

Monitoring sand mining in Morocco

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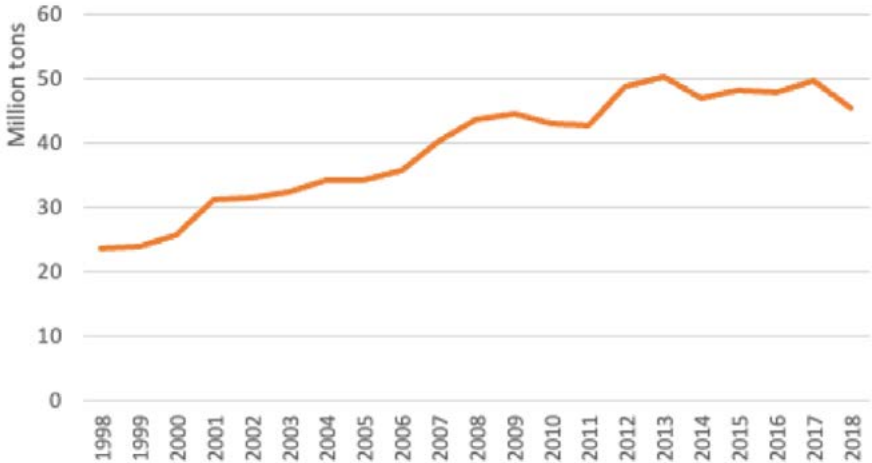
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Introduction

Sand is a natural raw material that has been in unprecedented demand over the past 20 years. It is the second most used natural substance in the world, after water. Its continued use has been called the main sustainability challenge of the 21st century by the United Nations Environment Programme (UNEP). It is one of the most difficult challenges to be taken up by the international community, because the standards and laws of the extraction and exploitation of sand, considering the social, economic and environmental repercussions, have barely been established. Excessive exploitation of this raw material is constantly increasing; the current volume of its extraction is three times greater than what it was at the end of the last century. The current estimate of global extraction varies between 47 and 59 billion cubic meters per year (Steinberger et al., 2010). The excessive use of this substance will continue in the coming years, given growing demand due to demographic expansion and urban booms all over the world, a phenomenon previously restricted to the industrialized countries of the north. The absence of reliable government statistical data relating to the extraction of sand, gravel and other aggregates, especially in developing countries, means that the only way to produce data is to calculate them based on tons of produced and marketed cement each year. For each ton of cement, you have to mix about six to seven tonnes of sand or gravel for industrial construction (see figure 1). Statistical data on the production of cement are provided by more than 150 countries (Peduzzi et al., 2014).

Figure 1: Sand production/extraction in Morocco (1998-2018)



Source: data compiled by Bert Suykens

In the last decade, there has been growing recognition of the need to think about sustainable sand mining across the globe (Steinberger et al., 2010). Concerns about the environmental impacts of unrestrained sand extraction (Lamb, Marschke, and Rigg 2019) – often deemed to be in the hands of “sand mafias” – have led to a recent proliferation of reports (UNEP, 2019) and academic articles (Bisht, 2021) that address multiple avenues for dealing with sand. However, and surprisingly given this interest, there is a lack of clear data on the (diversity of) sand extraction processes across the globe. Most detailed fieldwork-based analysis has focused on Asia and India in particular, with African cases being rather absent.

This report presents the findings of fieldwork on coastal sand extraction in Morocco. Morocco’s marine shores extend 3,500 km along the Mediterranean Sea and western shore of the Atlantic Ocean; most of the sand supply is of coastal origin. Total annual extraction, based on cement consumption figures, is about 10 million cubic metres, half of which is of “illegal” origin. This report and the case study depart to some extent from most accounts of sand mining in Morocco (Journal l’Economiste, 2005; ARTE television documentary, 2019) – which stress unchecked illegal beach sand mining run by syndicates

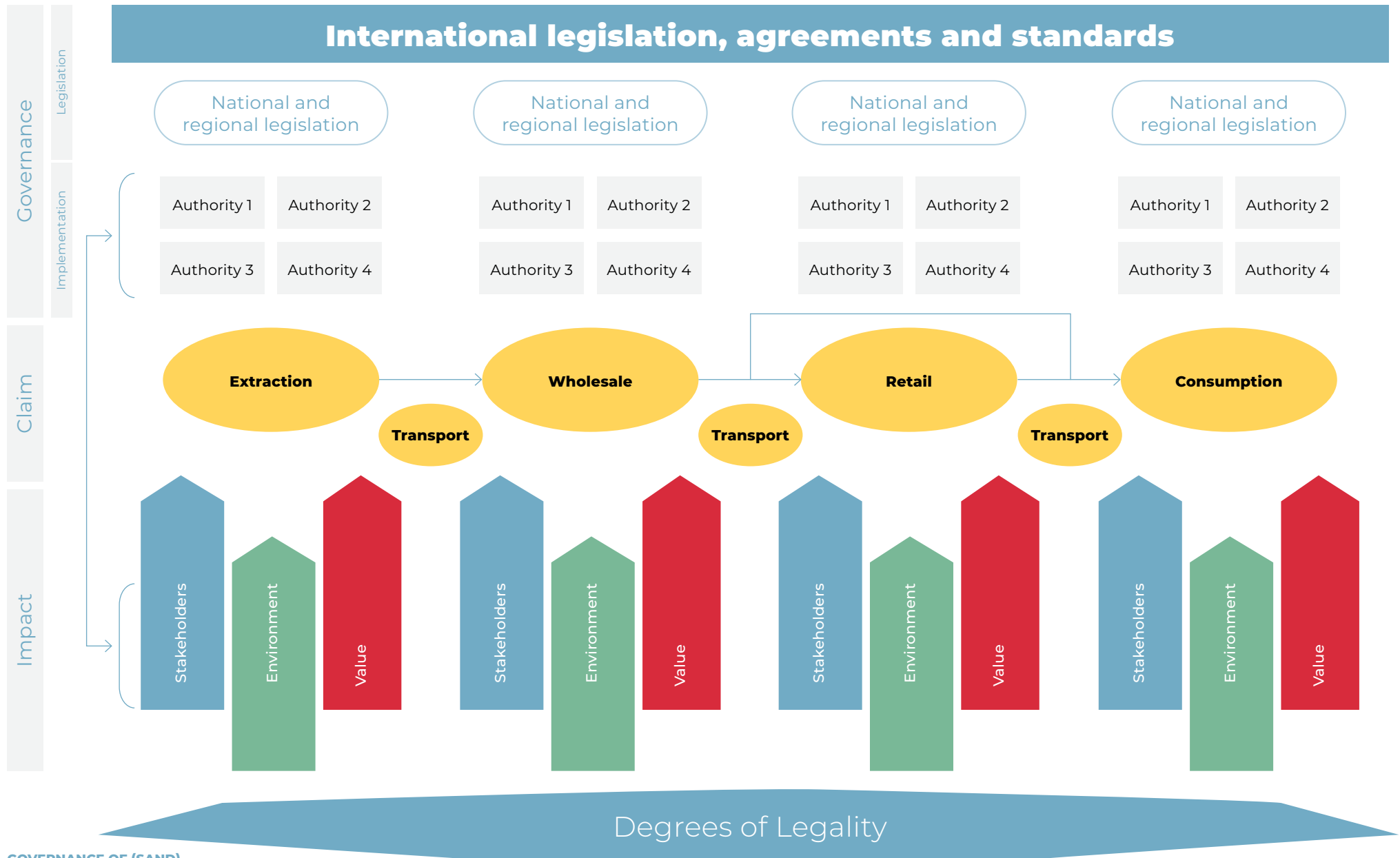
and mafias – by focusing on legal extraction on private land. These quarries started to operate at least partially as a response to the closure of most extraction sand mining sites operating on communal lands in the same area. The report thus offers insights into the phenomena of sand exploitation in Morocco, particularly sand extraction in the littoral area at Chelihate in Kenitra. First, we present the methodology applied in this research and the tools used to gather data, which allowed us to get an overview of the geographical and administrative characteristics of the area, the historical evolution of the juridical texts governing this activity, and its political economy. Second, we have analysed and interpreted data by mapping the stakeholders involved in these activities with their assets and stakes, according to the place they occupy in the process of extraction. Finally, we point out the monitoring gaps in this activity and suggest some recommendations to improve the process of administrative monitoring and drafting of laws, which began recently with the implementation of a new legislative text.

Methodology

The Governance of Commodity Chains (GoCC) framework (figure 2) forms the backbone of the two case studies in Morocco and Tanzania¹ (for more details on this commodity chain framework, see Suykens (2010); Dutta and Suykens (2017)). Developed by Bert Suykens and inspired by both Bernstein's work on the maize filière (Bernstein, 1996) and Ribot's work on the charcoal commodity chain (Ribot, 1998), the GoCC framework seeks to impart an understanding of commodity chains not simply as processes in which firms source resources in order to transform them into marketable commodities, but as sets of social relations, and aims to foreground the governance or the institutional set-up enabling the chain to function. Governance is not simply understood as the formal legal and administrative rules pertaining to a particular sector or activity, but is focused more on the implementation of rules and regulations at different points in the chain. Grounded in political economy, the GoCC framework seeks to foreground relations of power that link resources and commodities with a wide set of (formal and informal) authorities, as well as with labour and capital. Within the context of this study, we not only try to understand how different stakeholders share an interest in the sand trade and how value is created and distributed in the chain. We also seek to understand how the hierarchical relationships are established between all the other distinct political, social and community components linked more or less to sand production, exploitation and distribution, considering that sand is a natural raw material through which the structural constraints of multiple interests and powers (grassroots communities of rights holders, institutions of formal and informal organizations, civil society and scientists, etc.) overlap, resulting in potential environmental impacts. The framework is intended to be flexible and can contain as many (or as few) chain links as have been empirically established.

¹ For its use in Tanzania, see Shitima and Suykens (2022).

Figure 2: Governance of Commodity Chains Framework



We have employed a mixed-method approach, including the collection of quantitative data on extracted volumes, price, and transport costs. The qualitative research included semi-structured interviews, using an interview guide developed according to the research objectives. The sampled target population corresponds to the social categories involved in sand extraction, including owners and beneficiaries at the extraction site, sand transporters and their drivers, bulk stockpilers, and retail sellers. Secondly, we consulted the government agents in charge of local and national oversight and monitoring, as well as civil society actors and academics engaged in citizen activism and research for the preservation of the coastal environment. By examining the evolution of legislative texts, gathering data on state actions, and conducting interviews with the target population (particularly officials), we also traced the evolution of sand extraction through distinct historical stages and identified its social and political agents. Case study research in Morocco was challenging due to the fact that illegal extraction activities still take place around Kenitra at Sidi Taibi. The many rumours and allegations about illegal extraction activities within this area further highlight these challenges. However, we will focus on legislative frameworks and official measures, given their importance for the Moroccan case, and the practical difficulties and ethical dilemmas inherent to studying illegal sand mining.

General Context of Case-Study Research

Geographical and administrative framework

ADMINISTRATIVE

The case study research took place in the locality of Chelihate in the rural commune of Mnasra in the province of Kenitra, located on the right bank of the mouth of the Sebou River. The plan was to focus on two sand quarry sites: one small-scale artisanal, and the other large-scale industrial. Yet the nature and homogeneous mode of extraction in this zone (along the Moroccan Atlantic coast from the mouth of the Sebou River to Moulay Bouselhame in the north, an area of approximately 270 ha) forced us to limit our investigation to the 22 sand quarries² which are currently active. The quarries in question vary in size from 2 ha to more than 20 ha.

The rural commune of Mnasra covers a total area of 22,000 ha and has a total population of 34,429, according to the last general Moroccan census, in 2014, who live in 14 douars (settlements/villages), including Douar Chelihate and Douar Oulad Berjal, where the research took place. These two douars are located on the other side of the Oued Sebou, near the city of Kenitra. They are also close to a large Offshoring Industrial Zone known as the Atlantic Free Zone (AFZ), launched in 2012, with a management area of 345 ha, which led to a spectacular urban explosion in the surrounding area, particularly in Kenitra. Despite this, the two douars have remained intact, but their development

² Twenty quarries are legal and two quarries are not yet legalized.

has stagnated, with the exception of the improvement of residents' red clay homes, by taking advantage of buying debts with help given to them by the new sand businessmen (sand owners) who have settled alongside their villages since the mid-1980s.

TENURE OF THE LAND AND SOIL

Research on land tenure in the area of exploration allowed us to observe that there is a high percentage of private property: 50% of all the land in the commune (ORMVAG, 2013). Private land ownership is particularly uncommon in Morocco in areas such as the commune of Mnasra, which is not fertile enough to favour the intense agricultural activity that can lead to massive land appropriation. The agricultural activity that reigns in these areas is not intense but subsistence and almost rudimentary for the majority of the population. A few small, scattered avocado farms have been established in recent years by taking advantage of the dominance of "Melk status", or private ownership of land on an equal footing with sand mining quarries that were settled there since the mid-1980s (Bouderbala, Chraïbi, and Pascon, 1974, 1977).

NATURE OF THE SOIL

The nature of soil in the case study area is divided into four main soil types, which are called in the local dialect "dehs," "tirs," "ferchach" and "Rmel". Sand "Rmel" dominates the area, covering more than 6,150 ha, representing 41% of the entire land area (ORMVAG, 2013). This type of soil is incompatible with agricultural activity, which is the main activity of the local population, but it is ideal for sand extraction.

Legal and legislative framework of sand mining in Morocco

EVOLUTION OF LEGISLATIVE TEXTS

The first legal text governing quarries dates back to the colonial period, when urbanization and large-scale construction began to increase (Masson, 1972). The text included the urban policy of the "Grands chantiers", which resulted in the construction of a dozen new cities juxtaposing with the old "medinas" already in existence in the agglomerations of Rabat, Casablanca, Kenitra, Fez, Meknes, Ouazzane, Oujda and other cities (Masson, *ibid.*). This

first piece of legislation – or Dahir³ – dated 5 May 1914, was promulgated in this context of organization and construction, but its clauses were of a general nature, in order to organize and regulate all types of quarries. This Dahir reflected the emergence of a public works institution led by a general director, who was endowed with the power to take charge of quarry activity. Subsequent improvements made to this Dahir are in the order of adjustment and redefinition of enforcement, especially when it comes to overlapping powers vis-à-vis other institutions that were emerging and growing, as has been the case for the promulgation of the Dahir of 25 June 1917 related to urban institution prerogative. This Dahir stipulated that the location of the quarry within the urban perimeter meant that extraction from it could only begin after authorization by the Director General of Public Works with the consent of the head of urban service. In this same logic of improvement of the jurisprudence of the quarry in interaction with the new law, the Dahir of 7 October 1929 stipulated that the hygiene of workers and the public must be ensured within the quarry control and supervision framework. The powers of the Director General of Public Works were expanded to include preserving public safety and hygiene and imposing sanctions on violators in accordance with this new text.

The evolution of the legal repertoire regarding sand quarries then ceased for nearly a century. It should be noted that the legislation and institutional management of mining activity was separated from the framework regulating and governing sand quarries via the 1928 creation of the Bureau de la recherche et la participation (BRPM) and, at independence, the 1957 creation of the Ministry of Energy and Mines. The legislative framework's century-long status quo concerning sand quarries was due mainly to the slow pace of construction and public works. Sand extraction and its associated problems attracted the interest of public authorities beginning only in the mid-1980s, following debates in Europe, especially in France, over the extraction of coastal sand. It is in this context that administrative instructions were issued

³ Dahir is an ancient appellation for a Moroccan king's legislative act (publishing laws and decisions), after being approved by the parliament which was established after independence. This appellation is used in parallel with a new term: kingdom's decree. Its application has shifted depending on the era: precolonial times, under French colonialism, under protectorate status, and after independence.

to close most of the quarries north of Sale, namely those located near Nations Beach, Sidi Bouknadel and Sidi Taibi. This decision pushed sand entrepreneurs to find another area for their economic activities, resulting in their move to the Chelihate area, where they bought land.⁴

In line with objectives to “modernize” the Moroccan state, many sectors were subject to legislative changes, especially those that constituted a strategic priority for the state at the end of the last century. This new strategy, the main lines of which were laid down by the Yousfi changeover government of 1998-2002, focused on restructuring state administration, equipment, and sectors of activity. This included the restructuring of the construction and public works sector through the promulgation of *Dahir* 130.02.1 of 13 June 2002, as Law 08.01, relating to the supervision, organization and control of sand quarries. This *Dahir* and the related law can be considered the spark of a radical revolution in the management of sand extraction, regulation, and oversight, as it closely links the exploitation of sand with environmental problems and negative repercussions on maritime and forest environmental life. However, the Executive Decree of Law 08.01 on the management and regulation of exploitation of sand quarries ended up being “buried” by the General Secretariat of the Government, which did not submit it for publication in the Official Bulletin.

Fifteen years later, Law 27.13 – identical to the unpublished Law 08.01 – and its application via *Dahir* no. 1.15.66 was published on 9 June 2015. This long delay and the law’s lack of enforcement shows that the lobbies and actors involved in the lucrative sand extraction trade exercised great influence over state authorities. On one hand, the links of the operators⁵ to the high authoritarian sphere of the governors is self-evident. In this regard, and in accordance with aims of the 1998-2002 “government of alternance”,⁶ the

⁴ The sand owners who occupy the region of Chelihate today (interview with the president of the quarries owners association).

⁵ Here we mean by the term operators all the exploiters of sand quarries either on the collective land or on their own land, whom we refer to as “quarry owners”.

⁶ “The government of alternance” carries a specific political meaning in the Moroccan system: after a long political battle between the monarchy and the national political movement (the opposition party to the king: USFP, PPS, OADP and some independent individuals), this government accepted, in 1998, a year before the death of Hassan II, to govern and manage the affairs of the state.

closure of most of the sand quarries in the case study area of Chelihate, in 1999, is very significant. The operators closed them without any resistance, following oral instructions they received from the regional administration through the Chioukhs and Mokademines.⁷ This was the context in which most of the sand quarries located on the collective land, which were in the possession⁸ of certain notables, high officials and senior army officers in the localities of Chelihate, Oulad Berjal and Oulad Belaassal, were closed definitively.⁹ On the other hand, it took a long time for an administrative law regulating this essential and important economic sector to be implemented. There was a wait of more than 15 years for the publishing of the executive decree of Law 27.13 in the Official Bulletin.¹⁰ A comparative reading of the two texts reveals no significant changes. There are only a few partial modifications, such as the extension of the time limit for compliance with the new law by the operators under the rules of the Dahir of 5 May 1914 (9 Joumada II 1332), from six months to three years. Other improvements included the addition of Articles 64 and 65, which stipulate the official publication every year by the administration of the new and closed quarries, in addition to the dates of the implementation of this law.

The next sections will map access rights emanating from the social practices of yesteryear and the effects of these new legal texts.

MAPPING ACCESS RIGHTS

Collective access rights (collective land)

The first type of quarries are those located on collective lands. These are situated north of Chelihate, in the direction of Moulay Bouselham. These are communal lands whose exploitation rights or usufruct – use rights – belong exclusively to the ethnic groups in the area. Any of them can exploit the land per a prior community agreement managed by a territorial commission

⁷ Local administration agents chosen from among the local populations.

⁸ We are speaking here about the quasi-authorized quarries, which should not be confused with the fact of illegal extraction activities at sand littoral beaches in the area.

⁹ Interview with a former equipment official who is now an adviser of quarry owners.

¹⁰ Law n° 27-13 promulgated by Dahir n° 1-15-66 du 21 Chaâbane 1436 (9 juin 2015) related to sand quarries (BO n°6422-1 du 17 décembre 2015).

representing the community's subtribes and ethnic groups and presided over by a representative of the collective lands, all under the supervision of the Ministry of the Interior.¹¹ This legal status means that the administration of land and territories by the Ministry of the Interior at the central level and the province of Kenitra at the regional level plays an important role in the effective management of access to the sand quarries.

Individuals' access by ownership (private property)

The other type of sand quarries are those on individual private property – land separated from communal land. In Morocco, real estate ownership as a whole was almost exclusively collective. Individual ownership was rare and confined to cities or their immediate surroundings (gardens and orchards). Due to different contingent developments, however, land ownership evolved from being collective to individual (Bourkia, 1989). The implementation of this new system contributed significantly to the development of colonialism and the rise of individual property by providing security for real estate transactions and speculation. In the research area, these developments were reflected in the legal situation of several plots, due to the concomitance of these legislative transformations in parallel with the functional exercise of the Moroccan administration employee, called the “Amin alamlak”¹² (Bourkia, 1989), who was in charge of real estate properties in Kenitra. He was Si Ahmed Al-Bourjdali, a native of the Oulad Berjal tribe, one of the ethnic groups of Chelihate. He had played a leading role in turning communal land into private land via individual French deeds and distributing it to tribe members. Some of them were cautious and refused to divide their communal collective property, fearing that this process would facilitate the transfer of their ancestral communal property to French colonists, but in the end the region's collective ownership was broken up into many plots owned by Chelihate ethnic group members. Thus, individual French land deeds were introduced, which subsequently facilitated their acquisition by sand entrepreneurs who, after moving from the north of Sale,¹³ turned them into private sand quarries by the late 1980s.

¹¹ Dahir of 27 April 1919 (modified by Dahir n° 1-62-179 on 6 February 1963, 12 ramadan 1382).

¹² The name of the function exercised in the traditional system.

¹³ Interview with the owners' adviser and with a politician who owns an agricultural farm in the region.

Political economy

background of sand

mining and its social use

Sand commodity chain

This case study aims to explore the growing phenomenon of sand exploitation in Morocco by focusing, in particular, on the coastal sand in the rural locality of Chelihate in the province of Kenitra. In this section, on the one hand, we will analyse the social uses and circulation of sand as a market commodity, through prices and their fluctuations according to time, places and context to discover and reveal the value of this raw material and its evolution following the changes and developments of urbanization and construction. And on the other hand, we will analyse the use of sand as a raw material in a traditional society. This use may necessarily reflect individual and collective alignments, power relations, and the positions of social and political actors who benefit from the riches of this raw material.

Two interfaces should be highlighted: the first one is related to pecuniary profit (i.e. material gain), while the other is related to the symbolic side (moral and social values) that neighbouring people at times mobilise either to gain material benefits, or to oppose sand extraction by proclaiming themselves as inheritors of sandy lands. The analysis of sand stakeholders must also be seen through the lens of the relationship to the political field and its institutions, even though these institutions have little influence over sand management, control and marketing. It is therefore necessary to grasp the roles played by the institutions which are directly or indirectly linked to the issue of sand management and/or control, whether these institutions are formal or not in

the hierarchy of the state, while distinguishing the actors at each level and highlighting their stakes and roles.

Finally, the case study approaches the management of sand at the community level through the degree of involvement of civil and scientific associations, quarry neighbouring populations, and all those involved in any sand-related activity. Analysis of coastal sand extraction in Morocco takes us to the heart of the process of its commercial and social exploitation as well as related political and economic issues. This allows us to draw up an integrated mapping that illustrates all those who are involved in sand monitoring and determine their degree of importance in its management and exploitation, as well as the mechanisms they use. We distinguish between two main groups: i) collective holders of rights and private owners (entrepreneurs); and ii) other beneficiaries and actors in sand extraction.

Quarry access rights

Rather than limiting the analysis of quarries' benefit to the normative principles of law as it regulates access to this economic activity or to the social and traditional norms upon which collective access rests, there is a need to clearly define in our approach the material values of benefits from access and the indicators that serve as measurement tools. The approach of "access" as an act of "possession" or "exploitation" involves implicit values, which makes it, therefore, valueless – or insignificant – because it is implicit in things, money, some people, or symbols, etc. (Ribot, 1989, p. 311). Accordingly, we rely in this case study on cash benefits as an indicator of value to analyse "access" and its determinants, such as revenue or profit, as it is a market supply. Based on these financial values that benefit sand extraction actors, we can: 1) clearly define these actors, their degree of influence and their position in this commercial activity in relation to others; 2) evaluate the revenues and benefits at all steps of the sand exploitation process, from its extraction, to its transport, to its sale, to its use in construction; and 3) establish a timetable for the distribution of revenues and benefits as they actually occur, and thus design a schematic mapping of the functioning of the system of access to and control of sand quarries, and the processes and mechanisms of redistribution of gains and profits.

Mapping the actors involved

We considered both the theoretical (ideal) determinants of sand operators according to the legal framework of law; the access rights that frame the alignments, measures, and social positions of collective actors, and the pecuniary extent to which many other stakeholders are able to benefit from the sand quarries:

Figure 3: Sand mining stakeholders

Classifications	Actors	Description
Category 1	Population of Chelihate and Oulad Berjal.	Rights holders of collective lands neighbouring the maritime and forest domains.
Category 2	Private owners with land deeds.	Entrepreneurs who bought French land titles and set up sand quarries. They are currently organizing themselves as the Association sable et environnement.
Category 3	Senior officials, military, and notables.	State agents who benefited from the rentier economy by obtaining sand extraction permits. There are two types: those who acquired plots and invested in these activities, and others who stopped extracting sand once the administration began to enforce the regulations.
Category 4	Civil servants and agents of the Ministries of Equipment and Interior.	Administrative staff in charge of management of sand quarries.
Category 5	Wholesalers and large transporters who own trailers.	Wholesalers who own transport equipment.
Category 6	Warehouse owners and small transporters with trucks.	Retailers and small transporters scattered in the construction areas.
Category 7	Workers, drivers and quarry guards.	Employees of private owners.
Category 8	Sand end users.	Individuals in building and civil engineering companies, and property developers.
Category 9	Scientists and environmental activists.	Natural sciences and biology teachers and activists of environmental associations concerned about the degradation of the natural environment of the coasts and river.
Category 10	Civil society and activists for human rights and public goods, trade unionists, and others.	

Figure 4: Estimation of basic benefits by actor

Actor and/or stakeholder	Range of profits per actor in \$ (calculated using rate \$1 = dh9.27)	Quantity of sand	Observations
Quarry owners or contractors	\$453.07 to \$463.86	< 17m ³	Price range and quantities are estimates based on fieldwork.
Villagers	\$16.81 to \$32.36	Per 17 m ³ trailer	
Loading workers	\$10.78 to \$16.81	17 m ³ level	Staff working for the quarry owners/contractors.
Truck and trailer transporters	\$0.08 to \$0.11	Per m ³ /km	Minimum earning formula for transporters.
Wholesale dealers and retailers	\$0.97 to \$1.83	Per m ³ depending on quantity (17 or 23 m ³)	Gross earnings of sellers.

Figure 4 reflects the approximate and indicative financial value for the levels occupied by each actor. It also reflects the market value of sand. These statistics concerning the sale prices and the volume of sand were obtained (not without difficulty) from some of the people interviewed. Prices and volumes of sand are shrouded in mystery because their manipulation is another means to increase profits. The sand trade is likely subject to manipulation and falsified statistics, starting from the price, which ranges from \$453.07 to \$776.70, and in terms of sale volume, which ranges from 17 m³ to 23 m³ and sometimes even to 30 m³ (the unit of measurement of the quarry weigh-bridge is the tonne (t), while sales negotiations take place in cubic meters (m³)). Therefore, Figure 4 takes into consideration analyses of the minimum practical price and the minimum quantities of sand exchanged.

Figure 5: Quantities and prices applied in places in \$

Quantities of sand	Conversion in kg and tonnes	Price range in \$ (calculated using rate \$1 = dh9.27)
1 sack	40 to 45 kg or 7 shovels	\$1.51 to \$1.83
1 wheelbarrow (2 sacks)	80 to 90 kg (14 shovels)	\$2.24
1 m³	2,500 kg (2.5 tonnes)	\$26.97 to \$32.36

Figure 5 highlights the different quantities traded. The weight of sand traded clearly differs in price owing to differences in weight resulting from time spent in storage. The longer sand is stored, the more weight it loses as it dries out, thus impacting profits. In addition, the shops that sell sand retail thrive in areas that are under construction (in Kenitra, for example, Alliance, Oulad Oujih, and Hay Riyad) and sell either by the cubic metre or by tonne. There are three large warehouses in Kenitra, which sell by the cubic metre and only to those with trucks that can transport more than 10m³ or 18m³ of sand.

Data analysis and interpretation

Quarry access management, control, and sustainability

During the century of scant legislative change after the Dahir of 1914, sand extraction was among the rentier privileges granted by the central and regional authorities as part of the clientelism intended to widen their loyal bases. At this time, sand extraction did not pose any conflicts or apparent problems, apart from issues related to management and monitoring that led to restrictions obliging the beneficiaries of sand extraction to respect the clauses of the Dahir of 1914, in terms of alignment with the prescribed extraction levels and the restoration of closed quarries.

After 2000, demographic explosion and urban sprawl accentuated the demand for sand for building and public works. This drew public attention to sand extraction to the point that it became the subject of significant debate, specifically its administrative and political uses for rentier purposes: the attribution of an extraction monopoly to certain influential military and administrative elites, notably political leaders, notables and military officers. The debate was fuelled by the context of the demonstrations and protests of the Arab Spring. Indeed, sand extraction continued to be monopolized by certain elites and families favoured by the regional and central administrative authorities, thus the construction boom raised their commercial and economic revenues.¹⁴ For this reason, quarry management could be described

¹⁴ An interviewee did not hesitate to tell us that for years the maximum daily income was 1 million dirhams.

as administrative and political rentier management until 1999, the year after the establishment of the government of alternation, which had restructured the public sectors and their management. Public and territorial authorities in the prefectures and provinces were also repositioned to rationalize and better monitor extraction in accordance with the legislation in force and in application of the administrative decisions issued in the mid-1980s to protect the maritime coastlines.¹⁵

The situation would change significantly after 2002, due to the growing demand for sand as a result of the real estate boom and the spectacular growth of housing projects and real estate dynamics in most of Moroccan cities. This situation should be considered when it comes to the promulgation of Law 08.01, which, for reasons linked to the considerations and challenges faced by those in power, never entered into force. The fact that the executive decree of this Dahir was not published does not necessarily imply that the management and exploitation of quarries was chaotic, nor that they were not legally and administratively regulated. For instance, in 1999, most quarries (approximately 13) that fit into what activists called the “rentier economy” for the benefit of the senior military and administrative officials were closed. It is important to note that while quarry exploitation regulations of Law 08.01 were never released, a 2010 circular of the prime minister loosely defined quarry exploitation procedures and methods. The last of all these administrative and juridical developments was the promulgation of Law 27.13 per the publication of the Dahir of 9 June 2015 in the official bulletin of December 2015. Texts detailing the application of some of its clauses appeared about a month later.¹⁶

To better control access, the government required all quarry operators, whether private individuals or notables who benefited from the rentier economy, to apply for authorization to exploit quarries; this was also an attempt to oblige them to comply with the prescriptions and clauses of the new

¹⁵ Interview with a former regional functionary of the equipment department who witnessed the closure of several quarries in this context.

¹⁶ Bulletin official n° 6422 at 17 December 2015, (5 Rabiaa Ier 1437) p. 4424 ff.

law.¹⁷ One notable who owned two quarries that she had been operating since 1994 found herself struck off the list of authorized operators because she had not brought her business into compliance with the clauses of the new law by requesting her operating permit and submitting a new application to the authorities.¹⁸ This does not mean that the new law was strictly applied through legal, management and control measures at quarries. On the contrary, events on the ground since the promulgation of this new law demonstrate the coexistence of a formal system of theoretically advanced normative determinants in the legal and administrative management of sand alongside daily fraudulent practices of quarry operators who were not sanctioned. These dynamics highlighted the big difference between the legal framework and the real practices on the ground. What is clear is that despite the many rumours and allegations¹⁹ about illegal sand extraction activities, sand extraction is indeed subject to administrative and legal measures that were in force even before the promulgation of Law 27.13.²⁰ There was a process of adjustment in the extraction of sand at quarries: while there were about 48 quarries in the research area before 1999²¹ (divided between privately owned quarries and quarries on collective land), there were only 20 quarries when the field research was conducted at the end of June 2021,²² a decline in number that included the removal of two private quarries due to non-compliance with the 2015 law.

¹⁷ Interview with an official from the Ministry of Equipment and with a former regional functionary of the equipment department.

¹⁸ Interview with an official from the Ministry of Equipment and with a former regional functionary of the equipment department.

¹⁹ In interviews, a transporter who owns three trucks and a security guard in a hotel in Kenitra tried to convince us that this is a dangerous activity that is supervised by people positioned at very high echelons of the state, who can resort to murderous aggression if they notice the interviewees are digging into their wealth.

²⁰ Interview with a resident of Douar Berajal who had exploited a quarry before, which was closed after having reached the authorized level of extraction, and who had not been able to obtain another exploitation permit.

²¹ About this process of adjustment see page 9.

²² Interview with the administrator responsible for the management of quarries at the Regional Directorate of Equipment Department in Kenitra.

Who benefits from Moroccan coastal sand mining

VERTICAL DISTRIBUTION

Regarding the distribution of profits and revenues, some of our interviewees told us that the amount of profit generated in Chlihate was about 1 million dirhams (about \$100,000) per day at peak periods.²³ Significant benefits are captured by the direct owners or operators of the extraction quarries, whose investment costs are limited to freight and paying weighbridge workers, rotating guards, and quarry managers. Other stakeholders include transport operators whose profit does not exceed one dirham per cubic meter per one kilometre transport distance. Then there are the storehouse owners, among whom three categories can be distinguished:

- 1** Wholesale dealers who own large warehouses and transport trucks, which allows them to make income from transport and the storage of large quantities of sand. Indeed, some of the interviewees told us that from time to time they are involved in the theft of sand from abandoned or open quarries.
- 2** Retail sand sellers, who are the owners of small garages in the neighbourhoods under construction. They often provide truckloads of up to 10 m³, which they sell to individuals in the process of building their own houses in the area.
- 3** The inhabitants of the quarry neighbourhoods Douar Chelihate and Douar Ouelad Berajal, who are paid a lump sum of \$16.18 per 17 m³ truckload of sand. They were paid double this amount, i.e. \$32.36 per truckload, prior to the tax on sand that was enacted under the 2013 finance law and set at \$5.39 per cubic meter.²⁴ In addition, the maximum volume of sand per truck was set at 17m³. Quarry owners paid these lump sums to the inhabitants because they were the previous/original owners of the quarry land – that is, to prevent discontent over sand extraction, which could lead the authorities to close the quarries, using insecurity as a pretext.

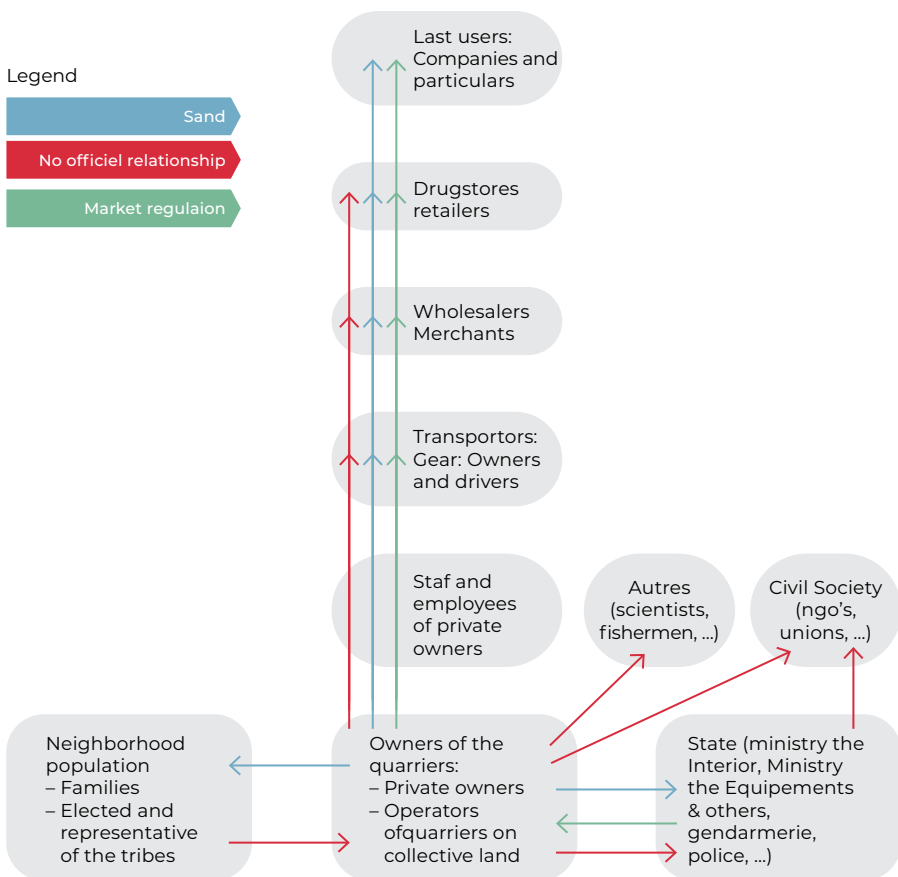
²³ Interview with a politician/farm owner in Chelihate.

²⁴ Dispositions of the financial law of 2013 in Morocco.

HORIZONTAL DISTRIBUTION

Profits are distributed unequally among the hierarchy of stakeholders depending on the position they occupy in the process of sand use or monitoring. However, lacking a uniform reference of sand weight or volume and fixed selling prices, the hierarchy relies on the validity of the data obtained. Figure 6 below seeks to decipher the meaning and implications of this distribution among stakeholders:

Figure 6: Shape of distribution of benefits and social dynamics of sand mining



Distribution of benefits beyond markets and prices

ALONGSIDE LEGISLATIVE EVOLUTION AND SOCIAL DYNAMICS

In the research area, *belonging* to the land is a key factor when it comes to gaining access to the quarries for exploitation, or benefiting from sand revenues. *Belonging* can refer either to being one of the ethnic inhabitants of the locality of Douar Chelihate and Douar Oulad Berjal on the one hand, or being an owner of sandy land that could be exploited as a sand quarry (the current owners of the quarries) on the other hand. Therefore, the category of being “local” includes two types: i) ethnic people of the land area and ii) new owners who bought the French-deeded land in the mid-1980s. Both of these parameters require authorization from the Regional Directorate of Equipment in accordance with the clauses of Law 27.13. In other words, administrative and legal legitimacy requires belonging to the land in order to have the right of access. However, belonging to the neighbourhoods (being “local”) adjacent to the quarries is not sufficient on its own to obtain a permit, despite the fulfilment of all of the conditions required by the law to obtain a quarry permit. Other unwritten considerations come into play in the monitoring of sand mining activity. Two interviewees described difficulties in obtaining a permit for extraction despite having deposited their complete application with the administration concerned and fulfilled all of the required conditions.²⁵

Access to the benefits from sand exploitation, despite the existence of clear normative legal texts for its regulation, management and control, remains at the political discretion of the state and its administrative bodies to approve or deny the licence. Prior to 1999, access and sand extraction measures were characterized by the overexploitation of sand and the non-respect of the limited regulation that was in place. Sand exploitation was not regulated or defined by oversight or exploitation restrictions. Some of the interviewees on site claimed that the number of authorized quarries exceeded 48, and that the trucks operating in the area came from all over Morocco and exceeded

²⁵ Interview with two inhabitants from the area, one belonging to Olad Berjal, the other to Douar Chelihate. One of them had been refused permission to extract from his quarry. Meanwhile, the other was still waiting for the administration's response.

700 trucks and trailers, the majority of which were engaged in the theft of sand from open quarries.²⁶ Access to and the ability to benefit from sand quarries reflects the strength and resources of each actor, their capacities and their social and political background.

AGENTS AND STAKEHOLDERS INVOLVED

Inhabitants of Douars adjacent to quarries:

Chelihate and Oulad Berjal

These populations have (at least in theory²⁷) an inherent right of access to the benefits from the extraction and sale of sand, considering that they belong to the ethnic groups that possess the collective usufruct rights of these tribal lands. However, these collective lands have undergone a process of private ownership through transaction by French deeds since the promulgation of the registration law in 1912, thereby undermining this collective right enjoyed by these residents and rights holders. Despite the existence of these private deeds, those living in areas neighbouring the private and titled quarries sought to benefit from their exploitation. This constraint led quarry owners – despite being the legal private landowners according to the official French deeds in their possession – to delay sand exploitation, given the security, social and political obstacles that those living near quarries could put in place. Quarry owners deal with these potential obstacles by accepting informal compromises with the area's dwellers, hiring them at the quarries as loading and levelling truck drivers, guards and more. After mechanization was introduced in loading and levelling operations, quarry owners decided, as part of the policy of compromise aiming to avoid tensions in the extraction areas, to allocate a lump sum for each truck loaded.

²⁶ Four interviews: an activist of the public fund protection association; the regional manager of the quarries in the Regional Directorate of Equipment; a politician residing in the area; and a quarry owner.

²⁷ Property, rights, and access are never strictly defined in autochthonous societies. We have explained above the religious aspect, but there are other aspects related to the social context itself and to the raw material (sand) embedded in land, which is a collective property. Thus, to possess the land title (the French deeds) means nothing against the centuries-old inherited right of access. (See J. Ribot, 1989.)

The disproportionate reduction in the amount that quarry neighbours receive from the quarry owners (\$5.39 tax versus \$16.18 reduction – three times greater than the tax applied in 2013) demonstrates the power of deed-holding owners over the original inhabitants of the area. At first, in a lawless context before 1999, the quarry owners were content to pay up to keep their activities from attracting discontent. Later, the circumstances changed: the quarry owners had exercised their activity for a while and acquired some recognition of belonging to the area. They made many acquaintances, which permitted them to forge alliances among quarry neighbours and state institutions of control. The icing on the cake was the second recognition by the state in the form of a tax on their activity, which gives more legitimacy to their deeds and activity.

The community neighbouring the quarries knew that the money they received was not a legitimate right in the new context of a law-based state. They knew it was a kind of bribe given by the quarry owners, who are in possession of ratified deeds. This an ironic reversal of the situation, now resulting in a diminution of the amount of money received by the quarries' neighbours. These sums, after being collected by quarry owners, are distributed each week to the population through their tribal representative.²⁸ The money is divided equally among three groups of the population once every three weeks. Each group consists of between 80 and 100 individuals. Each individual receives a maximum of \$16.18 (150 dh) every three weeks.

Private quarry owners

There are 22 quarries currently in operation (20 quarries whose owners became compliant with Law 27.13 within the set time limit). The two other quarries that operate from time to time do not have a regular administrative licence, as they have not submitted to the administration the request

²⁸ It is rooted in the management of tribal lands as developed traditionally and made loyal and official by the French colonial legislative law following the Dahir of 27 April 1919 organizing the rules of administrative supervision of the indigenous collective land and regulation of its management and alienation, *officiel Bulletin* of 28 April 1919, p 375. Every agnate ("ighas" in the local dialect) as defined by (Jacques Bercques, 1978) the tribe should select a representative in the tribal land council, which in turn should select an Amghar or syndicate (in the current language) to be responsible for managing all issues related to collective land under supervision of the agent of the authority (ministry of interior).

for renewal of the operating permit in compliance with the new law. All owners of these quarries are from elsewhere and do not belong to the ethnic groups and tribes from the extraction area. The majority of them used to operate sand quarries around Boulknadel, Nations Beach and Sidi Taibi, all located to the north of Sale, before these were closed in the mid-1980s by administrative decision. They were able to buy sandy land in this area and later transferred their operations there. The Agouzal family (led by the brothers Said and Hmad) is considered the most important and influential family, which owns vast tracts of land, rich in sand dunes, adjacent to the maritime and forest domains. They oversee the management and regulation of sand exploitation and extraction, relying on their experience in the business, their knowledge, and their complex relations with the administration and state. Over the years, they have reportedly been able to develop friendly relations with the population, supported by a good relationship with the territorial and regional administration of the ministry of equipment, Infrastructure, logistics and water, which has enabled them to maintain the quarrying operation despite negative publicity at the global and local levels due to political and environmental problems. After 1999, with the advent of the “government of alternance – which was responsible for managing the peaceful transition of political power to the new king and for the macro-economic restructuring of the state’s finances and its economic sectors and entities by adopting substantive management reforms – the quarries underwent a significant transformation. These new developments made it possible for the regional director of equipment in Kenitra at this time, in consultation with the governor of Kenitra province, to stop issuing new licences.²⁹ The regional director and governor were then able, in collaboration with the provincial quarry commission, to halt extraction at all quarries that were operational on collective land belonging mainly to senior civil servants and military officers. This transformation would be later supported by the Arab Spring and the Moroccan 20 February movement, which opened up a major debate on the rentier economy and the privileges enjoyed by certain

²⁹ One of our interviewees, who was an ex-member of the regional directorate of equipment, explained to us how the director was able to resist his hierarchical boss, the Minister of Equipment and Transport at that time, who travelled from Rabat to Kenitra with a notable politician who wanted to obtain a quarry sand permit. The new restrictions were taken seriously and no new licences were issued.

families of the Makhzen, in particular senior officers and powerful men of the regime. This is the debate that led to the advent of the Islamic government, which took over the reins of state in 2011, and which, as part of this debate, engaged in denunciation by announcing the list of names of the beneficiaries of these quarries.³⁰ The sand businessmen in this coastal area (including the Agouzal brothers and others), nonetheless, adapted to this new situation, moving closer and closer to the administration and working in close liaison with it. It is in this context of uncertainty and doubt for the sand owners that they organized themselves into the “*Association sable et environnement*” (Sand and Environment Association) created in 2005 by a consortium of quarry owners³¹, on the initiative of the Regional Directorate of the Ministry of Equipment. Given the circumstances, they also adopted the regulatory measure dictated by the administration, consisting of reproducing new topographic plans of the quarries by referring to the national and not local IGN points.³²

Alongside these developments, the quarry owners have continued to pay the local population the agreed lump sums in addition to other gestures. However, the quarry owners have strict expectations with regard to the sale of the neighbouring sand-rich land to third parties without their consent. They have repeatedly adopted the right of pre-emption against new purchasers in transactions that have taken place in these localities. Their strategy is to force local landowners to give up their plots of land if they have not been able to exploit them because the relevant administration has stopped issuing authorizations. The quarry owners then purchase the plots, either based on an agreement or, in the contrary case, by opposing the transaction using the

³⁰ List posted on the website of the Ministry of Equipment during the time of the Islamist Minister Abdelaziz Rebbah.

³¹ The quarry owners exercise their lucrative activities of sand extraction under the label of this association, rather than the legal framework. They make this choice to avoid public taxes, fees, regulation on workers' social rights, etc. In this manner they carry out their business activities quasi-informally.

³² Geodesic national points (topographic landmarks) benchmark a topographic landmark related to the local geography. Their placement is inexact when fixed only to the local geodesic landmark.

right of pre-emption.³³ The result has been the preservation of the monopoly of sand exploitation through the acquisition of most of the private properties in the area. The above-mentioned Sand and Environment Association allowed the quarry owners to collectively exploit the quarries. The Association helped them to acquire significant capacity in terms of means and skills to develop their resources and profits. More than 90% of the profits generated by the sand trade are net returns to the owners of these quarries, who do not invest much money up front.³⁴

In addition to paying off locals to keep them from protesting, quarry owners also try to enhance their image as virtuous purchasers of all the neighbouring French land deeds, by undertaking charitable actions and supporting people in need, especially during religious ceremonies or funerals. However, sometimes they undermine real estate transactions in the area.³⁵ In addition, despite the fact that they possess substantial financial means, the quarry owners refrain from acquiring transport trucks in order to allow others to benefit through employment as transporters, by opening the quarries up to every truck or trailer driver who wishes to transport sand. They also maintain relationships with traders who request any quantity of sand, whatever the quantity may be.

Sand quarry workers and employees

The guards, loading machine drivers, weighbridge workers and managers are employees hired by the quarry owners of the Sand and Environment Association, created in 2005 by the consortium, on the initiative of the Regional Directorate of the Ministry of Equipment. The employees receive a monthly salary for the tasks they perform as freight workers, day and/or night guards, weighbridge workers and other tasks.

³³ It is a legal juridical procedure rooted in the Muslim religious legacy that gives the right to the co-owner of land or property that is for sale to purchase it first. He should manifest his interest within 366 days.

³⁴ Interview with the owner's adviser and one of the residents who had a history of conflicts over sandy land.

³⁵ Interview with a farmer who is also a politician. His avocado farm has suffered from some of these practices.

Despite the huge sums of money that the owners of these quarries receive, which amount to one million dirhams per day at peak periods,³⁶ employees work without an official employment contract. They do not benefit from their legitimate labour rights as recognized in national and international law. They are not registered with the social security system to benefit from pensions, though some of them have worked in the quarries for decades.³⁷

Transporters, truck owners and drivers

These are truck owners or drivers who transport sand from quarries to construction sites. They include truck owners who have warehouses for storing sand and from which they resell it; we counted three large warehouses of this type in the city of Kenitra. The other category of transporters work directly with construction sites and owners of small warehouses located in city districts under construction.

There are two categories of storage: wholesale and retail. The first involves large warehouse owners who store and sell large volumes. They were established next to quarries to facilitate the marketing process, which had been very tentative. The other category involves smaller warehouses, often located in areas under construction, whose owners are paid by quarry owners according to supply and demand and the process of moving sand to market (see price table).

Builders or end users of sand

By these we mean all individuals or groups who use sand to construct their homes or build buildings or roads under contracts with the private sector or the state. It should be noted that for companies that have been awarded contracts to build or pave roads for the benefit of the state or local authorities, Law 27.13 allows them to open a sand quarry for the implementation of a construction project within the limits of the duration and needs stipulated by the project contract. We were not able to find to what extent these companies and construction firms make use of this possibility. Sale prices

³⁶ Amounts advanced by several interviewees during our fieldwork in June, July, August and September 2021.

³⁷ Interview with some sand quarry employees.

paid by sand end users are subject to the logic of the market according to supply and demand.

The state and its institutions

Raising the issue of sand extraction with agents of the state and its institutions presents many difficulties and obstacles, since it is shrouded in mystery. Although we were able to conduct interviews with some of the central and regional officials of the Ministry of Equipment, Infrastructure, Logistics and Water, we were unable to obtain precise and clear data on sand extraction either in Morocco or in the research area in Chelihate. Law 27.13 includes clauses on regional sand management plans and environmental studies that operators³⁸ are obliged to carry out prior to the granting of permits, as well as required monthly and biannual extraction reports; we found no such data at the official institution monitoring this activity, which we visited. All we obtained is oral data, not related to any official reports or monographies, and minutes from quarry checks or extraction and management inspections. Therefore, we can confirm that the administrative framework, supervision and monitoring of sand quarries is still ambiguous and unclear. The relationship of the state to sand extraction in terms of supervision, monitoring and management of access to sand benefits has always been informal and subject to unclear considerations and issues.³⁹ It should be noted that Law 27.13 has created a certain stability of sand extraction in our case study area, due to the efforts of quarry owners who complied with the clauses of the new law in a short period of time (these dynamics in the research area, however, should not be taken to represent the reality in the country as a whole). The exceptions are two quarries (out of the 22) not yet in compliance, which belong to a Saharawi owner who has a close relationship with the higher echelons of the Ministry of the Interior.⁴⁰

³⁸ Here we do not specify the quarry owners of the case study area because we are interpreting the connotation of the law in general.

³⁹ Many interviewees from the villages adjacent said that they have made their requests for authorization of a sand quarry on their own land, in accordance with the law, but their requests were rejected without any explanation.

⁴⁰ Interviews with an inhabitant of douar Oulad Berjal and with a quarry owner.

We also found that there is a kind of competition and conflict of interest between the ministerial entities in charge of the management and oversight of sand extraction according to the current law: The Ministry of Equipment, Logistics and Water and the Ministry of the Interior and the Regional entities related to it. The new law stipulates that the issuance of exploitation permits and the management and control of quarries is exclusively the responsibility of Ministry of Equipment regional agents. In contrast, the old law centralized everything in the hands of territorial agents of the Ministry of the Interior. This change of regulation left the Ministry of the Interior with the sole task of closing quarries when notified by the technical authority, the Ministry of Equipment. The agents of the provincial territorial administration consider that, with the new law, they are only in charge of routine duties and the management of problems.

This situation moreover represents a continuation of a kind of political conflict between the Islamist government that emerged from the context of the Arab Spring struggles, and pockets of resistance in the deep Makhzen administration, which is reflected in the allocation of certain administrative oversight tasks and the enforcement of rules as settled by law 27.13. After the establishment of the Islamic government on 3 January 2011, both ministries' missions were changed. The main shift was the curtailing of the authorities of the Ministry of the Interior related to technical public affairs responsibilities, which had included quarry oversight, grants of authorization, control and sanctions. Regional Ministry of the Interior staff lamented these changes, which left them with the merely administrative duties related to quarry closings.

Environmental impacts and local activism

Civil society's approach to Chelihate's sand mining industry is a result of its strong presence in the city of Kenitra, i.e. the territorial and political space in which it interacts with all those who are involved in the process of sand extraction. Researchers in natural sciences, biologists and specialists in environmental studies lead the approach, as most of them are organized, above all, within the framework of their institutional research structures at the Faculty of Sciences at Ibn Tofail University in Kenitra. They are active in the

Association for the Protection of the Coastline, the Association of Ecological Beacons for Development and Climate, the Association for the Protection of Public Funds and other associations that aim to defend the environment, democracy and citizenship.

The work carried out by these associations relates to the environmental impact of sand extraction on the flora and fauna on both sides of the Sebou River and in the ocean, which has negatively affected certain plant species and led to the extinction of certain types of fish (the chapel fish, for example). These are scientific facts that have been observed and confirmed by research, studies and doctoral theses. People have also been affected, particularly fishermen, and have participated in awareness-raising activities and campaigns, seminars, and educational activities carried out by these environmental protection associations, and even contributed to their organization and success.

The initiatives undertaken by scientist-activists are of great interest to other civil society groups, in particular trade unions, human and women's rights associations, professional associations, etc. These activities created strong social and civic dynamics among activists and greatly influenced the local community, which ended up encouraging the owners of sand quarries adjacent to the Atlantic coast at Chelihate and Oulad Berjal to organize themselves under "the Sand and Environment Association". In the name of this association, the quarries owners have organized a tour of the closed quarries for government employees of the local administration and for civil society actors⁴¹. The board member of the Association for the Protection of Public Funds told us that these quarries have been filled in and the land of all plots closed was returned to its prior state or farmed, but we could not verify this statement because access to the quarries is prohibited to third parties.⁴² We witnessed barriers reinforced by checkpoints and signs that read: "Private

⁴¹ Interviews with the president of the Association of Ecological Beacons for Development and Climate and with a board member of the Association for the Protection of Public Funds.

⁴² This attitude of one of the members of the civil society groups to support what we have already heard from the president of the association of the quarry owners should be interpreted separately in the process of *objectivation* (cf. Bourdieu) of actors involved in sand extraction.

property, entry forbidden". Workers and sand trucks can enter only through the guarded main gate, by showing an entry permit, which details trailer or truck tare weight, to the weighbridge employee.

We find that most organized activities, reports and studies on the environmental impacts on the area's marine and terrestrial biodiversity were focused mainly on the extraction works carried out by DRAPOR.⁴³ The company engages in sand dredging and sludge cleaning or so-called maintenance dredging. This entails dredging and flushing estuary silt out into the ocean to a distance of 10 km, to clear the way for ships and boats to the port near the mouth of the Sebou River. These extractive works cause severe environmental damage to marine and river organisms, in addition to siltation on beaches, and create deep marine canyons that have significant repercussions on the marine natural environment, according to many interviewees.

Finally, scientists' involvement is largely justified by the destructive impact of the human activities of extraction on maritime, river and terrestrial biodiversity, as documented by civil society and researchers. The exact nature of scientists' contribution requires further research (P. Bourdieu 1997).

⁴³ Drapor is a Moroccan public company established in 1984 under the authority of the Ministry of Equipment, Infrastructure, Logistics and Water. Its goals were defined in its implementation law as the rinsing, dredging, and sludge cleaning or so-called maintenance dredging of the maritime and fluvial ports. It was privatized in 2007. A huge media campaign promoted its activities.

Conclusion

In this section, we review the processes of sand extraction in relation to, on the one hand, legal and institutional measures and, on the other hand, practices on the ground. Prioritizing sustainability, one of our goals in this study was to point out the failure of this economic activity to meet national and international environmental standards. We would like to highlight that the data collected in the area of investigation cannot in any way be generalized. It is not possible to conclude that sand mining in Morocco is identical in all the regions of the country, without having carried out comparative studies in other areas, particularly in El jadida-Safi-Essaouira and Larache-Tangier-Tetouan, which are subject to intense urbanization.

We can say that Law 27.13 regulates the extraction of sand in Morocco. This law and the organizational decrees associated with it define procedures and measures to be followed to obtain licences, submit preliminary environmental studies, and secure financial guarantees etc. It also establishes work procedures and determines quarry digging dimensions and depth, extraction volumes and quantities, authorized transport weight, and measures and duties that must be observed when closing exhausted quarries.

At the administration responsible for the management and control of quarry licenses, the Regional Directorate of Equipment, in Kenitra, we found that the functionary in charge keeps a quarries register in which is written quarry operator names, quarry locations, work conditions, and extent of compliance with Law 27.13. Unfortunately, the functionary did not allow us to consult the register closely. A civil society interviewee told us that during a quarry tour for administrators said they keep a legal register concerning all quarries⁴⁴.

⁴⁴ Interview with a board member of the Association for the Protection of Public Funds.

Nevertheless, sand beaches are very vast, easily accessible and rarely controlled. They became subject to unregulated exploitation if not widespread looting. The authorities in charge of controlling extraction sites or roads leading to these sand beaches are tacitly complicit, according to rumours in Kenitra. Yet the government and local inhabitants have in their possession an efficient protective legal framework. This paradox expressed itself in the great discrepancy between what the law says and the actual procedural measures, practices and facts on the ground during our exploration and interviews. We observed selectivity and a lack of rigour in the implementation of preliminary environmental studies and the rehabilitation of quarries whose exploitation has ceased. Many interviewees reported weak control, lack of rigour and inconsistency between the administrative services involved in the management, supervision and monitoring of quarries, whether in the quarries themselves or during sand transport. We noticed in the language and tone of some interviewees the existence of a sort of competition, and even conflict, between stakeholders, which is reflected in the control processes themselves. The legal requirements which guarantee rationalization, control and harmonization in the process of quarry exploitation are not applied. The most often neglected procedures were the implementation of local and regional exploitation plans elaborated following preliminary studies and as a result of close coordination between all stakeholders – this is an essential tool which appears to never be used. Close coordination between public and private actors would clearly define sand needs at local and regional level, which would in turn contribute to control and rationalization of the issuance of permits for quarry exploitation. Allowing only the number of quarries required to meet sand needs, within the framework of a clear strategy, would help fix prices and control market exchanges.

The legal framework and administrative practices have been a crucial part of the analysis that permit us to conceive some suggestions to improve these practices. The first suggestion concerns the dilemma of monitoring extended open sky sand beaches. This issue can be overcome through the implementation of remote monitoring using new technologies and satellites and requires involvement of the local community, civil society, experts and scientists. Yet such monitoring and enforcement process must explicitly specify the distinction between the duties of the agents of the administration

and the role of civil society. The neighbouring inhabitants and associations can be a task force for enforcement as well as a check on the administration's control, thereby improving the extraction process.

The second suggestion is the implementation of legal training and coordination meetings for actors and those responsible for administrative control and quarry management, which can enhance coordination and cooperation. This could potentially improve the quality of monitoring, supervision and promotion of sustainable sand exploitation. Furthermore, it could help address the conflicts and competition between actors, which not only have a negative impact on the application of law enforcement but in fact serve the sand mafias, sand extractors (whether legal or not) and people who fail to adhere to legal rules⁴⁵ and/or to respect biodiversity.

The third suggestion concerns stopping quarry owners from appropriating all land plots and creating a monopoly, thereby accelerating the process of sand extraction. The colossal profits, wealth, social and political status they have gained make it very difficult to stop the process. It is therefore necessary to preserve this vital natural resource by supporting its transformation into common or public collective property alongside private exploitation within controlled limits in order to achieve and benefit from a kind of social and environmental justice.

Finally, it is desirable to implement comparative studies elsewhere on the evolution of the exploitation and extraction of sand in other regions and work on the cross-fertilization of experiences and practices. Such cross-fertilization should be broadly based on international experiences through which we could carry out studies and fieldwork visits in collaboration with regional and central organizers and interested civil society actors in order to cooperate under the umbrella of the international efforts led by the United Nations.

⁴⁵ We acknowledge, of course, that law and legal measures are not always “just” and often reflect the influence of the powerful in a society.

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