in Kenya has provoked significant societal tension. Following violent clashes between 2009 and 2017, which saw the tragic death of several people, contestations implied in the removing, transport and processing of this mundane resource have attracted nation-wide publicity (Beiser, 2017; Daghar, 2022). While efforts to regulate sandmining in Kenya are underway, large-scale sand harvesting continues, subjecting rivers, lakes and pits to excessive removal of sediment by local communities as well as organized groups (UNEP, 2019; Bachmann et al., 2024).

There is now a burgeoning literature within geography and anthropology that has pointed to the societal, economic and environmental significance of what is considered a “development mineral” in Africa and beyond (Torres et al., 2017; Bendixen et al., 2019; Franks, 2020; Dawson, 2021; Marschke and Rousseau, 2022; Suykens et al., 2023). However, less attention is paid to value creation and profit distribution within the wider sand trade (see for valuable exceptions Da and Le Billon, 2022 and Suykens et al., 2025). This is surprising given the enormous volumes of sand that are moved on a daily basis in

Sub-Saharan Africa, which benefit tens of thousands of loaders, drivers and traders and their communities.

What makes the sand trade in Kenya particularly intriguing is that it is a sphere where one of the most regulated and most profitable industries in the country, namely the cement and construction industry, meets one of the least regulated ones. We can only speculate if the latter may be necessary for the former to flourish. Scholarship in political geography and anthropology has pointed out that the smooth operations of logistical value chains in late capitalism often hinge on ill-regulated or criminal extraction practices (Cowen, 2014; Tsing, 2015; Messadra and Neilson, 2017; Schouten et al., 2019). Under a veneer of formality and accountability in global supply chains, the origins of critical resources often remain illegible, and the conditions of their extraction vanish from sight.

The extraction of sand adds an interesting variable to this argument: governments in fast urbanizing countries are likely to have little appetite for intervening too much in the sand trade. As their legitimacy is dependent on delivering public services such as housing and transportation infrastructure, all requiring enormous volumes of concrete, authorities have an interest in keeping sand a low-price resource. The

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<https://doi.org/10.1016/j.exis.2025.101806>

Received 7 May 2025; Received in revised form 17 October 2025; Accepted 18 October 2025

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latter may be best assured by turning a blind eye to the often-conflict-ridden ways in which conditions and prices at sand mining sites and during transit are hammered out (Beiser, 2015).¹ Such concerted negligence notwithstanding, sand mining contexts are anything but a free-for-all and are characterized by an array of informal yet quite effective rules and institutions though those rules may remain at the whim of economic and political dynamics elsewhere (Bachmann et al., 2024). In this paper we demonstrate that while differentials exist in how revenue and profits are generated along the chain from extraction, transport to markets, and are a source of uncertainty and tension between interest groups, the informal governance practices stabilize the different value chains and, in so doing, create a certain level of predictability and economic certainty for (some) actors engaged in the sand trade.

It is in relation to the above tangles that this paper derives its primary research aims: first, the article provides an extensive mapping of the sand value chains in three of the largest sand harvesting areas that provide large quantities of sand to the country's prime urban centres. Second, the paper seeks to understand what norms and rules underpin the governance of these value chains. Based on extensive field research in Kedong Valley, Kajiado and Kilifi, the paper reveals important variation in the localized governance of the sand trade and seeks to understand the mechanisms that make the sand trade in Kenya a contested yet durable venture.

The article's main contributions are both empirical and conceptual. To our knowledge this is the first study that comparatively maps major sand commodity chains and their governance in Kenya. Conceptually, the paper heeds one of the main concerns expressed in political ecology as well as resource geography as it aims at exploring how expressions of access to natural resources and the regulation of their extraction are embedded in societal relations and wider political economies (Peluso, 1992; Peluso and Watts, 2001). Of particular importance, in this regard, is an awareness for the ways in which costs and benefits of resource extraction are distributed between the main actors.

The paper proceeds as follows: In the next section, we revisit discussions within political ecology, anthropology and resource geography on the governance of resource extraction and introduce the theoretical perspective that underpins the paper. Building on Ribot's seminal work on the charcoal commodity chain in Senegal (1998), we explore how rules and norms evolve in the dynamics between actors, discourses and institutions that render the Kenyan sand economy a contested yet stable endeavour. Following that, we briefly situate sand harvesting and trade in Kenya and discuss issues of economic, social and legal contestation. At the heart of the article is the mapping of the value streams, distributional as well as regulatory practices along the commodity chains in three major areas of sand harvesting and transport. The article concludes with a comparative discussion of the findings.

2. How do commodity chains stabilize?

There is a vibrant discussion within anthropology, human geography, and political economy on the ways in which natural resource extraction practices are governed (Werthmann and Grätz, 2012; Mitchell, 2011; Gilberthorpe and Rajak, 2017; Shapiro and McNeish, 2021; D'Angelo and Pijpers, 2022). Across global extraction and mining contexts a multiplicity of formal and informal orders exists. We follow Olivier de Sardan's definition of governance as "any organized method of delivering public or collective services and goods according to specific logics and norms, and to specific forms of authority" (Olivier de Sardan, 2011, 22). In contrast to understandings of governance that take formal institutions and written rules as precedence in establishing binding authority, we consider governance as constantly evolving in a dynamic

interaction between different actors, institutions and knowledge claims. Particularly in contexts of decentralized small-scale mining, the predominant way sand is extracted in many parts of the global South, governance takes the form of sedimentary arrangements negotiated by an array of actors that may include state authorities, organized local labour, traditional authorities, communities, and private companies. Those arrangements are often fragile and contested in nature, but once the main stakeholders accept the undergirding logics and norms, they tend to solidify. As a result, these informal rules govern conditions of harvesting and trading in a way not necessarily visible to outsiders but predictable for key stakeholders (Olivier de Sardan, 2011).

Surprisingly little is known about how value is generated within the sand economies in sub-Saharan Africa. For a long time, this resource has been considered abundant given its wide availability in different ecosystems and its natural replenishment in river systems. However, accelerating urbanization, the expansion of large infrastructure projects, both consumers of enormous quantities of sand, the ensuing environmental damage as well as widespread reports about cartels and violent conflict in sand extraction have cast a glaring spotlight on the relatively recent commodification of sand (Da and Le Billon, 2022).

In this paper, we avail ourselves of the interdisciplinary literature on critical commodity chain analysis. One strand of the French *filière* (sector) research, which gained momentum in development studies in the 1980s, builds on pragmatist theory, arguing that actors need to find a common idiom for the market to function. Such language can be built on trust or on common norms in order to avoid contestations in the process of dealing with uncertainty (Boltanski and Thevenot, 2006). Drawing on this tradition, we are intrigued by the question of how commodity chains come into being, through which informal regulatory mechanisms they gain acceptance, and who the dominant actors at the various nodes along these chains are (for an overview see Raikes et al., 2000 and Lee, 2010). In addition, recent studies on global commodity chains have critiqued unequal integration and distribution of gains between the global South and the global North. These dynamics tend to coincide with a concentration of gains with a few centralized actors. While this has engendered a lively scholarship within economic geography and political ecology, the focus has often been on high value resources that are circulating internationally. Value chain analyses of more mundane resources such as timber, bricks, charcoal or sand are sparse but reveal different and novel dynamics (Gellert, 2003; Agyei et al., 2020; Shitima & Suykens 2022; Branch et al., 2023). For example, due to the bulk character of sand and the weight-value ratio unfavourable to long-distance trade, sand commodity chains are usually local or national. They are commonly arranged in a decentralized way connecting many players. Nevertheless, the governance arrangements, while by and large predictable, remain subject to contestations where well-networked entries to the field seek to redefine the terms and conditions.

In this context, Jesse Ribot's classical work (1998²) has provided critical impetus to the debate. We share Ribot's commitment to both the descriptive and normative concerns of a commodity chain analysis that "illuminates both the location of benefits to be devolved and the tools that could be used to devolve them to local populations" (Ribot, 1998, 309). Ribot argues that markets serve as political arenas where a diversity of stakeholders interact and where access as well as regulations are negotiated reflecting norms, values, interests, capacities and differentials in wider society (Ribot, 1998, 308). The key term here is access, defined as the "ability to derive benefits from things" (Ribot and Peluso, 2003, 153, see also Myers and Hansen, 2020 as well as Peluso and Ribot, 2020). Ribot and Peluso broadly differentiate *rights-based* and *structural*

¹ This argument was made during the National Stakeholder meeting on sand extraction, Nairobi, 14th November 2024.

² The seminal article by Peluso & Ribot (2003) engendered a vivid discussion on property, (bundles of) power and rights in the politics of natural resources (see Myers & Hansen, 2020 for an overview). In this article, we entertain a closer conversation with Ribot, 1998 as he centres his conceptual discussion on a commodity chain analysis, the subject of our analysis.

and relational mechanism of access (2003, 161–172). In so doing, they complement attention on legal/formal procedures of regulating access (permits, titles, licenses, theft) with structural (capital, technology) as well as ad hoc and informal mechanisms. While both sets of mechanism exhibit relevance for the sand commodity chain, we will put our emphasis on examining informal mechanisms including status, social relations, material parameters (capital) as well as the use/threat of coercion, as these are key for comprehending the variability of value chains across empirical settings (Ribot, 1998, 310). Methodologically, we proceed along the steps outlined in Ribot's work: identify relevant actors, explore revenue and profits at different locations along the chain, map how such profits are distributed within and between groups, and, most importantly, identify the "mechanisms by which access to benefits is maintained and controlled" (Ribot, 1998, 313). Following these steps lends itself to addressing the paper's puzzle of volatility and stability in the governance of sand value chains in Kenya.

3. The Kenyan sand economy and its regulation

Reliable quantitative data on the sand industry and its beneficiaries in the country is sparse. However, recent studies show that the sand industry provides income and employment to tens of thousands of Kenyans in both urban and rural areas as thousands of households depend heavily on sand harvesting for their livelihoods (Bachmann et al., 2024; Mbaka and Rona, 2022). Beyond direct jobs, the trade supports ancillary businesses such as transport services and food vending. At the national scale, sand also remains indispensable for Kenya's building sector as it underpins both housing and infrastructure development sectors in a fast-urbanizing country. Indeed, over the last few years, sand harvesting sites have been mushrooming along the country's numerous river systems serving the construction boom sparked by urbanization and grandiose infrastructure programmes.³ Against this background, Kenya has been singled out by international organizations as a country of unsustainable sand harvesting, troubled by insufficient regulation, environmental degradation and violent conflict (UNEP, 2019).⁴

The mining of 'construction minerals' in Kenya has until recently been only loosely regulated by National Sand Harvesting Guidelines issued by the National Environment Management Agency (NEMA, 2007) whose political leverage and capacity to enforce the guidelines were limited. This situation may improve following the introduction of the Environmental Management and Coordination (Sand Harvesting) Regulations in late 2024, which mandate NEMA to work with county governments and other agencies for implementation (Government of Kenya 2024). Even prior to these developments several counties were starting to formulate sand harvesting legislation though most have had negligible success, likely contributed by the conflict of interest between regulation and revenue through taxing sand transporters (Bachmann et al., 2024). Nevertheless, the different sand commodity chains are by no means ungoverned spaces but are brimming with informal rules, norms and regulated practices reflecting peculiarities in the different mining contexts.

³ The last decade the country witnessed the completion of a series of large infrastructure projects including the Nairobi bypass network as well as the Expressway, the Standard Gauge Railway, the Mombasa Dongo Kunda bypass as well as enormous rehabilitation and expansion of rural roads across the country's 47 counties.

⁴ In terms of sand conflicts these are not high profile; in the past 10 years only 4 incidents have been reported in the Armed Conflict Location Event Data (ACLED) database: a violent protest in 2020 in Kedong ranch (to be described), a conflict between groups selling sand in 2020 in Nairobi, the well-publicised killing of a police officer fighting illegal mining in 2017 and a deadly clash between sand groups in 2015 both in Makeni County.

⁵ Map developed with assistance from John Kanyingi, British Institute in Eastern Africa

Departing from other work in Kenya, which focuses on local economic, social and environmental impacts (e.g. Mbaka and Rono, 2022) and conflict trends (Daghar, 2022), this article maps the commodity chains of three of the largest sand harvesting areas in Kenya, namely Magarini (Kilifi County) north of Mombasa, Kajiado south of Nairobi and Kedong Valley northwest of Nairobi serving the major urban settlements in the country. The analysis identifies the main stakeholders, revenue streams and, most importantly, the evolution of rules and norms that ensure a predictable operation of the sand commodity chains in the country.

4. Methodology

Data for this study was collected as part of the international research project on the *Politics of Sand in East Africa*, which has a focus on Kenya and Uganda. In Kenya, the project was conducted collaboratively by researchers from the University of Gothenburg (Sweden), Maseno University (Kenya), and United States International University (Kenya). While the broader project covered sites in seven counties, namely, Kilifi, Kwale, Taita Taveta, Kajiado, Makeni, Narok/Nakuru, and Homa Bay, this article zooms in on Kenya's three largest sand harvesting areas in terms of volumes of sand extracted, namely Kedong Valley, Kilifi County and Kajiado County (see Fig. 1 below).

A combined sampling strategy was used on select respondents. Random sampling provided representativeness among readily accessible actors, while purposive sampling ensured the inclusion of key categories. Methods consisted of semi-structured interviews, focus group discussions as well as participant observation with loaders, drivers, retailers, landowners, county and national government officials including the National Environmental Management Authority, local leaders, civil society staff and savings and credit cooperative organization (SACCO) representatives. Participants were selected purposively to ensure depth and diversity of perspectives. Fieldwork was carried out in phases, with four major rounds conducted in April to June as well as October to November 2023, April to June 2024 as well as September to November 2024. This phased approach enabled the researchers to capture seasonal variations in sand harvesting and evolving governance arrangements. In total, 103 interviews were conducted – 35 in Kilifi, 28 in Kajiado, 40 in Kedong – of which 60 directly served the mapping of the value chains.

As a disclaimer, we explore value addition, informal regulation mechanisms in their social setting at each individual nodal point from extraction to transport to urban sand market. This choice determines that the extracted resource and the 'finished product' in our analysis are the same. It is also important to note that while the construction and cement industries are the primary consumers of sand, they were not the central focus of this study. Our analytical lens concentrated on the dynamics of harvesting from extraction sites to markets as we sought to examine the actors, costs, and governance arrangements along this segment of the value chain.

5. Mapping Kenyan sand commodity chains

5.1. Kilifi

5.1.1. Introduction

The sand harvesting industry in Kilifi County is mainly based in Magarini Division, concentrated in three main areas: Mjanaheri, Kibokoni, and Moi. While sand harvesting in Mjanaheri and Kibokoni occurs mainly on private land, the community in Moi, the newest site of extraction, lacks formal land rights. Historically, sand harvesting in Kilifi began in the 1960s as a small-scale activity to meet local needs, but it expanded significantly in the 1990s due to increased demand from Mombasa and other areas. This led to the establishment of local cooperative societies, such as the Kilifi Multipurpose Cooperative Society and later the Magarini Sand Cooperative, to regulate the trade and ensure community benefits. The industry resisted mechanization during the

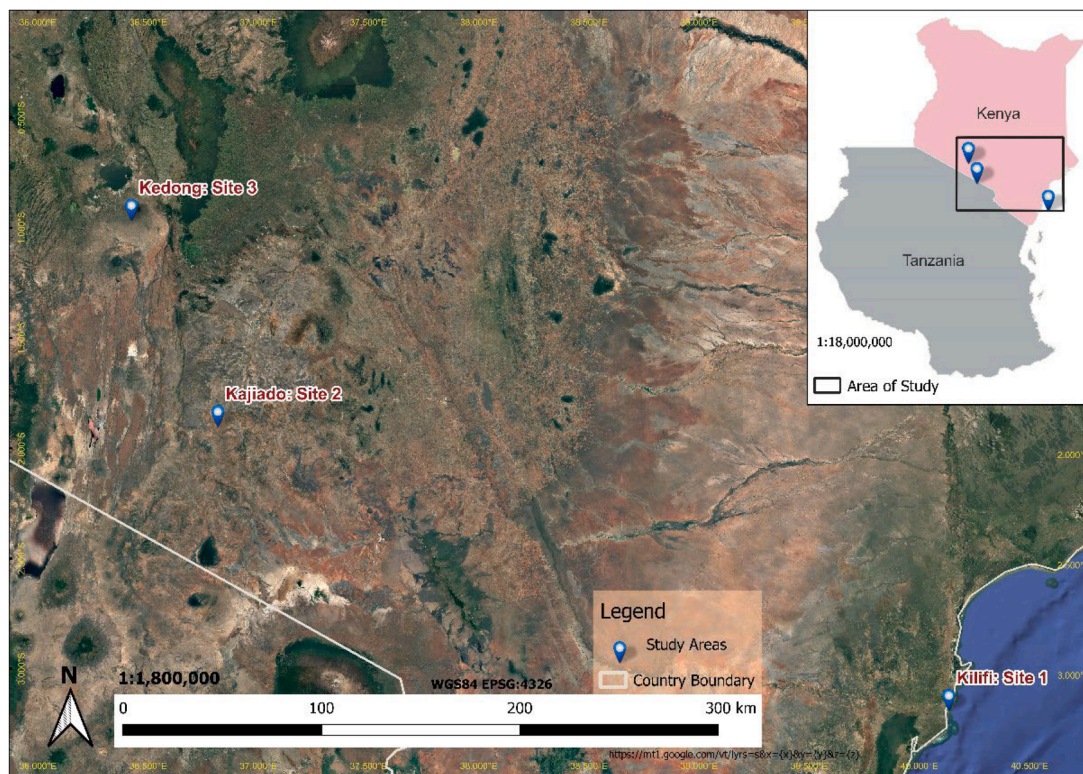


Fig. 1. Research locations⁵.

1990s, following attempts by influential Mombasa-based tycoons to introduce excavators at the sand sites in order to cut costs and improve efficiency.

5.1.2. Main actors

Actors include loaders, landowners, brokers, transporters, sand vendors, and the county government. Landowners offer river and pit sites for loaders to harvest from and determine prices for sand.⁶ Loaders fall into two categories, that is, heaping and packing loaders. Heaping loaders are employed by landowners and prepare sand piles at the quarry.⁷ They often work 24-hour shifts and under poor conditions, earning less. In contrast, packing loaders load sand onto trucks, earn more as they are paid per truck, and work more flexibly as they operate only when their assigned trucks are available.⁸ This disparity creates a clear hierarchy, with many heaping loaders aspiring to become packing loaders.

Brokers connect different actors and sometimes handle administrative tasks like paying cess⁹ fees on behalf of transporters.¹⁰ Many brokers operate in multiple roles such as loaders or landowners. This fluidity of roles adds complexity and creates suspicion around brokers, as their actions are seen as secretive, driven by self-interest,¹¹ and prone to price manipulation and information withholding.

Transporters facilitate the movement of sand from extraction sites to markets. Some large transport companies dominate the Mombasa

market,¹² while smaller operators typically serve local areas in Kilifi. Transporters are well-organized, with a standardized pricing system that helps mitigate competition-driven price wars seen among landowners.¹³ Their role in influencing sand pricing and market flow gives them substantial leverage in the trade.

Vendors buy sand from transporters or brokers and sell to end users. They fall into two main categories, wholesalers, who deal in bulk and profit through volume, and retailers, who sell smaller quantities to contractors and households. Wholesalers typically enjoy more stability, while retailers operate on short sales cycles and tighter cash flows. To maintain supply chains, wholesalers and even transporters often extend credit to retailers, though this exposes them to financial risk when payments default. In the recent years, competition has intensified with the rise of part-time traders, especially transporters selling sand below market rates on return trips.¹⁴ This undercuts full-time vendors and erodes pricing stability. Brokers add another layer of complexity by controlling market access and influencing prices as they often bypass smaller vendors. Vendors have attempted to standardize pricing based on sand quality and bargaining power but these efforts are increasingly undermined by informal competition and price undercutting.

5.1.3. Revenue streams

There are three main value chains: towards the expanding suburb of Mtwapa, to Mombasa as well as to the cement factories in and around Mombasa. The latter two are dominated by large transporters whose financial leverage allows them to influence prices and marginalize smaller actors into the first value chain, which is marked by intense competition, credit dependency and income volatility.

At the extraction sites, the primary revenue flows to loaders and

⁶ Interview, landowners in Mjanaheri in October 2023
⁷ Interview, loaders in Mjanaheri in October 2023.
⁸ Interview, loaders in Mjanaheri in October 2023.
⁹ Cess is a form of tax charged by county governments on goods that are moved across the county.
¹⁰ Interviews, brokers in Mjanaheri in October 2023
¹¹ Interviews, landowners and the former chair of the Magarini Sand Cooperative in October 2023.

¹² Interviews, drivers in Mjanaheri, Moi and Kibokoni in May and October 2023.
¹³ Ibid.
¹⁴ Interviews, vendors in Mzambarauni market, Mtwapa in June 2024.

landowners, who are typically paid by brokers or transporters for their services and goods. At this level, one of the most interesting contradictions is that loading costs are usually higher than the cost of sand itself. This is because loaders are well organized and have set fixed prices for their services while landowners are not organized and compete against each other by lowering costs of sand to attract more clients. For example, loading a 10-wheeler truck can cost around 3000 KES, while the price of sand is often much lower, sometimes just 2000 KES or below. Similarly, for a 24-wheeler truck, loaders receive around 6000 KES, while landowners are paid about 4000 KES¹⁵ (see Table 1 below).

Transporters also pay cess fee to the county government for each trip at 120 KES per tonne.¹⁶ Additionally, for sand quarries located in remote areas, where trucks must pass through private farms, brokers and sand site owners often pay access fees to farm owners, usually monthly.¹⁷

Once sand reaches markets such as Mtwapa or Mombasa, the price of sand rises significantly, even five-fold. These significant price escalations appear to benefit transporters, yet transporters often argue that their profit margins are squeezed by high operational costs such as fuel, maintenance of vehicles due to poor infrastructure, cess and bribes of around 800 KES at police roadblocks.

At the sand markets, like at the extraction sites, brokers facilitate sales, but are also accused of exploiting vendors.¹⁸ In addition, transporters who treat sand trading as a side hustle, sell sand at below-market rates, thus driving market volatility, and making it difficult for full-time

Table 1

Revenue streams in the sand trade across case study sites for a 10-wheeler truck, the most common truck at these sites with an average load of 12–15 tonnes (all figures in KES).²⁷

	Kilifi sites	Kajiado sites	Narok/Nakuru (Kedong site)
Fee to landowners	2000	3500	1500
Loading fee	3000	8000	6000
	(500 per loader; 6 loaders per truck)	(1000 per loader, 8 loaders per truck)	(1000 per loader, 6 loaders per truck)
Fee to elders	–	–	1000-1500
Total cost at source	5000	11,500	8500
County cess	1700	1000	2200
		(estimated from monthly charge)	
Bribes	800	2000	600
(Varies with number of police stops on journey, average given)			
Fuel	9000	10,000	10,000
(Varies with distance travelled, average given)			
Driver fee	3500	1000	1000
(Average given) ²⁷			
Total costs in transit	15,000	14,000	13,800
Market price	25,000-27,000	35,000-55,000	18,000-35,000
(Varies with distance from source, and affluence of destination)			

²⁷ Note that the amount is an average driver's daily wage. However, drivers employed under formal market arrangements can earn between 33,000 – 55,000 KES per month.

¹⁵ Interview, truck driver in Mjanaheri on 10th October 2023.

¹⁶ Interview, revenue officer, Kilifi County Government on 9th October 2023 and several transporters.

¹⁷ Interview, broker in Mjanaheri on 7th October 2023.

¹⁸ Interview, vendors in Mzambarauni in June 2024.

vendors to compete.

5.1.4. Informal and formal governance

Like most counties, Kilifi lacks a county-level sand harvesting legislation. The Kilifi County Government serves primarily as revenue collector, and perhaps unsurprisingly, its regulatory efforts are negligible. Furthermore, the county government has been criticized for not reinvesting cess revenues into infrastructure or supporting services for the industry.¹⁹ Consequent overextraction has led community members to call for formal regulations to protect their interests and streamline the industry.

Local customary structures, namely elders and community leaders have played an important role in governing access and control. This took the form of savings and credit cooperative organisations (SACCOS) during the 1990s responding to the need to set prices and enforce norms in an otherwise unregulated burgeoning market. However, maintaining control increasingly required coercive tactics. SACCOS faced resistance from influential transporters and buyers, some of whom used local administrators to intimidate SACCO officials.²⁰ In response, SACCO leaders resorted to blocking roads and forcibly unloading non-compliant trucks.²¹ However, this regulatory capacity proved fragile. Internal disputes over pricing and profit distribution, alongside growing competition from external brokers and transporters, steadily eroded SACCO influence.²²

Due to their formal land rights, landowners hold significant control over sand extraction. However, since the demise of their own SACCOS²³ they lack control over pricing and are now vulnerable to external price manipulation by brokers and transporters.²⁴ When SACCOS were operational, they were able to maintain higher prices at the extraction sites.

Moreover, social identity and family ties weigh heavily when it comes to shaping access to economic opportunities among actors. At Mjanaheri, loaders enjoy hereditary loading rights to specific trucks.²⁵ However, there is leeway for ‘outsiders’ to become packing loaders by buying those positions for prices that can go as high as KES 200,000. Therefore, it is not labour or merit but lineage, status and capital that shape who benefits from sand extraction. In contrast, in Moi and Kibokoni, where such rights are absent, local community associations manage disputes and channel revenues into community welfare, thus showing how grassroots institutions can effectively govern in contexts where formal mechanisms are weak or absent.

A notable dimension of the Kilifi case is the near-total absence of women in the sand economy. Across extraction, transport, brokerage, and retail, the sector is dominated by men. The few women present were confined to peripheral roles, such as selling food at sand loading sites. This gendered exclusion is consistent with broader patterns in extractive economies, where women are often relegated to informal and reproductive activities rather than direct participation in production or trade (Bryceson and Geenen, 2016). Similar patterns have been noted across extractive economies globally (Lahiri-Dutt, 2012).

5.2. Kajiado county

5.2.1. Introduction

Sand mining is a vital economic activity in Kajiado County and deeply integrated into regional infrastructure projects especially in

¹⁹ Interviews, loaders, landowners and brokers in Mjanaheri, Moi and Kibokoni in May and October 2023.

²⁰ Interview, founders of the Magarini Sand Cooperative in October 2023 in Mjanaheri.

²¹ Ibid.

²² Ibid.

²³ Ibid.

²⁴ Interview, former chair of the Magarini Sand Cooperative on 10/10/2023

²⁵ Interview, loaders in Mjanaheri in May 2023.

Nairobi. Key sites, such as Kasarani, Mile Sita, and Kelewa, have had sustained sand extraction for decades, with Kasarani being the largest, hosting over 26 specific sand harvesting points. These points are adjacent to private lands, since Kajiado land, once Maasai community-owned, has been subdivided and titled to individuals. The industry in Kajiado has experienced significant degradation due to overextraction, critically affecting the once limitless supply of water stored in riverbed sand, available to local communities for domestic use and farming.²⁶

5.2.2. Main actors

Actors include landowners, loaders, heapers, sand watchers, and others such as local repair suppliers and food vendors. The landowners are typically families or individuals who live adjacent to riverbeds where sand naturally accumulates. They have no ownership rights on riparian land but assert informal control, which makes their position rather precarious. Their dependence on the trade is best captured by a landowner who noted, “*This is my kids’ school fees, my food, and everything. I have been doing it since the 1990s.*”²⁸

Loaders and heapers, typically men between the ages of 17 and 69, are responsible for manually preparing and loading sand onto trucks, usually large 10 or 12-wheel trucks. Most of them are directly tied to loader SACCOs, while a very few may work in fluid teams, offering labour to the highest bidder and dividing the fee between them. At informal “magendo” sites—illegal, temporary off-loading locations to hide sand from authorities and truck owners—sand watchers, often members of families residing near these points, ensure security of operation for a fee. These local actors, despite their indispensability, have limited bargaining power and perhaps remain the most vulnerable in the sand economy. In the intermediate space, some brokers mediate transactions between landowners and transport companies at the extraction site and others engage with transporters and urban-based vendors leveraging their networks to secure contracts with large-scale consumers.

Further along the supply chain is the most resource-endowed segment of the sand economy, namely processing companies. Unlike their upstream counterparts, they dictate terms of engagement and are less vulnerable to policy shifts. Companies such as Kenya Builders Ltd and Keda Ceramics rely on Kajiado’s sand for manufacturing cement, glass, and ceramics. Notably, during the periods when sand processing companies collect sand, costs of loading are greatly reduced. However, an emerging trend shows that these companies are gradually shifting towards sand substitutes such as crushed rock dust. While this move enhances environmental sustainability, it disrupts income streams for those who depend on continued extraction for their livelihoods.

5.2.3. Revenue streams

Revenue dynamics from Kajiado’s sand value chain are complicated by the layered brokering and informal cost of sand policing, higher monthly charges by the county government and complex market dynamics. Table 1 summarizes the main expenses along the sand value chain for a 10-wheel truck. A unique aspect of Kajiado’s revenue streams is that benefits earned from the sale of sand go to the river site owners.²⁹ SACCOs both for loaders and transport companies then recoup indirectly through member subscription, and police wait for bribes along the way.

At the extraction site, local brokers operate as intermediaries between site owners³⁰ and transporters (or drivers and even contractors

buying directly from river sites). Typically, they earn between 2000 and 4000 KES per trip. In contrast, town-based brokers largely connect contractors with transporters. The broker not only identifies the market for the sand but also collects payment from the buying contractor and pays the transporter. The fees town-based brokers collect are considerably higher, up to 14,000 KES depending on distance and negotiation. Interestingly, with the entry of women brokers at the town level, a lower fee, namely between 1000–3000 KES, is acceptable. This has forced their male counterparts to exit or diversify their brokerage trades including through brokering for other building items such as rocks, iron materials, timber among others.³¹

Loaders receive 1000 KES each per truck, suggesting a relatively consistent payment pattern but one that remains informally governed.³² Meanwhile, site owners’ fees vary based on location and socio-economic empowerment; those near tarmac roads ask 6000 KES per truck or trailer while those farther away receive 3500 KES only as they are blocked by brokers from reaching out directly to drivers or truck owners to negotiate prices.³³ Drivers may be temporary or permanent, the latter tending to earn a little more. Additionally, the owners of pathways granting access to sand sites charge 300–500 KES per truck, creating a layered payment structure that addresses even micro-access levels within the site itself.

During transport, informal costs emerge prominently, particularly in the form of bribes. Police bribes cost drivers 2000 to 3000 KES per trip and trucks reaching the Nairobi estates incur the highest bribes, while weighbridge officials fine 6000–10,000 KES for overloading, illustrating governance gaps and the informal costs that impact long-distance transport. While more formalized interactions also exist, for example through annual payments to the Kenyan National Highway Authority for marginal overweight, drivers face additional reloading and offloading fees, which are informally negotiated and often contested. Finally, instead of paying cess fees for every journey, Kajiado County operates a system of formalized monthly fees, with six-wheeler truck owners paying 25,000 KES and twelve-wheeler owners paying 50,000 KES.

The market level is stratified according to the destination and nature of the market with customers paying around 33,000 KES in local markets and³⁴ up to 64,000 KES in gated markets further afield. The mobile markets situated at high-traffic intersections, such as Kitengela, fetch premium prices between 35,000 and 55,000 KES per truck.

5.2.4. Informal and formal governance

As in other Kenyan counties, a range of informal practices in the sand chain in Kajiado is embedded in formal regulatory structures and engender a complex setup of hybrid governance. While the government has a formalized cess fee payment system at designated collection points, truck drivers and brokers frequently resort to informal negotiations—often involving bribery—to evade or minimize these fees. These adaptations allow actors to reconcile the contradictions between state-imposed regulations and the on-the-ground realities of resource extraction. Likewise, in the transport segment the Kenya National Highways Authority enforces weight restrictions to safeguard infrastructure, truck drivers routinely overload vehicles and negotiate their way through official controls by paying bribes. Moreover, police actors extract bribes from overloaded trucks, effectively functioning as unofficial enforcers of a system that allows the trade to persist despite legal restrictions.

SACCOs, function as semi-formal regulatory bodies; loader SACCOs

²⁶ Focus group discussion, loaders, Kerio 1, 18th October 2023.

²⁷ For a more detailed breakdown across sites and truck types see Bachmann et al. 2024.

²⁸ Interview, sand site owner 12th June 2024.

²⁹ Usually, two families on the adjacent to the river section sand is being harvested from.

³⁰ Especially those lower in the social strata. Those with some sense of economic empowerment sell directly, and try to disrupt brokers.

³¹ Interviews, sand brokers on 20th and 21st of 2024 at Kitengela.

³² The standard loading rate in Kajiado is 8,000 KES per trailer with eight people needed for loading.

³³ Ibid.

³⁴ Pail and wheelbarrow resellers in Kajiado Town, however, deal in much smaller transactions, with pales with buyers paying 200 KES and wheelbarrow buyers paying 200–300 KES.

organize workers into manageable groups, reducing conflicts over loading schedules and wages.³⁵ Transporter SACCOs, meanwhile, negotiate with authorities to manage weight limit penalties and facilitate smoother operations at weighbridges.

Social relations play a pivotal role in the distribution stage. Families living adjacent to riverbeds negotiate fees with brokers and transporters outside the constraints of formal licensing, illustrating that local practices and social norms have come to define access to and control over the resource. Town-based brokers, who leverage personal relationships and local social ties, bypass formal bidding processes to secure contracts with large construction firms. Moreover, mobile sand markets—temporary setups where trucks sell directly to consumers at strategic locations—operate outside of conventional regulatory oversight. These market structures provide flexibility, ensuring that supply meets demand even when formal market mechanisms might falter. In this way, the informal regulation of distribution not only complements but also stabilizes the commodity chain by fostering continuous market interactions. Another feature of the informal governance in Kajiado is the emergence of cartel-like structures. Certain brokers, through exclusive agreements with landowners at high-quality extraction sites, have managed to monopolize key segments of the value chain. Their power is maintained by coercion, intimidation, and the control of social networks, which limit competition and dictate market conditions.

5.3. Narok/Nakuru (Kedong site)

5.3.1. Introduction

Kedong is a 30,000-hectare site at the foot of Mt Longonot around 50 km northwest of Nairobi where black volcanic sand is harvested. It is one of the largest sand harvesting sites in the country and at the same time, the site of several large-scale developments such as the standard gauge railway (SGR), the inland container depot and an industrial park. The surrounding land, once Maasai ancestral rangelands, is now privately owned by Maasai landowners, though many Maasai continue subsistence pastoralist livelihoods. Kedong Ranch is a former colonial settlers' ranch which never reverted to the Maasai is currently owned by a group which includes some of Kenya's political elites. 35,000 people (400 large families) of the Kitet Maasai community continue to occupy Kedong using it for herding and sand harvesting. However, attempts to evict them intensified following the construction of the SGR and associated developments (Mkutu et al., 2024).

5.3.2. Main actors

Harvesting and loading of trucks is carried out by local youths organized into sand harvesting groups, and access is controlled by the Maasai elders to whom a small fee is paid by every truck collecting sand. The sand harvesting groups in Kedong, consisting of 50–400 members mainly of Maasai ethnicity, are highly organized into loading rosters and arrange loyalty deals with trucks or transport companies. Families and all community members in the area rely heavily upon the sand industry, with women earning from sales of cooked food to the loaders and even needy people being provided for through funds overseen by the elders. As noted, “in the Suswa area, every house is touched by the sand.”³⁶

Trucks taking sand from Kedong may be owned by individuals with one or two trucks or companies both small and large. Around 400 trucks access the site in the course of a day, and some come at night. The transporters generally also act as vendors who sell to private individuals, hardware stores or contractors carrying out construction. Some may have their own yards, and some are themselves contractors or construction companies. However, large construction companies, particularly the Chinese state-owned enterprise China Road and Bridge

Corporation in the area (contracted to build the China funded-SGR amongst others), also subcontract transport companies to bring them sand from Kedong (Huang and Lesutis, 2023). Therefore, a variety of arrangements exist (see Fig. 2). Trucks deliver sand mainly within the vicinity of Mahi Mahiu and Nairobi in previously agricultural, now rapidly urbanising satellite towns such as Limuru (53 km), Kiambu (76 km) and Ruiru (93 km), with a few going in different directions to sites in Bomet (143 km) and Kinangop (96 km). Depending on the distance to the site of delivery trucks make more than one trip a day. Brokers may be involved in these processes at every point.

Kedong Ranch owners are the rather hidden actors in the Kedong story. As noted, around 2019, the ranch began fencing and restricting community access. The community mounted protests against Kedong ranch owners and achieved the current compromise. The ranch also purchased its own excavator which, however, was destroyed by the local sand harvesting groups.³⁷ They also rioted violently against the SGR about jobs, including tenders for transporting sand, resulting in a change of policy to employ more locals in the project (Mkutu et al., 2024).

5.3.3. Revenue streams

It is estimated that the scope of turnover at Kedong Ranch may be perhaps 2 million KES (15,000 USD) on a single day (Bachmann et al., 2024). The most important on-site expenses the drivers pay are the gate fee to the ranch (1500 KES), the fee for the Maasai community elders (1000–1500 KES) as well as the fees paid to local loaders, totalling between 3000 and 6000 KES (for a breakdown of costs and revenues for a 10-wheel truck see Table 1). Those expenses are obligatory since companies are restricted from bringing their own loaders. Once on the road, there are additional expenses such as cess fees payable to the three counties of Nakuru, Kiambu and Nairobi (800 – 2200 KES depending on the size of the truck). Police also stop all trucks and are routinely given a 100 KES bribe, typically amounting to 600 KES or more during a journey.³⁸ Fuel is the largest expense and is similar to the cost of the sand itself. Drivers and unloaders are other beneficiaries. Sand from Kedong is then sold at around 20,000 KES for a 6-wheel truck (majority) to 35,000 KES for a 10-wheel truck. Net profits per trip vary from 5–10,000 KES. Some of these costs are standardised because of widespread membership in cooperatives.

A particular challenge for transporters is the weighbridge, located close to the Kedong gate on the highway to Mahi Mahiu. Transporters lament that they are severely penalized for even slight overloading, being charged 10,000 KES or more, which encourages bribery. As in other counties, drivers sometimes overload trucks and take to informal sites to make an extra 3000 KES.³⁹ After loading, the sand value chain is quite decentralised, which gives an opportunity for many actors to benefit, including brokers. One of the interviewees built up his business from being a “shamba boy” (a garden labourer) earning 4000 KES a month, to becoming a broker, and later to running his own successful business as a transporter/vendor with four trucks.⁴⁰

5.3.4. Informal and formal governance

As noted, sand loaders in Kedong all belong to welfare groups, well organised, using a system of “numbers” which are inherited or bought and then allow equitable allocation of work. Each group has its own committees, constitutions, regulations, disciplinary procedures, bank account, shares and branding. Sand harvesting groups and transporter SACCOs are often large and powerful entities with political clout and the governance provided by these organizations provides for secure

³⁵ Interviews, downstream actors, including SACCOs leadership within Kajiado Town.

³⁶ Focus group discussion, sand harvesting groups. 21 July 2021.

³⁷ Interview, retired civil servant and a sand elder, Kedong Ranch, 14 July 2021; Interview with senior national government administrator, Suswa, 11 May 2023.

³⁸ Widely reported in interviews with truck drivers, August 2024

³⁹ Interview, driver, August 2024

⁴⁰ Interview with a Nairobi-based vendor, Nairobi, 30 May 2024

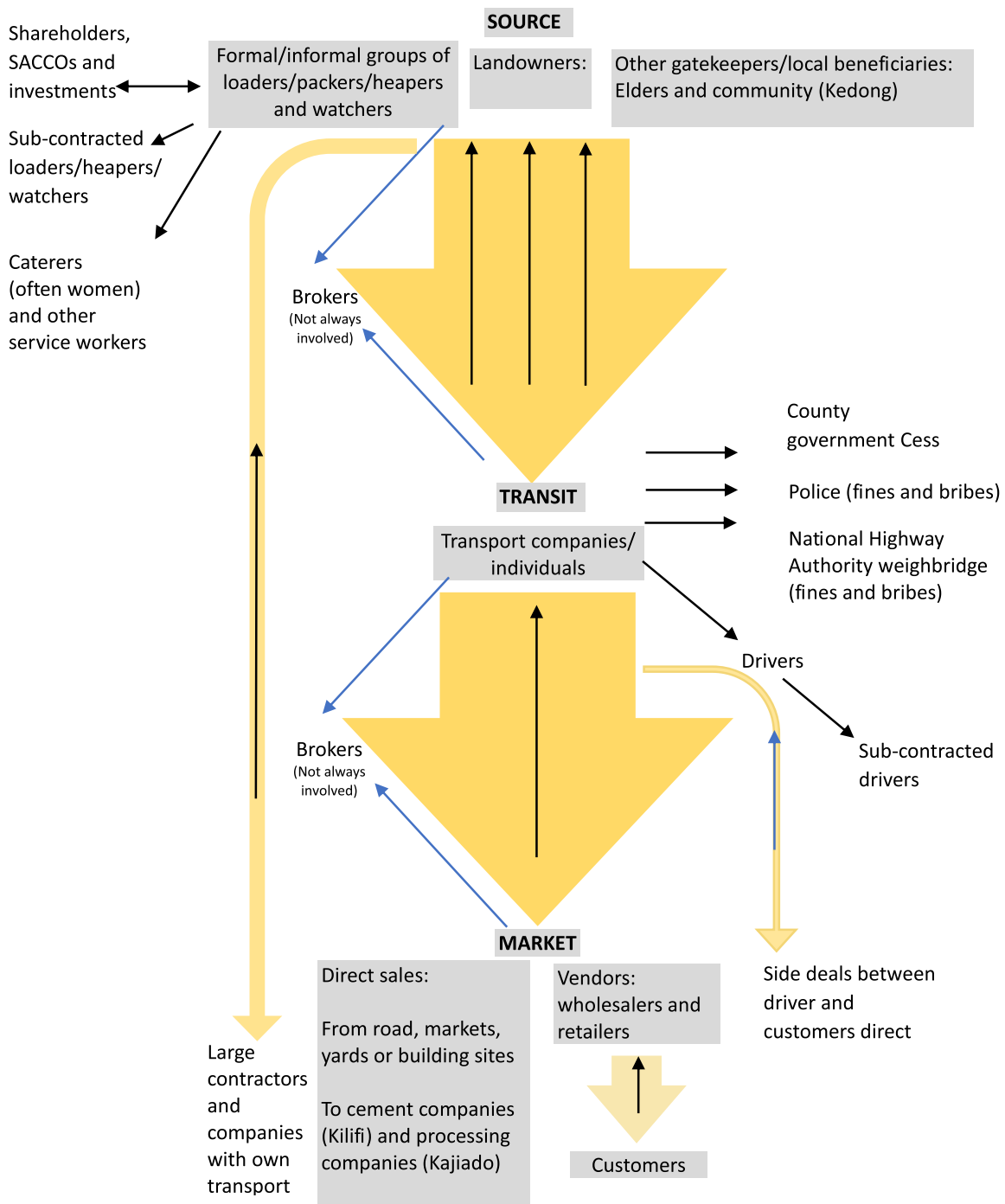


Fig. 2. Actors, sand movements and revenue flows in the Kenyan sand trade. Broad arrows indicate sand movements while thin arrows indicate revenue flows.

arrangements between loaders and transporters, standardises fees and, in so doing, protects members from exploitation. However brokers have often defrauded groups which has been difficult to regulate because of the informal nature of the arrangements.⁴¹ The elders at the Kedong site have an interesting role in regulating who can and cannot benefit from loading, only allowing loaders from the vicinity, but ensuring that a broader segment of the community is allowed to benefit. Interestingly many non-Maasai loaders in the Mahi Mahiu sand harvesting groups also have access to the sites because of a historical arrangement from

when the sand harvesting business began.⁴²

The Nakuru County government seems to have chosen a hands-off approach to the regulation of the sand trade, perhaps to keep large and politically powerful sand harvesting groups and even transporter SACCOs on the side of the governor. Lastly, the role of Kedong ranch itself is interesting. The ranch owners do not restrict harvesting, which may be because some of the owners are themselves involved in the sand transporting business (one interview revealed that a truck driver was working for one of the ranch owners).⁴³ Currently the ranch owners

⁴¹ FDG with Neema Youth Group, 21 December 2022.

⁴² Phone conversation with a sand harvester and researcher, November 2024

⁴³ Interview, name withheld, 7 August 2024

allow the Kitet Maasai elders to have control and to derive some fees, probably because of contested ownership and fears of conflict which has in the past been destructive and deadly (Mkutu et al., 2024).

6. Discussion

Fig. 2 synthesizes the actors and movement that characterize the sand value chains across the three major sand harvesting sites in Kenya.

The above mapping testifies to the importance of informal mechanisms in steering access to the chains' benefits but also reveals their ambiguous outcomes. With formal regulations not enforced, the predictability of the sand value chain in terms of providing economic opportunity for a wide segment of actors hinge on powerful social networks, status and wealth. The relevance of social status is particularly illustrated in the Kedong case, where elders continue to play an important role as custodians of community land and of informal authorities for law and order. This has helped them secure income and control over equitable access to the rivers—a setup that also benefits loaders, food vendors and needy people within the community. They do this both for collective benefit, fulfilling the social contract as community leaders, but also for personal gain, as evidenced when they try to bribe loaders to come their rivers. In Kilifi also, elders had an influential role in the formation of early SACCOS which were able to regulate levies and transport logistics but were unable to maintain their influence. Lineage and culture are related concepts which are evident in all three cases, particularly in parts of Kilifi and Kedong where the inheritance of loading rights is a distinct socio-economic practice.

Social status is often attached to the availability of capital, and wealth determines in whose favour the arrangements work. The actors in our cases operate within a highly specialized value chain that reflects both survival-driven participation and resource-based market dominance. For loaders, financial capital is often necessary to join SACCOS and loader groups. These groups build up wealth, and wealthier groups can strike lucrative deals with transporters, make their own investments and even buy their own trucks. Empowered landowners in Kilifi for example, namely those with access and control to alternative livelihoods beyond sand sales, control the market prices and charge way above their counterparts who are without such advantage. Another example are urban-based brokers who have more leverage on market control and influence prices of sand to contractors, earning them more profit and economic status. They are more educated, have alternatives, and operate very invisibly in the chain, yet earn more than their local/sand-site-based brokers counterparts. Compounding the vulnerabilities of the poor at the local level is the aspect of sand harvesting which receives the greatest publicity, namely the environmental impact. While not the topic of this research, it is worth considering the economics of the disruption of river courses and water sump properties of sand, floods and creation of ditches as they constitute extreme challenges to local lives and livelihoods (see Bachmann et al., 2024). Those experiencing them are involved in harvesting as one of few alternative opportunities and receive comparatively little compensation for their losses.

Economic means are an important way of extracting the most value from sand, for example by being able to store and sell later when demand is higher, or to afford a good location from which to sell. Similarly, for transporters and vendors, bigger transport and vending companies benefit from the economies of scale and have more capacity to absorb shocks. In Kilifi, they drive down prices at some sites, exploiting local loaders. Some buy land and undermine SACCOS to control the value chain. Thus, the capital-intensive nature of the trade acts as a significant barrier to entry for smaller players. Smaller players also have less resilience to shocks or being defrauded by brokers, face stresses of delays and limited cash flow, and may be forced into more risky strategies to survive.

The analysis suggests that the discussion on access within the commodity chain needs to acknowledge the principles of collectivism vs. individualism, which goes beyond simply social networking. Ostrom

notes that collectivism relies upon the institutionalization of rules and organisation, and wider recognition of these (Ostrom, 1990). It is a powerful way in which people maintain access to benefits for themselves and others. In Kedong the organisation of Maasai society and the historical situation of collective informal ownership of the land cannot be underestimated. Where the land is held collectively, albeit informally, collectivism in the sand harvesting business is working, while in Kajiado, also Maasai land, where land parcels are now private, the situation is much more haphazard with landowners undermining collective efforts of regulation. The well-circumscribed nature of the Kedong site and the mostly ethnic homogeneity, with local legitimacy of elders of the area seems to contribute to the strength of the informal governance.

Collectives such as SACCOS and loader groups may not necessarily provide equitable benefits as they formalize social hierarchies into economic structures. SACCOS in Kajiado regulate labour, while in Kilifi they traditionally managed broader aspects such as levies and transport logistics. These structures reinforce the power of high-status actors who already benefit the most from the trade. Higher-status groups also do better and cost more to join, as Kedong illustrates. These groups may even be able to achieve political strength, which is difficult for large players such as the county governments to challenge. The latter have little incentive to change the status quo because of significant gains from cess payments levied on sand. Hence, informal regulation is critical for allowing collective access to benefits of sand. However, while rule-obedience in SACCOS and loaders groups ensures benefit for many, in all cases, illegitimate activities remain important practices through which actors manage to individually benefit.

7. Conclusion

Effective collaboration between various layers of governance that would make the sand trade in Kenya equitable and sustainable, and potentially adhering to Ostrom's polycentric governance model (1990), is, a few exceptions notwithstanding, largely absent. One of the challenges about enforcing national sand governance has been a legal vacuum, together with a lack of capacity at the level of the local administration (Katisya-Njoroge, 2021).

All the cases illustrate that formal and informal governance mechanisms have evolved together and continue to do so. Legal frameworks, brimming with weaknesses in enforcement, set the stage upon which informal practices—bribery, negotiations, social networks, and cartel-like controls—take centre-stage. These informal mechanisms are critical for understanding the distribution of access and benefits within the sand economy, as they mediate the gap between statutory regulations and the everyday practices of resource extraction. Since devolution in Kenya in 2013, county governments have become key players in developing local legislation but are swayed by the significant revenue they receive from sand harvesting. The 2024 Sand Act is modelled on a piece of county legislation developed a decade ago in Makueni County in response to widespread conflict and corruption in the industry. Makueni's own Sand Conservation and Utilization Act in 2015 devolved the governance of sand to the local level. It is heralded as progressive when it comes to wide participation in the governance of sand.

Drawing on Ribot's (1998) insights on the coexistence of legal and extra-legal mechanisms, we have shown that the sand economy is stabilized not by the absence of conflict between formal and informal governance, but through their dynamic interplay. Understanding governance as an evolving interaction among diverse actors, institutions, and knowledge claims, we see that formal rules provide a skeletal framework, while informal practices animate the system and ensure its functionality. Ultimately, Kenya's sand economy is not merely a collection of independent transactions but an interconnected system where actors' roles are shaped by access to resources, social capital, and regulatory loopholes. The resilience of the trade hinges on this structured informality, where every actor—from the site-level loader to the urban broker—plays a part in sustaining a market that remains

simultaneously regulated and lawless. The nuanced interactions within this value chain underscore how governance in the sand economy is not dictated solely by policy but is continuously negotiated by those navigating its economic terrain.

CRediT authorship contribution statement

Jan Bachmann: Writing – review & editing, Writing – original draft, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Kennedy Mkutu:** Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Data curation, Conceptualization. **Odhiambo Alphonse Kasera:** Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Data curation. **Benard Musembi Kilaka:** Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Conceptualization.

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