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(Re-)moving earth, building Kenya – The politics of sand extraction in Kedong

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A B S T R A C T

This article delves into the critical domain of sand mining and trade in the context of rapid urbanization and massive infrastructure development in Kenya. It joins the growing body of work in geography and political ecology that interrogates the social and political intricacies that govern the removal and forwarding of this 'mundane' mineral. More specifically, this article seeks to reappraise the concept of extractivism a term often applied in the discussion of mining of more inherently valuable commodities, describing a form of accumulation based on the depletion of resources in the context of unequal relations.

The article focuses on Kedong Valley, a place of colossal sand removal operations, significant revenue generation, and enclave characteristics. It is an area where contestations around the environment, land ownership and use, livelihoods and political authority have long intersected and where sand mining ventures have raised the stakes for control over the land. However, uncharacteristic for extractivism, instead of a few dominant actors, the extractive agents in the Kenyan sand business are many, close and fragmented. The need for effective governance of sand extraction ties together different claims to regulatory authority expressed through norms, regulations, interests and coercion. The self-organization of loaders, for example, has built considerable leverage for collective claim-making, exposing the 'socially thick' relations of extraction practices. The paper demonstrates that the concept of extractivism realizes its analytical value when complementing its structural take with attending to how claims to political authority are made through extraction practices in concrete places.

1. Introduction

Exploring contestations around sand harvesting and circulation in contexts of rapid urbanization, until recently, has been situated at the fringes of discussions on natural resource extraction. Fortunately, there is a growing body of literature that has brought issues emerging around the rapid commodification of minerals understood as being 'low value' to the centre-stage. This article aims at contributing to this literature by addressing the question that has defined a whole subfield within political ecology and political geography, namely and in this case with regard to sand: what do dynamics of extraction and circulation of sand reveal about politics and, in reverse, how do situated political arrangements shape the political economy of sand? The puzzle of how extractives, the state and claims to authority are entangled has generated a number of seminal works (see for example Bridge & Le Billon, 2017; Malm, 2016; Mitchell, 2013) urging us to pay attention to the resource-specific material conditions as well as the actors-networks that "organize the flows and concentration" (Mitchell, 2013) of both resources and revenue and thus shape and entrench wider political conditions.

In many ways though, the mining and forwarding of sand seems to be at odds with the glossary of this debate that employs concepts such as conflict resource, enclaves, upscaling, transnational extractive industries and high-value mineral export. Sand, in contrast, is widely available in different ecosystems and regarded as naturally replenishing. Sand tends to have a high local use value in the area of mining as one of the base materials for housing and infrastructure. At the same time, unlike many of the minerals discussed within artisanal small-scale mining (ASM) literature, sand has a low value in long-distance trade due to its weight. In addition, the threshold to engage in sand extraction is rather low in terms of necessary skills, technology and capital. Sand harvesting, for many and for long, was plainly uncontroversial and organized in a more horizontal way. However, the intensification of sand extraction in the last decade or two and the violent contestations around it have since gained attention, particular in relation to Asia where organized gangs and armed mafias have sprung up around sand harvesting sites (Binoy, 2017; Lamb & Fung, 2022; Mahadevan, 2019; for a comprehensive review see Marschke & Rousseau 2022) Moreover, the degradation of sand-bearing ecosystems in the context of urbanization is by now acknowledged as one of the most pressing global sustainability challenges (UNEP, 2019, Bendixen et al., 2021, Torres et al., 2017).

The picture is indeed bleak: the commodification of sand produces

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adverse consequences that we see elsewhere in excessive extraction: depletion of ecosystems, destruction of local livelihoods, disasters waiting to happen, and revenue generation that benefits elites or actors elsewhere. The insatiable appetite of governments, the construction industry and real estate capital across the global South has generated excesses in sand removal across urbanizing contexts. Although estimating the volumes of sand harvested every year is all but guesswork—a recurrent figure is 40–50 billion tonnes (UNEP, 2019, 3)—they certainly dwarf the amounts of sediment carried downstream. As a result, changed courses and stream velocity of damaged rivers has brought about disruption of farming-based livelihoods and general water insecurity for downstream communities as well as a higher risk of erosion. Furthermore, illegal mining and forwarding of sand is orchestrated by fragile alliances of businesspeople, state officials, landowners and brokers who dispossess communities by burdening them with the externalities of rapid "modernization".

This paper joins the growing body of work in geography and political ecology that has problematized the adverse social and environmental effects of excessive and ill-regulated sand mining. Long at the margins of these debates, sand extraction has recently gained considerable attention (amongst others Da & Le Billon, 2022; John, 2021; Katz-Lavigne et al., 2022; Suykens et al., 2023; Dawson, 2021) We take our point of departure in the call made within the anthropology of extraction and within critical resource geography to study how 'resources' come into being conditioned by factors such as physical conditions, social values, infrastructures, calculations, capital, discourses and labour (Bridge, 2009; Kama, 2020; Richardson & Weszkalnys, 2014). More specifically, we will engage the discussion on extractivism as a form of accumulation premised on the depletion of resources in a context of unequal social relations between sites of extraction and political centres. While the literature on extractivism has expanded the concept's ambit in the last couple of years (Dunlap & Jakobsen, 2020; Mezzadra & Neilson, 2017; Pasternak et al., 2023), the concept has nevertheless evidenced its value for laying bare patterns of exploitation in the sand business (Bisht 2021). However, to retain its analytical utility, the concept needs to remain attentive to how layered claims to authority that set the parameters for extraction practices in concrete environments are managed, negotiated and 'determined'.

Working our way towards making the toolbox of critical resource geography productive for the study of sand extraction through thick description of the organization of sand mining at one of the largest sand mining areas in Kenya, the paper proceeds as follows: In the next section we situate sand in the wider literature on natural resources and extractivism. Following that, we discuss the scope, the (lack of) regulation and the contestations around sand harvesting in Kenya. Empirically, we zoom in on the political intricacies around sand mining in Kedong Valley. This extraction zone sticks out in regard to scale of sand removal, scope of revenue and a sophisticated informal governance system. The picture that emerges is one of a 'smooth' exploitation. At the same time our study reveals the leverage of community members as co-designers of extractive practices. While the paper has Kedong Valley as its empirical setting, it is part of a larger project on sand controversies in East Africa.[1]

2. The politics of sand extraction

2.1. Everywhere resource, rare attention

D'Angelo and Pijpers (2022) remind us that all things humans produce—and for the first time the mass of human-made objects now exceeds all living biomass—are predicated on removing stuff from earth. As a key ingredient of a modernity made of concrete, it is surprising that sand has been at the periphery of academic and public debates on minerals. There is a vivacious discourse on metals and energy minerals, the imbrication of fossil fuels and the formation of capitalism and the way in which high-value mineral extraction both entrenches rentier economies in the global South and serves the needs of consumers in the global North (Appel et al., 2015; Mitchell, 2013) That said, more than 80 % of globally extracted minerals are in fact construction and industrial minerals of which three quarters are made up of sand and gravel (Franks, 2020, 454).

It is worth rehearsing some figures that point to the scope of the global demand for sand, or its proxy cement as it were. Every human being uses an average of 18 kg sand every single day (UNEP, 2019). In three years in the early 2000s, China processed more cement than the US did in the entire 20th century (Smil, 2014, 91). The construction of one kilometer of paved road consumes 30,000 tonnes of aggregate (Bisht 2021). And finally, production of cement is currently responsible for 8% of global carbon dioxide emissions as the by-product of the burning of clay and limestones (Lehne & Preston, 2018). With regards to sustainability challenges, sand plays a major role in the energy transitions, in providing ecosystem services connected to freshwater provision as well as in serving essential infrastructure needs (UNEP, 2022).

Sand has a somewhat awkward place amongst minerals. Minerals considered precious, that is, minerals that have a high value to weight ratio and which usually constitute the object of desire in the globally expanding resource frontiers, are often found in confined areas, where access can easily be controlled by what Schubert et al. have called call "global corporate overlords" (Schubert et al., 2018, 14). In this regard, sand is different and exhibits a genuine 'social thickness' (Ferguson, 2006). In contrast to many 'precious' minerals, sand deposits are spread out widely and are to be found along the common pool resource systems of rivers and lakes (Ostrom 2001) where access is usually difficult to restrict. Artisanal miners easily venture into scooping sand which does not require advanced technology, expert knowledge or large capital. Further, as a component to concrete sand has a pivotal function in the provision of subsistence such as housing and infrastructure and, thus, has a high use value for many. Officially, however, construction and industrial minerals including sand and gravel are known as "low value minerals" due to the low price they generate on the market in relation to their weight (Franks, 2020). The bulky character of sand curbs profitability in long-distance trade. These factors also explain the historically limited commodification of sand. The terminology of 'development minerals' has been used to describe those minerals that are "mined,

[1] The empirical work in this paper is based on interviews and observations made in Kedong Valley in December 2022, March 2023 as well as May 2023. The research project, hosted by the University of Gothenburg and carried out in partnership with USIU Africa and Maseno University includes additional sites in both Kenya and Uganda. Additional pilot studies have been carried out (and will be) in Homa Bay (May 2022 and October 2023) Kwale (May 2022 and April-June 2023), Taita Taveta (November 2022 and May-June 2023), Makueni/Kajiado (November 2022 and October 2023), Kilifi (May 2023 and September 2023) as well as selected sites in Uganda (August and November 2023) by a research team consisting of the authors as well as Dr. Benard Musembi Kilaka, Dr. Michael Owiso, Wangui Mbuguiro, Nelson Omwoyo, Benson Nyambedha, Alphonce Kasera, and John Bwakali.

processed, manufactured and used domestically in industries such as construction, manufacturing, infrastructure and agriculture" (Franks, 2020, 455). While this term may be misleading as to the multiple imaginaries attached to development and the implied absence of conflict in the pursuit of development, it is a useful term for revealing differences with regard to commodification, destination and ownership of the industry between what are considered 'high-value' minerals on the one hand and 'development' or industrial minerals on the other (see Franks, 2020, 456). Mining of high-price-weight ratio minerals, oil as the prime example here (see Ferguson, 2005, 2006; Watts, 2021), tends to be capital-intensive, and the resources are usually destined for export while development minerals are usually labour-intensive and serve the local and domestic market. Additionally, in contrast to priced minerals, the taxation of scattered development minerals unfolds decentralized at different chokepoints in the value chain, and their extraction tends to generate income for unskilled labour and has the potential to create up- and downstream value—what Franks calls utilization linkage—in the local economy (Franks, 2020, 455). Sand as a development mineral feeds concrete production pivotal for grand infrastructure and housing schemes—with the potential to boost economic growth— but is also utilized mundanely to address subsistence in rural contexts around sand mining sites. As Akong observes, it is surprising that, despite the transformative potential of development minerals, which yield low resource rents but have strong utilization linkages within the domestic economy, policymakers keep on focusing on precious minerals, that is, ones with a high surplus value per unit, destined for export and weak ties to other domestic sectors (Akong, 2020, 464). This prioritization may explain the insufficient regulation of and absent strategies for development minerals in many resource-abundant countries.

That said, the above observations constitute a somewhat simple ideal-type classification and, in the meantime, many areas of urbanization and massive infrastructure expansion are now witnessing an accelerating commodification of sand with ensuing economic, environmental and political implications. Contestations around sand mining have come under increasing scrutiny with a focus on, amongst others, questions of sustainability (UNEP, 2022; Bendixen et al., 2021; Torres et al., 2017), the ill-regulation of extractions and trade (Da & Le Billon 2022; Katz-Lavigne et al., 2022; Lamb et al., 2019); or on the need to consider the material base of modernist urbanization (Dawson, 2021, John, 2021). Building on this rich body of literature, this article explores how local struggles for access and control in a sector that is perceived as erratic and unregulated are negotiated and enforced.

2.2. Handle with care: The sand business as extractivism

In the following, we will be exploring the contours of the literature on extraction and extractivism by first discussing the shifting scope of the concept, second, laying out its key features before, third, weighing in on the value the concept adds in recognizing the diversity of political claim-making in the context of resource extraction. In light of violent contestations around sand mining in contexts of unequal relations between local populations and organized extractive agents, invoking the concept of extractivism, which points to systematic features of exploitation, seems to be a low-hanging fruit. Yet, in many ways, the harvesting of this construction resource does not seem to fully submit to the macro features said to constitute the logic of extractivism. The debate on extraction and extractivism has certainly been waxing in the last decade, having made its way from Marxist scholarship on Latin American political economies (Acosta, 2013, 2017; Gudynas, 2018) to diverse conceptual and empirical contributions in political geography, peasant and agricultural studies, political ecology and indigenous scholarship. Extractivism is generally understood as a form of accumulation in late capitalism feeding on the removal of primary resources and their commodification in the service of the prosperity of the metropoles (Shapiro & McNeish, 2021)[2]. While laid out to historicize the outward orientation of resource flows in Latin American economies, more recent scholarship has widened the concept's purview signifying a 'logic' that not only pervades natural resource frontiers but contexts marked by asymmetries writ large (Watts 2021, Mezzadra & Neilson, 2017; Pasternak et al., 2023). Thus conceived, extractivism is constitutive of a modernist way of thinking and acting towards human and non-human environments predicated on "forceful removal" of things and ideas alike and, in so doing, furthering the commodification of social relations (Escobar, 2017; Gago & Mezzadra, 2017; see also Dunlap and Jakobsen, 2020; Durante et al., 2021) Ideas of expanding the notion of extractivism as governing situations of asymmetry more generally are powerful and have actuated a pulsating academic debate. However, charging extractivism with too heavy a nomenclature comes with drawbacks as analytical boundaries fade. Szeman and Wenzel warn, extractivism risks entering "conceptual creep" with its analytical purchase traded for becoming all but the "epithet du jour" (Szeman & Wenzel, 2021, 510; for an extended critique see also D'Angelo & Pijpers 2022, 5-7). Plus, practices of mining, value addition, regulation and control are extremely diverse. While in many environments, excessive mining sows multiple troubles, in others such escalation is absent.

The common denominator of the concept of extractivism seems to be a double drain: The removal of the resource is wedded with the loss of opportunity for communities to accumulate wealth from that resource (Chagnon et al., 2022; Ye et al., 2020). The literature has in the following honed the concept by nuancing actors, infrastructures and mechanisms of power and control (Chagnon et al., 2022; Durante et al., 2021; Kröger, 2020; Bisht, 2021). Ye et al., (2020, 156) pronounce the efforts by an "operational centre" to monopolize and control the resource flows from the mining site up the value chain. This ambition is premised upon the existence of symbiotic ties between state actors and private capital as it entails putting in place a complex infrastructure of extraction, which includes amongst other technology, security arrangements, transport, labour, etc. (Ye et al., 2020, 156). Extractivism can thus be understood as a set of ideas and practices that builds on the forceful removal of natural resources by powerful 'extractive agents' who contend for controlling both mining and the value chain.

To summarize, seeking to understand sand mining though the lens of extractivism is an ambiguous venture. On the one hand, it seems straightforward to infer that not all of the characteristics identified in the literature fully cohere with the practices of sand mining. Due to the more horizontal extraction of sand, yielded by the mineral's wide availability, its high local use value and, in turn, its relative insignificance for the national or international political economy, sand harvesting simply was no matter of concern for most communities. On the other, the concept lends itself well for an analysis of the disruptive character of excessive sand mining in contexts of extensive urbanization and the construction of large infrastructure projects across the global

[2] Large scale mining in Kenya is currently limited to very few activities and players such as the mining of titanium in Kwale County (managed by Base Titanium), the Samruddha Resources-run iron ore mine in Wundanyi, Taita Taveta County and the dredging of soda ash at Lake Magadi (Kajiado County) by Tata Chemicals. Tullow Oil's plans for petroleum extraction in Turkana have been hampered by multiple challenges Kilaka, 2022). Their realization remains uncertain not least after the pullout of financial partners Total Energies and Africa Oil in May 2023.

South. The radical albeit recent commodification of sand has not only produced scarred landscapes affecting access to water and food security for communities residing along the mined rivers, but it has also disrupted and partly upended existing political economies. At their place we see a form of accumulation that thrives on intrusion, coercion and exploitation in which livelihoods are pitted against one another. While the 'sand business' has brought a large number of mostly young people into rickety labour, for livelihoods reliant on farming, on the other, escalating sand mining proved devastating. Ambitions to control and profit from sand mining and trade, however, play out in a process of what Côte and Korf have called "making concessions", pointing to the multi-layered and potentially conflicting claims to regulatory authority over space, livelihoods and extraction practices that need to be negotiated and accommodated (Côte & Korf, 2018: 467). Governing sand extraction entails sedimented norms about place and community, mining laws and local regulation, market forces, as well as coercive practices, and in so doing may both undermine existing and establish new hierarchies. The concept of extractivism realizes its value when complementing its structural take with attending to the 'thick' social relations of resource extraction in concrete places and histories. Taken together, such a perspective allows for an investigation of, as Gilberthorpe and Rajak put it aptly, "how economies of extraction create new domains for the exercise of power, and new struggles over authority, at the micro-level as much as the macro" (Gilberthorpe & Rajak, 2016: 193).

3. Scoping sand extraction in Kenya

The potential of Kenya's mineral sector is yet to be fully explored. Revenues account to around 1% of the country's GDP, with a potential to reach up to 10% according to government estimates (Government of Kenya 2016b). The bulk of mining, predominantly gold, gemstone and construction minerals is done by artisanal miners.[2] A study by the NGO Pact, using data from 2014, put the estimated numbers of artisanal miners in Kenya at 140,000, providing a livelihood for just under 1 million Kenyans (Pact, 2018). In the same study Pact estimates the number of sand miners in Kenya at 30,000, but the decade since that time has seen a massive construction boom realized in rapid urbanisation together with infrastructure developments such as the Standard Gauge Railway, the opening of Lamu Port and several ambitious and complex road-building projects. Extrapolating from our pilot studies in seven Kenyan counties, we estimate that that sand harvesting in Kenya employs between 60,000 and 100,000 people. In any case, Kenya has been identified as one of the most critical countries for unsustainable sand harvesting, troubled by weak regulation, environmental degradation and "sand wars" (UNEP, 2019), and similar concerns are reflected widely in both the national media and county development plans.[3] Daghar's (2022) study of four counties in Kenya, highlights the failure of the legislative framework to regulate extraction and the propensity for conflict and criminality at various levels. However, robust data on extent, impact and revenue of sand mining and trade do not exist in Kenya.

The dearth of data is matched by an alarming absence of effective legislation on sand mining and utilization on the national level reflecting the low status of development minerals discussed above. In the Kenyan Mining Act, naturally occurring sand is not classified as a mineral. The Act only designates "heavy mineral sands", which is a class of ore often found in beach sand, and "silica sands", a quartz consisting of at least 95% silicon dioxide, as construction and industrial mineral (Government of Kenya 2016a, 2016b). Other national and subnational legislation on the environment and mining classifies sand variously as "common mineral", "quarrying material" or simply as "soil" (Katisya-Njogore, 2021). In the wake of the devolved government in Kenya, licenses for artisanal mining are issued by the County Directors for Mines in consultation with the artisanal mining committee that includes county government representatives, the Ministry of Mining, representatives of artisanal miners and the National Environmental Management Authority (NEMA) (Government of Kenya 2016a, para 93–94). Given this legal ambiguity substitute regulation attempts to govern sand extraction, namely through NEMA's, 2007 Sand Harvesting Guidelines. They require all harvesters and transporters to apply for approval to harvest sand subject to strict conditions and cover not only environmental and sustainability aspects but also social and labour regulations (Katisya-Njogore, 2021; NEMA, 2007).[4] However, many NEMA county offices often lack the capacity and resource to enforce these comprehensive guidelines. In addition, there may be a lack of support from county governments whose interests are swayed by revenue through licensing and cess fees.[5] Further, draft Environmental Management and Coordination (Sand Harvesting Control and Management) Regulations created in 2021 to tighten control have not been passed at the time of writing. The regulations may facilitate taxation of artisanal harvesters and stipulate new charges for licencing.

An additional legislative layer is provided by county laws.[6] The act that stands out and has received considerable international attention is the Makueni County Sand Conservation and Utilization Act (Makueni County Government, 2015). The Act was a response to an escalation of conflict in the county following a massive increase in sand harvesting for construction of the Standard Gauge Railway (SGR) and urban expansion in Nairobi. It led to a total ban on sandmining for a time, and an ongoing ban on transport out of the county. The enforcement of the Act greatly curbed illegal activity[7] and allowed rivers to recover. The Act has been taken as a template by other progressive county governments. Therefore, extraction of sand is only loosely covered by law in Kenya and culpability for unsustainable extraction is at the level of the state which has failed to fill the legal gaps described.

In the following we will zoom in on a single albeit extreme case of sand exploitation in Kedong Ranch, Narok County. The case is unique because while it is not as violent as reports on other counties imply, there are some powerful undercurrents; dynamics of extractivism are superimposed upon pre-existing dynamics of dispossession and exclusion, in a context of rapid development which exacerbates them all.

4. Sand extraction in Kedong Ranch

4.1. Situating Kedong Ranch

Efforts to govern large-scale removal of sand in Kedong Ranch are

[3] 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 Project (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 Makueni County.

[4] The guidelines designate sand-harvesting sites following an affirmative environmental impact assessment, issues licences to applicants and lay out strict boundaries regarding the conditions of harvesting and transport of sand.

[5] Cess, sometimes referred to as infrastructure maintenance fee, is a county government on products that move across county borders. The revenue, which is based on the weight of the product, is supposed to be invested into local infrastructure.

[6] Kwale, Kilifi, Machakos, Taita Taveta, Kajiado and Makueni counties are among those which have been developing legislation in this area; they differ tremendously in their level of ambition to effectively regulate the exploitation of sand (see Kajiado County Government, 2020; Kwale County Government, 2016, Kilifi County Government, 2021, Makueni County Government, 2015, Taita Taveta County Government, 2020).

[7] Interviews, community members and officials at the Makueni Sand Conservation and Utilization Authority, Wote and Muangini, Makueni County, 30 November and 1 December 2022.

socially 'thick' and display a 'plurification of regulatory authority' (Côte & Korf, 2018) as we will show in this section. Kedong is a 30,000 hectare area of land located on the Rift Valley floor near Mount Suswa and Mount Longonot volcanic craters around 50 km northwest of Nairobi. The area is one of the largest sand harvesting sites in the country but also a place traversed by large infrastructure projects, including the SGR and plans to construct a major geo-thermal power plant, which induced significant contestation over land, compensation and participation in the area. Furthermore, the once communal Maasai rangelands have been gradually subdivided and titled among the Maasai l paving the way for private sales and leasing for irrigation agriculture (Mkutu et al., 2022; Mkutu, 2023). Alongside all this activity, however, many Maasai continue subsistence pastoralist livelihoods, and live in settlements largely unserved by modern amenities.

The various land acquisitions have often resulted in contestation and dispossession of local Maasai, and a tendency towards economic exclusion from ensuing development. Kedong Ranch was established during the colonial era by a settler called Meyers who "agreed" a 99-years-lease with local Maasai.[8] It has never been returned to the Maasai but passed hands through various owners and to this day is owned by a group which includes some of Kenya's political elites (Ndii, 2021). And while 35,000 people (400 large families) of the Kitet Maasai community continue to occupy the land and use it for herding and sand harvesting, their future became uncertain following the construction of the SGR and identification of the site for an Inland Container Depot (ICD) and associated industrial park (Special Economic Zones Authority, 2020; Aquaclean Services Ltd, 2020). Once the plans were made to develop the area, it was unexpectedly fenced, people evicted and deep trenches dug to keep them from entering, prompting a confrontation between community members and the police (Cherono and Matara, 2020). Currently many local people remain, and sand harvesting continues though numbers of loaders have reduced.[9] The issue remains unresolved with a group of complainants taking the matter further to the international courts,[10] and the people expecting eviction at any moment.

4.2. Dynamics of sand extraction

The smooth removal and forwarding of sand in one of the largest sand-mining areas in Kenya is the outcome of contestation and accommodation of varying norms, rules, interests and capabilities of a conglomerate of actors over time. Sand extraction in Kedong began in 2004.[11] The area has both pit sand and river sand, washed down from Mount Longonot during the rains. Harvesting of both sand types is carried out by local groups of which there are around 15 going by names such as Neema, Vumilia, Naretoi, Pole Pole[12] and Puan.[13] The land is governed by the Maasai elders who have the power to permit sand harvesting on their properties or refuse. However, the land is officially the property of non-Maasai so-called absentee landowners who reside in Nairobi. The latter view sand harvesting as a means of capitalizing on their unused land and have introduced their own system of revenue collection.

In contrast to most other harvesting sites in Kenya, the welfare associations in Kedong valley are highly organized with their own committee, constitution, regulations, disciplinary procedures, bank account, shares, office, logo, and stickers to identify trucks with whose drivers/owners they make semi-permanent agreements.[15] Each group employs up to 200 loaders of whom the majority are Maasai, since group rules allow only local membership. Membership comes at a cost and since groups are not always looking to expand, it is often necessary to buy out an existing member. The cost of getting "a number" depends upon the level of activity at the site and the investments made by the group. The Neema group for example currently charges 80,000 Kenya Shillings (KES) (600 USD) while a group known as *Haraka* (quick) in Mahi-Mahiu, a nearby town, is charging five times as much because of investment in land and a truck.[15] The work is divided equally between loaders who do 24-hour shifts. Scooping sand is often dangerous and sometimes fatal; injuries such as falling from lorries, falling in rivers, collapsing sand and falling rocks particularly in rainy seasons are not uncommon.[16] And while some groups have a fund for medical care or raise money for injured colleagues there is no formal insurance cover.[17]

The loaders at the various sand harvesting sites in Kedong valley are mainly Maasai males between age of 17 to 40 for whom entering the sand harvesting business means quick tax-free income. Take for example James Naorokot (name changed), a young Maasai sand loader who we met at Kedong. He grew up in a large polygamous family outside Suswa town, on land now traversed by the SGR. Alongside his schooling, James assisted with herding until the age of 16 and recalls arduous journeys of 20–30 km with the livestock, often eating and drinking only once a day. He has worked as a sand loader in Kedong since 2019 and also owns goats which he herds together with his brothers, who are also loaders. With assistance from family James has just graduated with a BA in Statistics from the University of Nairobi. However, he has yet to find formal employment, and for the time being continues to load sand, leading some family members to voice that the degree is a waste of money. In the same youth group there are three other graduates, though one has recently managed to find formal work. James explains that for many, sand harvesting supplements pastoralist income and appeals because pastoralism is increasingly challenged by the subdivision and privatization of land as well as population increase, all of which shrink the available rangelands. Further, translating pastoral commodities into cash is not easy. Cattle do not yield high volumes of milk except in rainy seasons, and one does not sell an animal every day. James noted that he like other educated youths, is willing to leave behind the pastoralist livelihood and traditions, not because they are resented or despised - he explained that amongst pastoralists "there is a lot of love for cows ... most probably I miss it" - , but because it is too difficult to sustain both pastoralism and a formal job which is likely to require living in the city. However, many youths not heading for formal work continue pastoralism alongside sand harvesting and use their income to invest in more animals.

4.3. Economics

The sand business in the valley benefits does not exclusively benefit youth loaders, landowners and distant extractive agents but nurtures wide sections of the local community. The Kitet Maasai elders have established arrangements to meet various needs through the sand business. For example, women with no reliable income are given the opportunity to cook and sell food to loaders, while unmarried or childless women known as *rikiriko* or widows are allowed to collect 50–100 KShs (0,30-0,60US$) at different river sites and poor families with expenses such as hospital bills are also catered for through a fund

[8] Interview, official in the Kitet community-based organisation, Suswa, 20 December 2022.
[9] Group interview, senior staff in Nema and Muninew sand harvesting groups, 15 July 2022.
[10] Interview, official in the Kitet community-based organisation, Suswa, 20 December 2022.
[11] Interview, former local administrator, Suswa, 20 December 2022.
[12] FDG with Neema Youth Group, December 21, 2022,
[13] FGD with Puan Sand Harvest Youth Group, December 21, 2022.
[14] FGD with Neema Youth Group, December 21, 2022, and Puan Sand Harvest Youth Group, December 21, 2022.
[15] FGD with Puan Sand Harvest Youth Group, December 21, 2022; Phone interview with a sand harvester from Neema group, 10 January 2024.
[16] Interview local pastor, Suswa, 19 December 2022.
[17] FGD with Neema Youth Group, December 21, 2022, and Puan Sand Harvest Youth Group, December 21, 2022.

allocated by elders.[18] The complex management of interaction between buyers, truckers, landowners and loaders is the realm of the brokers. The brokers we interrogated in Kedong valley were mostly the leaders of the sand harvesting youth groups who, on behalf of their members, look for truck owners or companies in Kiambu and Nairobi. Brokers number around 10–20 and are often astute entrepreneurs with a keen eye for market trends as they negotiate prices, coordinate transportation, and manage the logistics of getting the sand to construction sites or other destinations.

A tally of trucks entering Kedong Ranch during daylight hours for two consecutive days at each of the four main gates, carried out on 21–22 December 2022, revealed a total number of 428 (see Table 1). Most trucks were small six-wheeled vehicles which carry around 5–6 tonnes of sand, while the largest eighteen-wheeled trucks may carry as much as 40 tonnes of sand. Based on these figures an estimate of the amount of sand removed was as much as 2,000 tonnes a day bound for Nairobi and other nearby counties. By this count, perhaps as much as 2 million KES (12,5,00 US$) exchanges hands on a single day. It must be noted that this estimation is based on a snapshot and does not cover variation in the availability of sand (the rivers are seasonal and December is high season for sand harvesting following the rains), conditions of access or trends in demand. Some loaders mentioned that up to 1000 lorries entered the sites during the construction of the SGR between 2017 and 2019. It gives however a good indication of the scope of potential turnovers at a single sand-harvesting site.

Smaller trucks may be loaded by 6 loaders at a cost of 3000 KES (19 US$) while large trucks are loaded by 12 youths at double the price. Loaders then receive 500 KES (3 US$) for every truck which they help to fill. There are other fees for trucks, including those imposed by elders who man the river valleys[19] and to some extent represent the interests of Kitet Maasai households. In this way, the age-set system which Maasai adhere appears to be a factor in community organization around the sand harvesting industry. One of the elders described how they began in a rather threatening manner:

> *So we called each other into a group and we started charging 200 [per 6-wheeled truck] and 400 [per 10 wheeled truck]. At one point we used to have sticks and knives and we would damage cars.*

Other fees for trucks include a gate fee, imposed by ranch owners and a cess fee collected by the county government at roadblocks outside Suswa town. The Kedong Ranch gate fee has caused problems to loaders as the"triple taxation" as it was described, led transporters/traders to abandon Kedong for other cheaper sources such as Longonot and Ewaso in Kajiado,[20] bringing another reason for dispute between resident communities and the Kedong Ranch shareholders.[21] It is clear that the County government and Kedong Ranch receive a sizeable income from sand which is likely to sway any decisions on environmental protection. Even after the fees and wages are considered there are other local financial flows surrounding the industry (see Fig. 1). Some members sub-contract other youth to use their"number" and take a share of the earnings, utilizing the number as a personal welfare mechanism.[22] Some groups are also able to collectively invest profits, and some are themselves part of larger savings and credit cooperatives (SACCOs) which may have their own substantial investments and dividends. However, most youths do not manage to save or self-improve.[23] There are also shareholders in the sand harvesting groups.[24] One secretary in a state office explained that she bought 200 shares in one of the largest groups for 1,000 KES (6US$) each and she makes 2000 KES (12 US$) a week.[25] Once the sand leaves the ranch it is priced according to distance and demand. For example, a 10-wheel truck loaded with sand which has paid 12,500 KES (78 US$) for the various fees in Kedong will ask 15,000 KES (93 US$) for a buyer within Suswa town, but 74 km away in Narok town the price will be up to 28,000 KES (174 US$) and 100 km away in the other direction in Nairobi, as much as 40,000 (248 US$).[26]

4.4. Politics and conflict

The dynamics of sand extraction discussed above are embedded in a wider resource space, reconfiguring relations between nature and society in general and between loaders, brokers, communities, truckers, politicians, construction companies as well as the real estate sector in urban centres in particular. The spiking demand for housing[27] as well as the Kenyan government's priority to effect *maendeleo* (progress) through mega infrastructure projects have transformed sand and sediment in Kenya into a highly commodified and contested resource.

As our pilot study suggests and Daghar (2022) describes, sand harvesting has potentials for conflict between sand loaders competing for customers,[28] and between communities and loaders who have caused disruption of water supplies, and livelihoods or disruption of property and infrastructure. Conflict may also potentially happen further along the value chain over money, corruption and politics. Political patrons become shareholders in the proceeds of extraction and political conflicts sometimes play out on the ground between sand harvesting groups (Daghar, 2022) Political patronage does not bode well for effective regulation of the industry.

Various conflict dynamics are evident in Kedong. Territorial and boundary disputes are present between different groups and elders[29] and sometimes trucks are hijacked by another group.[30] The local administration has had occasion to intervene in the conflicts, which also prevent groups uniting to negotiate good prices.[31] Environmental degradation has led to protests by community members in Kedong and Makueni.[32] In terms of politics, the size of sand harvesting groups implies considerable political power; The *Haraka* group mentioned earlier in Mahi-Mahiu town has 400 members and the leader has been elected as a Member of the County Assembly (MCA) having campaigned using

[18] Interview with community activist, Suswa town, 13 July 2021.
[19] Interview former senior chief and elder in the sand business, Kedong 14 July 2021.
[20] Interview with ward administrator in Naireg Kiangare, December 19, 2022.
[21] Interview with Tumanka, the former senior chief and elder in the sand business, December 20, 2022.
[22] FDG with Neema Youth Group, December 21, 2022,
[23] Interview local pastor, Suswa, 19 December 2022.
[24] At sand harvesting sites around the country brokers play a prominent role in linking together loaders and owners/drivers of sand trucks. In places other than Kedong also arrange safe passage and the organization of loaders. In Kedong as noted, the high level or organization of groups allows them to often deal directly with the owners/drivers, and brokers play a comparatively lesser role than in other sand-mining areas in Kenya.
[25] Interview, secretary for a state office, Narok, 19 December 2022.
[26] FDG with Neema Youth Group, December 21, 2022; Interview local pastor, Suswa, 19 December 2022.
[27] Kenya's push for affordable housing for its growing urban poor also requires sand, although the numbers of houses are far behind the plan due to challenges such as limited finance flows, increased construction costs, lack of land availability and lack of affordability for consumers (Russo, 2022; Kieti et al., 2022).
[28] FGDs with Neema and Puan Groups, December 21, 2022.
[29] Group Interview with senior administrators in Narok, December 19, 2022.
[30] FGD with Neema Youth Group, December 21, 2022, and Puan Sand Harvest Youth Group, December 21, 2022.
[31] Interview local pastor, Suswa, 19 December 2022.
[32] Interview with assistant county commissioner Suswa division December 19, 2022.

Table 1
Dynamics and Economics of Sand Harvesting at Kedong Ranch Based on Two Days Data Collection (21–22 December 2022).

		Types of Trucks				Income		
		6 wheels	10 wheels	12 wheels	18 wheels	Day	Month	Year
No. of Trucks (48 h)		307	92	26	3			
Fee to elders	Per Truck	1000	1500	1500	3000			
	Total	307,000	138,000	39,000	9000	247,000 KES (1,530 US$)	–	–
Kedong Ranch gate fee	Per Truck	1000	1500	1500	3000			
	Total	307,000	138,000	39,000	9000	247,000 KES (1,530 US$)	7.4 M KES (46,000 US$)	88.9 M KES (552,000 US$)
Loaders wages	Per Truck	3000	6000	6000	15,000			
	Total	921,000	552,000	156,000	45,000	837,000 KES (5,200 US$)	–	–
County Govt Cess	Per Truck	3500	3500	3500	3500			
	Total	1,074,500	322,000	91,000	10,500	749,000 KES (4,650 US$)	22.5 M KES (140,000 US$)	269.6 Mio KES (1,7 Mio US$)
Grand Total						2.1 Mio KES (13,400 US$)	6.2 Mio KES (385,100 US$)	749 Mio KES (4,7 Mio US$)

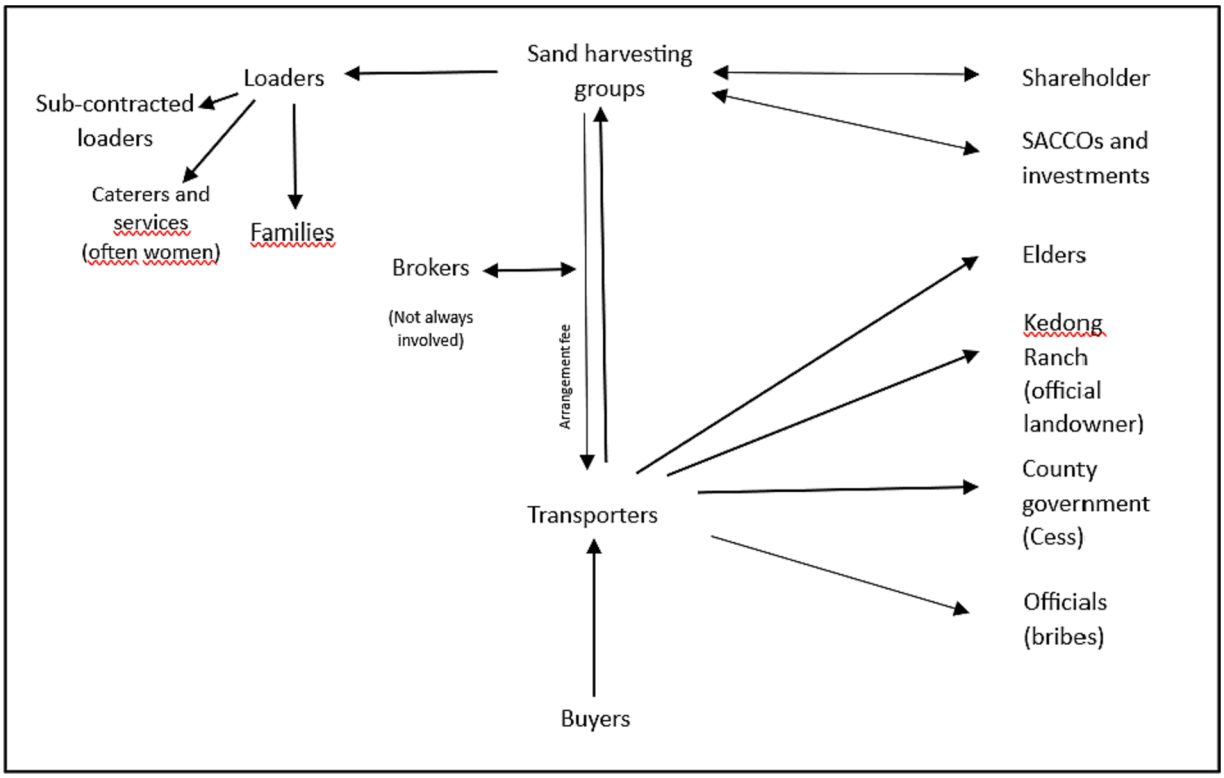

Fig. 1. Actors and Wealth Flows in the Kedong sand resource environment.

donkeys for transport.[33]

As noted, the ownership disputes at Kedong ranch have been the main conflict trigger in the area. The fencing of Kedong and the resulting hike in payments for trucks to enter, and hence reduced numbers of trucks, led to demonstrations and road blocks by community members and the deployment of government paramilitary. Two people died in the clashes (Cherono and Matara, 2020). As noted by loaders: "For two weeks they were beating people and even killed people…the the GSU claimed that youths were blocking the roads…that's why they were being beaten, but the issue was about Kedong…the conflict was about resources."[34] Wider politics has also played a part in conflict in the area. Political demonstrations by the opposition party in March 2023 led to an attack on Kedong, one of several land portions belonging to political elites which were invaded at the time (The Nation 2023). The opportunity was also seized by around 150 community members armed with pangas (knives) and rungus (sticks) to destroy parts of the Kedong Ranch fence and attempt to remove officials from the gates. Conflicting information circulated, with the security services claiming that the incident was about a conflict over sand harvesting fees, and at the same time arguing that the former president did not have a share in the land, while the county commissioner simply pointed to an invasion of property (Kiplagat, 2023; Ombati, 2023).

Sand harvesting in Kedong valley has become an opportunity for many. It has turned into a central part of the local economy especially given the challenges faced in the pursuit of traditional pastoralist livelihoods. Remarkably, as the subtle bottom-up organization of the harvesting at the Kedong sites testifies, to some extent the egalitarian nature of Maasai society has been extended to the sand industry. However, the

[33] Interview, secretary for a state office, Narok, 19 December 2022.
[34] Focus group discussion with sand loaders, Suswa town, 12 July 2021.

organized removal of sand in Kedong remains highly exploitative as brokers, landowners and other actors further up the value chain make higher profits and are economically secure in contrast to local youths who are dependent on this livelihood.

5. Conclusion

Seeking to understand the politico-economic intricacies of the sand business in Kenya, we showcased the value of engaging with the arguments on resource-making and extractivism. The former explores the conditions of how physical assets are made into an exploitable resource while the latter links processes of accumulation-by-depletion to broader questions of unequal exchange and asymmetric societal relations. Our case of Kedong Valley is special in relation to the amounts of sand removed, the scale of revenue, the enclave character of the site and the elaborated procedures that control both removal and transport of sand. It is also a resource space where contestations around the environment, land ownership and use, livelihoods and political authority have long intersected. Sand mining in this environmentally and politically fragile context has entrenched these antagonisms. On the one hand, sand removal at Kedong Ranch displays systematic features of accumulation emphasized in the extractivism literature. We do not only see large-scale (and contested) depletion of resources, we also note concentrated and highly controlled mining as well as immense turnovers, which tend to disproportionately benefit actors other than the majority of the community. Additionally, dispossession dating from colonial times has allowed another layer of elites (in this case landowners and state actors) to make large profits from sand harvesting while leaving the community uncertain about their future. The underlying conflict is not primarily about sand, but sand has raised the stakes for control over the land, a situation which is likely to be replicated across Kenya. Furthermore, a devolved system of government with shared responsibility on mining intersect with claims around land ownership and land stewardship.

On the other hand, symptomatic for many other resources spaces where 'low value' development minerals are removed, Kedong valley is also a space of opportunity for many. The self-organization of the loaders builds leverage for collective claim-making while the refined set of rules that governs sand extraction at this site ties together elders, loaders, communities, truckers, landowners and even brokers in a way that defies a purely exploitative logic. While the commodity value of sand has recently been maximized in large infrastructure projects where substantial rents can be generated, the resource realizes its use value as a 'development mineral' in the local economies, assuring the subsistence of hundreds of people as well as the growth of small towns around sand mining sites.

In mining zones where governance is fluid, fragmented or contested, social actors—both state and non-state if ever there can be a clear boundary—articulate their claims to political authority through extraction practices. A new national law, currently in the pipeline, aims to control harvesting by classifying sand as a mineral. The ramifications are potentially immense as such a redefinition requires not only that every harvesting site is licensed; it also requests the consumers of sand to state the origin of the resource. This is likely to change the current open market system and reinforce links between elites and the state, while sand-harvesting cooperatives may be disempowered. The Act may also increase tensions between the county governments to the national government as legal provisions would likely re-route revenue from the former, who currently benefit from collecting fees from local sand trade, to the latter. County-level enforcement such as in Makueni may be more effective and with less propensity for grand corruption, while counties are also able to work more closely with local sand-harvesting groups to manage sustainable extraction for the benefit of the community. This is more closely aligned with the constitution which places the role of environmental management with the people. Moreover, while we see the potential for sand harvesting to become politicised, this has happened at the local level, which may be a benefit by ensuring representation of local communities. Therefore, strengthening representation of sand harvesting groups and local-level control is likely to be key to balancing the extractivist tendency of sand-harvesting.

Sand mining sites are moving targets and will mushroom where the next infrastructure project is supposed to be hammered into the ground. Sand mining opportunities will thus primarily attract local configurations of corporate and political interest. In the sand value chain in Kenya, extractive agents are pretty many, pretty close, pretty fragmented and often invested in both the communities and potentially their exploitation. While having many—instead of the few dominant—extractive agents scattered around thousands of sand mining environments in Kenya, to some extent, goes against the grain of the extractivist condition described above, it is in no way less severe. This moving nature of extraction means that there is a community to be left behind when the resource has been drained. The figurations described above call upon scholars of extractives to remain attentive to both the disastrous as well as the inventive dynamics that unfold in sand-mining environments.

CRediT authorship contribution statement

Jan Bachmann: Conceptualization, Investigation, Project administration, Writing – original draft, Writing – review & editing. **Kennedy Mkutu:** Data curation, Formal analysis, Writing – original draft, Writing – review & editing. **Evelyne Atieno Owino:** Data curation, writing - original draft, Writing - review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

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