

# BUILT ON SAND

AN EXAMINATION OF THE PRACTICE OF SAND MINING IN SOUTH ASIA  
WITH REFLECTIONS FROM THE MAHAKALI AND THE TEESTA RIVERS



Nirian Rai, Saumitra Neupane, Shreeva Rana, Devesh Belbase, and Vimal Khawas

## EXECUTIVE SUMMARY

### BACKGROUND

The presence of sand in our everyday modern lives is ubiquitous. And yet its presence is taken for granted—given our understanding that it is found almost everywhere and at a price of dirt—that it may not be getting the attention it truly deserves. Sand is a limited resource, yet, by volume, is the most mined mineral in the world. Modernization and the growing trend in urbanization across the globe, have contributed to a significant increase in the demand for sand. The largest share of this demand comes from the construction industry. However, this growth in demand have led to growing concerns over the sustainability and ecological viability of existing supply systems.

Sand is an essential raw material for the current development pathway of all modern societies and its demand comes from all the different sectors that rely on its availability and affordability. Consequently, extraction of sand has to be allowed where available and feasible to ensure adequate supply. Where this becomes a serious issue is when the supply is sourced through unsustainable extractive practices or when the demand simply reaches beyond what nature can replenish. Both these result in the degradation of the riverine ecosystem that has significant and lasting negative impacts. The current challenge regarding sand mining concerns with the unenviable task of having to strike a balance between two critical issues: i) ensuring that the demand for sand is met and, more importantly, at an affordable price; and ii) overseeing the sustainable extraction of sand that ensures a minimal impact on the river ecosystem and long-term benefit to the society at large. What makes this a complex balance is that the interests and incentives around these two responsibilities may not always be aligned; on the contrary, they may even be in direct conflict with each other.

In acknowledging these concerns governments are increasingly examining their position on sand mining. The resulting response has been a move towards introducing stronger regulatory frameworks for resource governance, sustainability, and oversight. Yet, given the market forces of a growing demand and a limited supply, illegal sand mining continues to find space. This situation is more pronounced across developing countries where weak governance impair regulatory oversight and enforcement.

This study draws on empirical insights on sand mining practices in the Mahakali River in Nepal and the Teesta River in India to build knowledge base on policies, institutions, and market for river aggregates in the two countries. Additionally, based on the findings, the study forwards specific recommendations to engage with policy makers and private sector to promote more responsible and sustainable sand mining practices.

### IMPACTS OF SAND MINING

Removal of sediment from the river channel has been noted to disrupt preexisting balance between sediment supply and transporting capacity of the river, leading to incision both upstream and downstream of the extraction site.<sup>1</sup> Sustained and intensive sand mining can significantly expedite the process of channel incision, resulting in drastic morphological changes within a span of 10-100 years; in its natural course such changes would have occurred over millennia.<sup>2</sup> Incisions commonly result in other changes in river morphology such as narrowing of the river channel and lowering of the river bed. Some major impacts of mining induced river incision are:

- Erosion of river banks
- Threats to the structural integrity of hydrological and engineering infrastructure
- Decrease in downstream sediment flux
- Decline in aquatic flora and fauna diversity

<sup>1</sup> Wiejaczka, Tamang, Piróg, and Prokop 2018

<sup>2</sup> Simon and Massimo 2006

## REFLECTIONS ON SAND MINING IN NEPAL

**Federalism and Jurisdictional overlap in a new regime:** Restructuring of the Nepali state was key in successfully bringing an end to years of political turmoil in the country, but the fact that very limited homework had been done to ensure a smooth transition from the old to the new political system is now gradually becoming clear. With regard to sand mining in the Mahakali River, this is most evident in the dispute over sharing of royalty revenue between the Mahakali and the Bhimdutta Municipalities.

**The incentives of local governments:** Royalty from sand mining does bring in a modest amount of revenue for local governments. However, current levels of extraction in the Mahakali River is not determined scientifically, but driven by the interest of local governments to adopt IEE over EIA. Unlike the EIA, IEE is not time and resource intensive, as well as does not require federal clearance. The implications of this inconsistency in the natural deposit and the limit of legal extraction is that a lot of sand can be stigmatized as being illegal, even when the extraction may still be environmentally sustainable. This also has a direct implication on lost royalty for the local governments.

**Private sector, contracting, and over-extraction:** There are a number of issues that have to be understood as to how the private sector engages in sand mining in Mahakali. The first area deals with contractor's interest to serve as an intermediary, selling of the entire contract, at a marked-up price, to other contractors or raising rent from other small sand miners.<sup>3</sup> Another related issue is the practice of collusion among the bidders<sup>4</sup> to lower the contract value. The third issue relates to siphoning of river aggregates by contractors of the government-owned projects that are allowed to extract as per the project requirement.

**The impacts of sand mining on communities:** Despite observed impacts of dust pollution and deterioration of local road infrastructure, mining is providing employment opportunities for many local communities. These opportunities in the sand mining sector also attract seasonal migrants, from both Nepal and India.

## REFLECTIONS ON SAND MINING IN INDIA

**The role of activism and the judiciary in India's sand mining:** Activists and the judiciary have played an instrumental role in bring about the current policy regime that is meant to protect the riverine environment from indiscriminate sand mining in India. These efforts have resulted in pushing the MoEFCC to issue the EIA Notification and the Sand Mining Guidelines. However, even with the new regulatory measures the government is having limited success to adequately control illegal sand mining across India.

**The nexus narrative of India's sand mining industry:** Terms such as *sand mafia* and *the nexus* have become the key buzzwords in describing the state of India's sand mining industry and is used extensively in the commentaries against illegal and unsustainable sand mining in the country. Very similar to the nature of organized crimes elsewhere, sand mafias in India are said to have invested in cultivating political protection.<sup>5</sup> In India's federal system, because States hold the authority to formulate policies on natural resources as well as law and order, state-level politicians and authorities use discretionary power to extend patronage to sand mafias in return for financial kickbacks.<sup>6</sup> The nexus between *mafias*, politicians, and the authorities was identified as being the major hindrance for effective monitoring and regulatory enforcement.<sup>7</sup>

<sup>3</sup> Interview with Engineer Air

<sup>4</sup> While we had read a number of media reports in the national media on sand mining that had to do with the nexus between the private sector and government officials, we did not come across this during our short field visit to the region. For more details on such collusion practiced in Nepal, refer to Duwadi 2018

<sup>5</sup> Madhavan 2019

<sup>6</sup> Madhavan 2019

<sup>7</sup> Field Interview with Sub-divisional Land and Land Reforms Officer

**Sand mining, communities, and their livelihood:** The presence of sand mining in many instances is not only because it benefits those involved in illegal schemes, but also because it is a key source of employment for many communities along the river. This is especially the case for those that are living in poverty and may not have opportunities to earn a stable income. With livelihoods rooted to the stability of local mining operations, communities were found to strongly voice their support for undisrupted mining operations.

## THE OVERARCHING OBSERVATIONS

The framing of the issue around sand mining in Nepal and India are vastly different, which is also reflected in who the actors involved are and the policies and institutions that have been established to deal with the problem at hand. In Nepal, the scale of operation of sand mining in terms of the market and the corresponding supply of sand from the Mahakali River is relatively small and the institutions that have been established to manage the industry is fairly straightforward. Furthermore, given the current political transition in the country, the primary issue in the Mahakali region is less about illegal sand mining, and more about the jurisdictional overlaps and the mechanisms to distribute royalty among the administrative units. In India, however, given the huge market demand, a willing supply chain, a mature and vocal activism, an active judiciary, and a corresponding act of the central and state governments, the policies and institutions to oversee sand mining is more complex.

Secondly, the regulatory regimes that Nepal and India have established has provisions, at least in paper, that promote sustainable sand mining. However, having observed how sand mining is being conducted in the Mahakali and the Teesta Rivers, it is evident to us that the proliferation of illegal sand mining is less about the absence of policies and more about the failure to adequately implement existing laws. This is due to two primary issues: (i) the constraints in capacity of the local institutions; followed by the limited resources that is made available, and (ii) the structuring of the institutional incentives and its influence in how people respond.

## RECOMMENDATIONS

**Collaborate with local governmental and non-governmental institutions** to be able to engage, monitor, and provide oversight of the entire mining process, especially by extending support to develop and align policies; in making better estimates of local demand and supply of sand; and increasing capacity of relevant institutions for monitoring and oversight.

**Contribute towards a more effective benefit sharing mechanism** by i) conducting research to evaluate the effectiveness of current benefit sharing mechanisms; ii) arranging advocacy forums and public hearings designed to promote transparency and accountability of spending; and iii) supporting relevant government bodies to prepare a benefit sharing plan.

**Provide local, regional, and national-level policy platforms** that offer space for constructive criticisms and solutions-oriented dialogues. Tentative topics for these dialogues can be as follows: promoting alternatives to river sand; overcoming challenges in governance.

**Invest in building knowledge through in-depth scientific inquiry** to fully understand and estimate the nature and level of impacts of sand mining to generate long-term information not only from the immediate basin but also in areas much further downstream. The knowledge generated from this initiative should be the basis for reform activism and evidence-based policy action.

**Connect global networks and involve the major players**, especially the construction sector and the multilateral institutions such as the UN, World Bank, the Asian Development Bank, and the Asian Infrastructure Investment Bank, among others, and the governments of the region to discuss issues related to indiscriminate, unsustainable, and illegal sand mining.

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## 1. INTRODUCTION

### 1.1 BACKGROUND

The foundation of modern civilization is built, literally, on sand.<sup>8</sup> The presence of sand in our everyday modern lives is ubiquitous: it is a key component in concrete that allows us to build most of our modern infrastructure; it is the source for silica in the manufacturing of glass that allows us to communicate through our computer and phone screens. And yet we seem to be taking its presence for granted—given our understanding that it is found almost everywhere and at a price of dirt—that it may not be getting the attention it truly deserves.

The extraction of sand<sup>9</sup> from rivers is not a recent phenomenon. Humans have used sand for millennia; ancient Egyptians and Mesopotamians were using sand as early as 3500 BCE.<sup>10</sup> But what was different for most of human history was that the extraction from rivers was being done at a scale that nature was able to replenish itself and hence there was very little impact on the overall ecosystem. But as a result of modernization of human society and the growing trend in urbanization across the globe, there has been a significant increase in the demand for sand. This is exacerbated by the fact that humans today have the tools and the technology to extract at such levels like never before. With such commercialization of sand and the ability of modern machinery to extract indiscriminate amounts of sand, failure to adequately regulate this industry can have irreparable consequences.

And while we may not treat it as such, sand is a limited resource, and growth in global demand and the race to supply it have led to growing concerns over the sustainability and ecological viability of existing supply systems. In the forefront of raising these concerns are activists who have been vociferously raising their voices. In acknowledging these concerns governments are examining their position on river bed mining. The resulting response has been a move towards introducing stronger regulatory frameworks for resource governance, sustainability, and oversight. Yet, given the market forces of a growing demand and a limited supply, illegal sand mining is finding space. This situation is more pronounced across developing countries where weak governance impair regulatory oversight and enforcement.

### 1.2 SCOPE OF THE STUDY

This study is in response to a Request for Proposal (RFP) made public by the Transboundary Rivers of South Asia (TROSA) project, a five-year initiative funded by Swedish International Development Agency and managed by a consortium of institutions led by Oxfam International. The overall objective of TROSA is “to contribute to poverty reduction and marginalization among vulnerable river basin communities through increased access to and control over riverine water resources on which their livelihoods depend.” As such, the specific objective of the study laid forth in the RFP were as follows:

- to review the knowledge base on sand and gravel (aggregate) mining in selected South Asian river basins and their diverse impacts;
- to map existing policy instruments governing sand extraction, its marketing and trade (including cross-border trade, if ongoing);
- to map sectors and industries which use sand from these rivers; and
- based on the findings of the research, suggest ways to engage with policy makers and private sector to promote more responsible and sustainable sand mining practices.

Given the expressed objectives in the RFP, Policy Entrepreneurs Incorporated proposed to examine the practice of sand mining in South Asia with special focus on the Mahakali<sup>11</sup> and

<sup>8</sup> Beiser 2019

<sup>9</sup> For the purpose of this report, we will refer all river aggregates as sand.

<sup>10</sup> Rayasam 2016

<sup>11</sup> The Mahakali is referred to by a number of names, namely, Kali and Sarada, to make it consistent in the report, it will be simply referred to as the Mahakali

the Teesta<sup>12</sup> Rivers. The choice of rivers was done so given that both these rivers fall under TROSA's mandate and there are on-going project activities that this study intends to contribute towards.

### **1.3 METHODOLOGY OF THE RESEARCH**

This research was conducted in two phases. The first phase was an examination of available literature on sand mining. Literature ranged from academic pieces in journals, reports from non-governmental institutions engaged in the area of sand mining, either as activists or through specific programs, media reports from the local and national newspapers, and official government publications. The review of these documents helped in mapping and documenting existing policy instruments that are currently in place India and Nepal and in developing the analytical framework of the study.

The second phase consisted of field visits to the select river basins. The research team first traveled to the Mahakali River followed by a second trip to the Teesta River. The field visit included meetings with officials of local bodies, political actors, members of the local business organizations, and representatives from the civil society. It will also include engagements with local community members, who have been impacted by sand mining from their rivers. The research team also made attempts to meet with the private sector entities engaged in the extraction of sand and gravel to understand their business model, including their market. Based on the findings from these exercises, the research team conducted further interviews to locate possible ways to ensure responsible and sustainable sand mining practices.

Findings from the field study and compiled secondary literature were organized within key themes of the analytical framework – license approval process; guidelines for harvesting; allotment of extraction areas; loading and transport; royalty and collections; market demand; and monitoring and enforcement for analyzing and interpreting underlying drivers, the process of the entire practice, and the overall impact.

### **1.4 LIMITATION OF THE STUDY**

A key limitation to this study was the limited resource available for this particular undertaking. As a result, the study team could only allocate a limited number of days over a period of less than three months to complete the entire study. This has limited both the time to conduct a thorough investigation of the literature, but more importantly, the team could only be in the field for around four to five days, which limited the research team's ability to undertake in-depth examination of the sector and its key issues, both in Nepal and India. However, the team understands that this undertaking is only part of the larger initiative that is currently being undertaken. Hence, this report should be seen as a preliminary program document of the TROSA program that attempts to scope and bring to surface key issues in sand mining that is relevant for future programmatic interventions. It should be noted that given the difference in access to information between Nepal and India, the analysis also differs accordingly.

### **1.5 ARRANGEMENT OF THIS REPORT**

To achieve the required objective, this investigation is reported in the following sections: the first section unpacks the phenomenon of sand mining. It does so by providing a brief detail explanation behind the sand market. For those who are familiar with the primary literature, the early section of the first chapter can be skipped. The second and the third section are accounts from the field. As noted in the limitation of the study, the research team only had several days per river, which limited the number of interactions and the ability to observe the practice of sand mining. The final section brings together the overall observation of the practice of sand mining in South Asia and suggests ways to engage with policy makers and private sector to promote more responsible and sustainable sand mining practices.

<sup>12</sup> Teesta is spelled as Tista.

## 2. THE ESSENTIALS OF SAND MINING

This chapter examines the available literature on sand mining in an attempt to unpack the various characteristics of its practice. This includes topics ranging from the basic workings of the demand and supply for sand to the methods of extraction, the governance, and the impacts of sand mining on the river and the local communities. This chapter is intended for those who may not be very familiar with the concepts of sand mining; for those already acquainted with the essentials of sand mining, we advise you to skip ahead to the next chapter.

### 2.1 SAND MARKET: THE OVERALL ARCHITECTURE

The global sand market, in 2018, was estimated to be US\$ 10 billion. Here, we first try to unpack the mechanisms, i.e., the demand and supply, that drive the market.

**2.1.1 Demand for Sand:** The annual global demand for sand is estimated to be around 50 billion tons.<sup>13</sup> The largest share of this demand comes from the construction industry. Whether this is to construct buildings and other such infrastructure that are based on concrete or roads or runways that are based on asphalt, sand is a principle component in all of them. Given the trend towards modernization and urbanization of human society, there has been an exponential growth in the demand for sand in recent years.

Globally, countries like Singapore and China have, in recent years, been some of the largest consumers of sand.<sup>14</sup> In Singapore, other than to feed its high pace of construction, sand is also used in its ambitious land reclamation project; since the 1970s, Singapore has expanded its total land territory by about 20 percent. China is also another major consumer of sand, given its rapid push for modernization and industrialization. For example, it has been reported that China used more concrete, and therefore sand, between 2011 and 2013, than the United States did during the entire 20th century.<sup>15</sup> Its Three Gorges Project, built around 2012, set a world-record use of sand and concrete at 15 million cubic meters. In a region more relevant to this study, i.e., South Asia, the demand for sand has been strong. Fuelled by the economic growth of countries such as India, Bangladesh, and Sri Lanka, the demand for sand in this region growing. With each South Asian country seeking its own path to economic prosperity, there is significant optimism for growth in the region, which will result in even further growth in the demand for sand.

Besides the construction industry, sand has a variety of other uses. A big consumption of sand is in producing a diverse set of household and industrial commodities. For example, silica sand is critical to the production of glass, which is used to make most essential items such as bottles, eyewear, to television screens. It is also used in creating artificial reefs, beaches, and islands.<sup>16</sup> It can also be used to make sand bags used for flood protection. There are even more novel usages of sand, including in the production of computer chips, and most recently in hydraulic fracking, a process through which natural gas is extracted from underground.

**2.1.2 Supply of Sand:** The journey of all sand begins high up in the mountains as particles chipped away from rocky slopes that gradually find their way into the waterways. There, as they traverse downstream, the particles break further down into smaller pieces through countless collisions with each other and the surrounding environment. This results in them eventually becoming sand along the river banks; those that are washed into the ocean are found in the depths, some of which makes it to the beaches.

But not all sand is created equal. River sand is the most preferred, especially for construction, given their consistency in shape and size. They are also made up of hard minerals like quartz,

<sup>13</sup> Beiser 2019

<sup>14</sup> OEC 2016

<sup>15</sup> MaCarthy 2014

<sup>16</sup> Sausa 2017

which create a strong bond when mixed with cement. Beach sand, on the other hand, is salty and contains marine impurities such as shells and other aquatic life, which makes the concrete softer or chemically reactive. Finally, there is desert sand, which despite its abundance is not suitable for construction because the grains are very smooth and do not bind well when mixing with concrete. This is shown by the fact that when building the Burj Khalifa, despite having sand in all its abundance, the United Arab Emirates had to import sand from Australia.<sup>17</sup>

Given its high demand, sand, by volume, is the most mined mineral in the world. And the most widely used extraction technique to extract sand is riverbed mining, where sand is collected directly from the river. The popularity of this method is due to the fact that the sand deposits are readily available and also largely free from impurities thus making the extraction process very cost-effective. Riverbed mining can either be done through *in-stream mining*, where extraction is done directly from dry stream beds through mechanical or manual method or from flowing streams using hydraulic excavators, or bar scaling, which involves removal of the top layer using a gravel bar or net. The second method is *flood plain mining*, which is also referred to as *terrace* or *off-channel mining*. Here, the collection of sand is done from sites along the riverbanks where the river expands and deposits sand during rainy season when the water level in the river is high.

While sand is a cheap commodity to produce, it is bulky and quite heavy to transport. This can significantly add to its overall cost, especially if it has to be delivered far from the extraction site. As a result, most of the sand supply generally tends to stay local. This is also why many rivers that are in close proximity to cities are generally exploited first to meet the growing urban demand. But there is a global market where sand is traded across large distances. The United States, China, and India are some of the largest exporters of sand. In 2014, an estimated 53 percent of the global supply of sand was met through exports from five countries, with the US alone accounting for 22 percent. Sand extraction is rampant across much of the Asia-Pacific region. Sharp increment in the price of sand, up 100-150 percent since 2018, has made it economically desirable for many countries to engage in trading of sand.<sup>18</sup> For example, Myanmar exported 4 million cubic meters of sand to Singapore between 2011 and 2014 for an estimated value of USD 12 million.<sup>19</sup> Besides such official numbers, there are estimates of a large volume of sand being consumed and traded illegally.

## 2.2 IMPACTS OF SAND MINING<sup>20</sup>

But before sand became such an integral element of modern development, it had always been part of the natural ecosystem contributing directly to the riverine ecology. And with sand being extracted from these ecosystems, a number of studies are pointing to the negative impacts and the unsustainability of the current practice. This is especially true when trying to meet the ever-growing demand, given the physical and the ecological impact it has on the natural ecosystem in and around the sand mines, which also impacts the lives and livelihood of the communities whose lives are connected to the river. Some of these major impacts highlighted in these studies are provided below. Given the overall objective of the research, this section is limited to summarizing the overall messages from the past studies available.<sup>21</sup>

*Impact on the river ecosystem:* Extraction of sand at levels higher than its natural replenishment has been studied to cause varying levels of onsite and offsite impacts.<sup>22</sup>

<sup>17</sup> Freeman 2017

<sup>18</sup> Dash 2018

<sup>19</sup> Kadoe 2018

<sup>20</sup> It should be noted here that due to the scope of this paper, this section only focuses on the impact from riverbed sand mining.

<sup>21</sup> For a comprehensive meta-analysis of recent studies on impact of sand mining, see the 2018 WWF report titled *Impacts of Sand Mining on Ecosystem Structure, Process and Biodiversity*.

<sup>22</sup> Padmalal, Maya, Shreebha, and Sreeja 2008

The most common and visible morphological change associated with sand mining is related to channel incision. Removal of sediment from the channel has been noted to disrupt preexisting balance between sediment supply and transporting capacity of the river, leading to incision both upstream and downstream of the extraction site.<sup>23</sup> Incisions commonly result in other morphological changes such as narrowing of the river channel and lowering of the river bed.<sup>24</sup>

The impact of these changes have also been a subject of several studies. The most common impacts relate to erosion of river banks; lowering of ground water table in the alluvial plains; loss of wetland areas; and threats to the structural integrity of hydrological and engineering infrastructure such as bridges and dams.<sup>25</sup> While channel incision is a gradual geomorphological phenomena, a point of concern is the change in the pace of incision. Anthropogenic disturbances such as sustained and intensive sand mining can significantly expedite the process channel incision, resulting in drastic morphological changes within a span of 10-100 years; in its natural course such changes would have occurred over millennia.<sup>26</sup>

Another key impact of sand mining is related to the decrease in downstream sediment flux, which over time holds potential to exacerbate the effects of subsidence (sinking) in river deltas. For example, reduced sediment supply in the coastal areas of the Mekong delta has resulted in the successive reduction of the shoreline, thereby increasing the vulnerability of those living in the delta to, among other things, flooding and sea-level rise.<sup>27</sup> This condition is further exacerbated if there are large dams upstream of the mining sites, which obstruct the natural process of sand replenishment downstream.<sup>28</sup>

The physical habitat plays a major role in the distribution of aquatic flora and fauna within a river ecosystem.<sup>29</sup> Major disruptions there, including through activities such as sand mining, can induce drastic changes in the biodiversity of aquatic species. Some key associated impacts include decline of floral and faunal diversity within the river basin; decline of terrestrial insects whose larval stages are in the shallow water sandy fluvial systems; loss of habitat and or changes in breeding and spawning grounds for fish species; and reduction in inland fishery resources.<sup>30</sup> Some examples of this impact include reduction of salmon population in the Puyallup River in the United States<sup>31</sup> and destruction of the nesting and breeding habitats of the endangered *gharials* in India and Nepal.<sup>32</sup>

*Impact on riverine communities:* Communities living in areas close to sand mines are also impacted by the extraction. In their study of sand mining practices in the Neyyar River in Kerala, India, Shaji et al (2014) observed the following social impacts on local communities: increase in instances of conflict, especially where illegal sand mining is conducted by “outsiders with criminal background”; increase in alcohol consumption and other “unhealthy practices” due to sudden influx of money from illegal sand mining activities, and increase in number of deaths due to drowning from deep pits resulting from sand mining.

<sup>23</sup> Wiejaczka, Tamang, Piróg, and Prokop 2018

<sup>24</sup> Best 2018

<sup>25</sup> Bravard et al. 1997

<sup>26</sup> Simon and Massimo 2006

<sup>27</sup> Anthony et al. 2015

<sup>28</sup> Chen 2017

<sup>29</sup> Kurup et al. (2005), in Padmalal et al. 2008

<sup>30</sup> Padmalal et al. 2008

<sup>31</sup> Kandolf 1997

<sup>32</sup> Bendixen, Best, Hackney, and Iversen 2019

There are times when the communities living closest to the sand mines are those that are also find direct employment. Impact on the sand miners themselves, who risk their lives to engage in illegal sand mining. Threats to the life of those involved in the process of mining is equally alarming. For example, the divers in the Vasai Creek, Mumbai, India, risk their lives for IRs 1,000 a day to dive 12 meters deep almost 200 times a day. The uneven depth due to sand mining have been reported to create currents and whirlpools that not only threaten the lives of the divers but those travelling via the river channel.<sup>33</sup>

*Other impacts:* Environmental impacts related to mining are not only limited to extraction sites but also during the transportation, storage, and processing of sand. Large amount of waste is generated while processing stones and boulders to convert to sand and gravel.<sup>34</sup> Water and air pollution are common while processing sand and gravel. Release of untreated processing effluents into the river further results in increased turbidity, low pH, and heavy metal toxicity. These physical changes significantly affect aquatic biodiversity and impact populations who depend on the river for various livelihood purposes.<sup>35</sup>

It should be noted that, despite these claims of impacts of sand mining, a 2018 meta-study by WWF finds that there is still limited scientific analysis that has systematically documented the causal relationship. Having conducted a comprehensive analysis of the available literature, one of their primary recommendations is to invest more in rigorous scientific examination to bring better evidence to policies that promote sustainable sand mining.

### **2.3 GOVERNING SAND MINING**

As stated earlier, sand is an essential raw material for the current development pathway of all modern societies and its demand comes from all the different sectors that rely on its availability and affordability. Consequently, governments have to allow for the extraction of sand where available and feasible to ensure the supply. Where this becomes a serious issue is when the supply is sourced through unsustainable extractive practices or when the demand simply reaches beyond what nature can replenish. Both these result in the degradation of the riverine ecosystem that has negative impacts, which have been discussed in the earlier section.

The challenge for governments for effective governance of the sector is that they have an unenviable task of having to strike a balance between two issues that are at the heart sand mining. These are the responsibilities of i) ensuring that the demand for sand is met and, more importantly, at an affordable price; and ii) overseeing the sustainable extraction of sand that ensures a minimal impact on the river ecosystem and long-term benefit to the society at large. What makes this a complex balance is that the interests and incentives around these two responsibilities may not always be aligned; on the contrary, they may even be in direct conflict with each other.

Most governments across the globe have adopted various measures to regulate sand mining in an attempt to minimize associated environmental cost. For example, in developed countries where demand for sand proliferated relatively early and its environmental impacts have been duly recognized, governments have either banned or drastically reduced in-stream mining.<sup>36</sup> Furthermore, given the strong institutions and rule of law in these countries, the prevalence of

<sup>33</sup> Srivastava 2017

<sup>34</sup> Ako et al. 2014

<sup>35</sup> Gavriletea 2017

<sup>36</sup> Koehnken and Rintoul 2018

illegal sand mining is very limited.<sup>37</sup> In contrast, governments of countries that are on a more recent trajectory of rapid economic growth are struggling to adequately regulate and monitor their sand mining industry. As a result, not only is the sand mining in these countries huge, as a result of weak oversight by the governments, most of this is being done unsustainably or even illegally.<sup>38</sup> This is abetted by the fact any major imbalance in the demand and supply of sand results in it being a high-value market commodity, which entices the nexus of profit-seeking private extractors and willing government officials to engage in illegal sand mining.

Other overarching institutional arrangements can also be at play to promote extravagant mining of sand. For example, governments levy tax on sand based on the amount extracted from the rivers, which serves as an important revenue source for many local governments. As a result, officials in charge of making the decisions on the quantity may be incentivized to allow the maximum levels of sand mining, at times even beyond what is deemed sustainable. Similar incentives to endorse large amount of sand mining can also come from high places: when governments regulate mining of sand, say through an issuance of a ban, this decreases the availability of sand in the market resulting in an increase in price of sand, which is then reflected in overall economy. The fear of a political backlash can limit the political will of policy makers to take on any drastic measures.<sup>39</sup>

## 2.4 THE COMMENTARY CRITICAL OF SAND MINING

While the average person may not be aware of the state of affairs of sand and its associated complexities, the push to drive all this into the public consciousness is being led by a growing number of activists from across the globe. The narrative of their activism centers on the growing unsustainability of the current practices of sand mining and highlights the negative impacts that it has on the environment and communities. They have also been demanding from governments a larger accountability on this matter and to ensure better governance of this particular resource. Their actions have ranged from physically obstructing the illegal extraction of sand, publishing editorial pieces on newspapers, producing documentaries aimed for public consumption, conducting research on impacts of sand mining, to filing public interest litigation. In addition to raising the profile of the sand mining issue in a crowded field of global agendas, some of their actions have been to influence the regulation of sand mining in their countries.<sup>40</sup>

In a similar vein, there is significant amount of reporting of illegal sand mining in the media of many countries, including in South Asia. A key narrative in these articles, as exemplified by a 2017 article titled *Sand Mining is Destroying Asia's Rivers* in thethirdpole.net, an online portal covering Asia's water crisis, is that "uncontrolled and mostly illegal extraction of sand and rocks from riverbeds for construction is killing rivers across South Asia... and must be tightly controlled."<sup>41</sup> These media reporting often point to the presence of a strong nexus between the *sand mafias*, local government officials and politicians, corporations, law enforcement agencies, and local communities across the various stages of sand mining.<sup>42</sup> But having exposed some the ground realities of the illegal sand mining industry, a number of activists and journalists have been either received threats of violence or actually been harmed.

<sup>37</sup> As noted in the WWF study, there was limited studies on illegal sand mining in western countries, which is very different to what is observed in developing countries, and can be taken as a proxy for its non-existence.

<sup>38</sup> Koehnken and Rintoul 2018

<sup>39</sup> The Third Pole 2017

<sup>40</sup> This is discussed further in the case of sand mining in India.

<sup>41</sup> The Third Pole 2017

<sup>42</sup> For details see Rege 2016

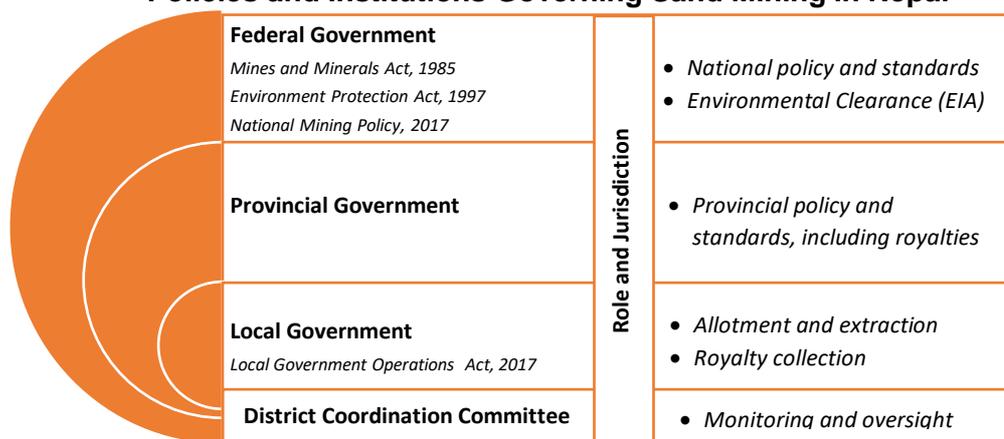
### 3. SAND MINING IN NEPAL: ACCOUNTS FROM THE MAHAKALI RIVER

This chapter observes the status of sand mining in Nepal with a particular focus on how it is practice in the Mahakali River. The reason for picking the Mahakali River, as opposed to many other rivers in Nepal with significantly more instances of sand mining, especially those closer to urban centers like Kathmandu, is because this research is designed to feed directly into the programming aspect of the TROSA program and Mahakali is its focus in this particular region. It should also be noted here that despite Mahakali being a transboundary river, given the limited time and resources available for the research, the analysis is limited to the practice on the Nepal side.

#### 3.1 A BRIEF OVERVIEW OF SAND MINING AND ITS REGULATIONS IN NEPAL

The demand for sand in Nepal increased dramatically in early 1980s due largely to the rapid urbanization in Kathmandu and other cities across the country. Most of this demand, at least back then, was small enough to be met through the extraction of sand from nearby rivers. The demand was further increased by the construction of large private and public infrastructure works such as roads, airports, and hydropower projects, all associated with the development trajectory of the country. And in the rush to profit from the rising price of sand and left as an unregulated activity by the government, the extraction of river sand reached unsustainable levels. One major event that brought sand mining to the center of public attention occurred in 1991 when the Bagmati Bridge in the heart of the capital city collapsed. Experts and the media quickly linked this to the rampant extraction of sand from the riverbed near the base of the bridge. This put pressure on the government to better regulate sand mining in the country.

#### Policies and Institutions Governing Sand Mining in Nepal



Sand is classified in Nepal as a non-metallic mineral and the extraction and market operations of sand is governed by the Mines and Minerals Act. As elsewhere, Nepalis have long extracted sand from nearby rivers to meet their needs. The first-time sand was brought under the purview of a governmental policy was in the 1980s when it was explicitly mentioned in the Mines and Mineral Act. Another legislation that provides oversight on the practice of sand mining in Nepal is the Environment Protection Act of 1997. This legislation, which regulates development activities with a potential to adversely impact the environment, requires all mining operations to get an environmental clearance from designated government agencies. Its corresponding regulation prescribes the norms, modalities, and processes for the various sectors to obtain the necessary clearances. As per this legal regime, all extractions of sand of over 300 cubic meter per day have to conduct an Environmental Impact Assessment (EIA), to be monitored and regulated by the Department of Environment under the Ministry of Forest and Environment. For all sand mining under 300 cubic meter per day, the requirement is

limited only to an Initial Environmental Examination (IEE), which has a relatively simpler requirement, is relatively cheaper, and can be approved directly by the related line ministries.<sup>43</sup>

Much of the established regulatory regime for sand mining in Nepal, and for every other sector in the country, changed with the promulgation of a new constitution in 2015. A prominent feature of this constitution was the decision to restructure the Nepali state into three tiers of governments at the federal, provincial, and local levels and the requirement for the central government to devolve significant authority and funds down to its sub-national counterparts. The constitution, among many other things, also provides a new guiding framework for the governance and management of the country's natural resources. With regard to sand mining, because sand is classified under the mines and mineral category, it is listed for a concurrent power sharing between the federal, provincial, and local governments. This constitutional arrangement was further clarified by the GoN's new National Mining Policy in 2017. This policy limits the role of the federal government to that of drafting national level policies.<sup>44</sup> Provincial governments hold authority and autonomy to formulate provincial policies to govern sector operations, including that on norms and standards of mining and rate of royalties. Similarly, local governments have been entrusted with responsibilities around implementation and oversight of sand mining.<sup>45</sup> The role of sub-national bodies is further institutionalized through the Local Government Operations Act of 2017, which authorizes the provincial government to establish the royalty rates and the local governments to collect the taxes on sand mining.

## **3.2 FIELD OBSERVATIONS FROM THE MAHAKALI**

**3.2.1 The River:** As stated earlier, the proposed river for field observation in Nepal was the Mahakali River. This river begins high up at an altitude of about 3,600 meters near Kalapani collecting water from the various glacial streams. As it moves further south, it serves, on major stretches, as a boundary between Nepal and India and is joined by its other major tributaries: large ones include Dhauliganga at Tawaghat, Goriganga at Jauljibi, and Saryu at Pancheswor from the Indian side, and Chameliya from the Nepal side. On its eastern bank is the Sudurpaschim Pradesh of Nepal, which consists of the districts of Darchula, Baitadi, Dadeldhura, and Kanchanpur; on its western bank is the Indian state of Uttarakhand, which consists of the districts of Pithoragarh, Champawat, and Udhan Singh Nagar. Downstream, past the Nepal-India border, where the river is now solely referred to as Sarada, it mixes with yet another river flowing from Nepal, namely, the Karnali/Ghagara, and assumes that name until it eventually mixes with the Ganges.

**3.2.2 The Field Visit:** The research team, based on media reporting on sand mining activities in the Mahakali River, identified Bhimdutta<sup>46</sup> Municipality and its surrounding area for its field visit. This region sits where the river, after travelling through deep gorges, opens to the plains leaving ample deposits of sand in the river banks. What also makes this ideal is the fact that, due to historical reasons that led to a swapping of around 4000 acres of riverbank territory between Nepal and India, the Mahakali River does not serve as a boundary river. This turned out to be an interesting issue given that Nepal legally allows for sand mining within its territory, but India does not, despite the fact that these areas are alongside each other. The research team spent four days traveling from Kathmandu to the field, the observations of which are presented in the following section.

**3.2.3 Accounts from the Field:** As specified in the given scope of work, the research team in this section is looking to map out the existing the process of sand extraction, including the

<sup>43</sup> In 2016, in the aftermath of the devastating earthquake and the increased demand for sand and other aggregates to rebuild, the government for a limited period of time amended its existing regulations to allow all such extractions solely on the basis of an IEE.

<sup>44</sup> Under Article 26.1 of the National Mining Policy (GoN), 2017

<sup>45</sup> Under Article 21 of the National Mining Policy (GoN), 2017

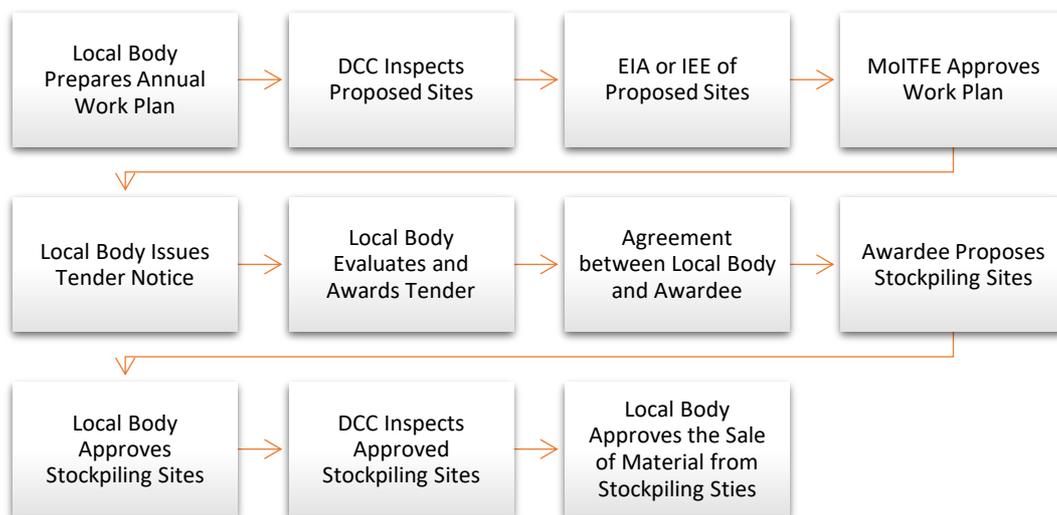
<sup>46</sup> Bhimdutta was up until recently named Mahendra Nagar. While officially this name has been changed, colloquially many people refer to it by its older name.

policies that govern it, and to put together the market mechanisms in place, including the identification of demand from specific industries and sectors that are driving sand mining in the region. It should be noted here that due to fact that Nepal is now in a very nascent stage of implementing federalism, there is a lack of clarity in many of the process. Given that the entire regulatory regime is in transition, the accounts provided here reflect practices that may have only been instituted very recently. For example, the Sudurpaschhim Province, in 2018, issued the Sudurpaschhim Province Riverine Material Management Directive, which governs the current practice of sand mining in the province, but there are struggles in implementation. Also, important to note that while this section is titled “Accounts from the Field,” it significantly relies on official government documents to vet and complete the information gathered from the field. A more through reflection on the observed practice is provided in the following section.

**Approval Process:** Local governments are required to follow a set of standard procedures to approve the extraction of sand within their jurisdiction.<sup>47</sup> This process begins with the municipal office first preparing an annual work plan that includes the identification of potential sites for extraction.<sup>48</sup> These sites are then inspected by the District Coordination Committee (DCC),<sup>49</sup> and if approved, the municipal office initiates the process of obtaining environmental clearance. In the Mahakali, since the extraction was projected to be less than 350 cubic meter per day, the process only required an IEE. Additionally, to make things easier, the IEE only needs to be approved from the respective line ministry, in this case the Ministry of Industry, Tourism, Forest and Environment of the Sudurpaschhim Province.

Once the environmental clearance is approved, the municipal office initiates the tendering process to award the extraction license. The bids submitted are evaluated by the municipal officials and successful bidders notified. Post selection, the winning contractor proposes sites for stock piling, which are inspected by municipal officials and the DCC for approval. The DCC is also meant to inspect the collection and storage sites to ensure compliance to established norm and standards.

**Process Flow for the Approval of Sand Mining in Sudurpaschhim Province<sup>50</sup>**



<sup>47</sup> This was initially overseen by the District Development Committees. Since the promulgation of the constitution and the elections of the local bodies, this responsibility had now shifted to the urban and rural municipalities.

<sup>48</sup> Sand mining is not allowed in river sections that fall within the national forest

<sup>49</sup> DCCs were established in 2017 to replace the older district development committee. It is meant to serve as a coordination unit that brings together the efforts of the federal, provincial, and local bodies.

<sup>50</sup> This process flow chat has been put together based on the Sudurpaschhim Province Riverine Material Management Directive, 2018

During the field visit, the research team was informed that the tendering for the extraction of sand from the Mahakali River for fiscal year 2018-2019 had not taken place. This was because of a dispute over a royalty sharing arrangement between the two municipalities that are on the opposite banks of the Mahakali River, namely, Bhimdutta and Mahakali.<sup>51</sup> Apparently, Mahakali was demanding for 70 percent of the total royalty revenue, which Bhimdutta was not willing to agree to.

It should be noted that the Sudurpaschim Province Riverine Material Management Directive allows for all projects classified by the central government as *national pride projects* or by the provincial government as *provincial pride projects* to extract the required amount of river aggregates from nearby rivers. This extraction does, however, need to be done from sites and quantity approved by the DCC and at the rate established by the provincial government plus applicable taxes, which is to be collected by the local government.

***Guidelines for harvesting:*** There is a set of rules established through various policy documents that have to be adhered to while legally harvesting sand from the Mahakali River. Some of the key ones based on the Sudurpaschim Province Riverine Material Management Directive are as follows: the collection of riverbed materials is limited to areas demarcated by the municipality; the extraction and processing can only be done between sunrise and sunset; harvested materials must be stored at least 500 meters away from the extraction site.

Others that are based on the IEE document prepared by the Bhimdutta Municipality are as follows: the extraction can only be done inside 200 meters from either side of the riverbank; sand mining is not allowed during the wet season, i.e., from mid-June to mid-September;<sup>52</sup> the maximum daily extraction is set at 250 cubic meter per day or 67,500 cubic meter in the nine months of period allowed; and extraction is limited to flood-plain mining and can only be done through manual labor using simple hand-held tools. But these rules are often not strictly adhered to, some of which are discussed in greater detail in the sections below.

***Allotment of extraction areas:*** Local governments are responsible for identifying possible zones for sand extraction. From the discussions with local authorities, it seemed that this process of identification is based on a visual estimate of the river and not through any standard scientific method. Once the sites have been identified, the municipality needs to prepare the EIA/IEE to get the necessary environmental clearance. In Bhimdutta, the task of conducting the IEE in the Mahakali River was outsourced to a Kathmandu-based engineering consulting company that dispatched a group of experts.



The green area includes the three zones identified by in the 2018 IEE report of the Mahakali Municipality. The red area is included to show a section in the Indian part of the Mahakali where sand mining is not allowed.

<sup>51</sup> In 2014, the GoN merged the Dodhara and Chandni Village Development Committees to establish the Dodhara-Chandni Municipality, which was then renamed Mahakali Municipality in 2016.

<sup>52</sup> In the Nepali calendar this would be the months of Asadh, Shrawan, and Bhadra.

Among other things, the IEE informs about the annual volume of deposits in the chosen sites. For example, the IEE prepared by the Bhimdutta Municipality for 2018 estimates sand deposit of 13,51,040 cubic meter in the three zones: between Chaukisota to Aerighat (702,000 cubic meter); between Aerighat to Piprayaghat (378,000 cubic meter); and between the Piprayaghat and the Dodhara-Chandani suspension bridge (271,040 cubic meter). This estimate, the IEE states, was arrived at based on available data, site visits, and secondary source materials and was done through a consultative process with representatives from the local communities, civil society organizations, and municipal office. The IEE estimates the total revenue generation for the fiscal year from sand mining to be around NRs. 100 million.

Besides the official extraction sites identified for commercial sand mining by the municipality, the research team was also informed about smaller mining activities of the local communities. Given the miniscule scale of these activities, which is also associated with income generation and their livelihood, authorities were seen to be tolerant to such smaller operations.

*Loading and transport.* Loading of sand is being done both manually and mechanically. While the IEE clearly states that all loading is to be done manually, the use of excavators was quite rampant. An excavator was even a preferred method of loading given that it charged NRs. 600 to load a truck while manual loading cost NRs. 750. Both tractors and tippers were used in the transport of aggregates: tractors haul around 4-6 cubic meter per trip, while tippers haul around 10 cubic meter per trip. The aggregates are then transported either to a private “crusher” plant where they are sorted, crushed, and stored or directly to a project site of a public or private construction.

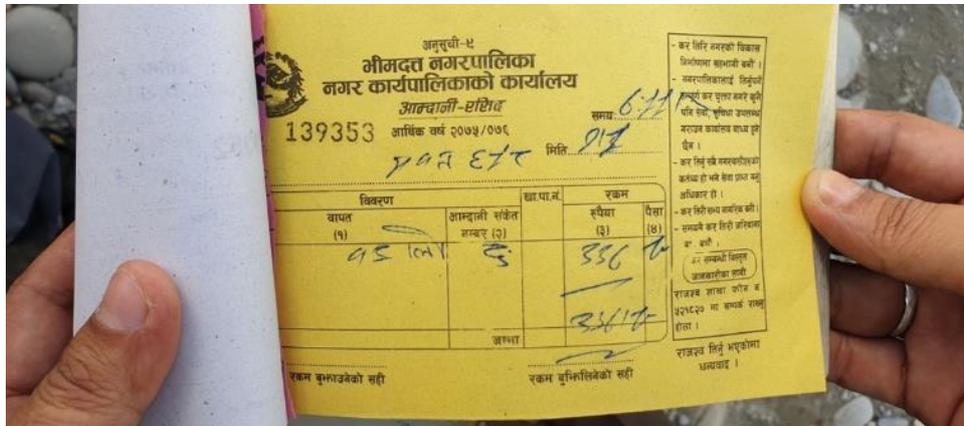


A tractor being manually loaded with river aggregates by male and female laborers in the Mahakali River



While the law restricts the use of excavators for sand mining, these were two among a dozen excavators working the allocated extraction sites in the Mahakali River.

**Royalty and collection:** The government of Sudurpaschhim Province, through its Fiscal Act, 2018, has fixed the rate of royalty for the extraction of sand at NRs. 75 per cubic meter. The municipality is responsible to collect this royalty from the contractor tendered to undertake the extraction. But given that there had been no tendering done this fiscal year, both municipalities had deputed representatives at the extraction site to levy a charge of NRs. 350 per haulage.



An official of the Bhimadutta Municipality shows a recently issued voucher for royalty collected from a truck carrying sand mined from the Mahakali River.

Of the total revenue collected by the local government, the Sudurpaschhim Province Riverine Material Management Directive (2018) requires them to share, on a monthly basis, 40 percent with the provincial government. Furthermore, the directive also requires local governments to allocate exclusively 15 percent of the royalty revenue to improve the lives of the communities directly affected by the sand mining and to conduct riverbank protection works near the extraction sites. This is, however, a very recent requirement and we were informed that it is yet to be practiced.



This six-lane access road under construction, also serves as embankment for flood protection, is meant to connect to a proposed dry-port, both of which are authorized to extract sand from the Mahakali River.

**Demand for sand:** A significant portion of sand mining in the Mahakali River is done by the large-scale infrastructure projects being undertaken by the GoN. As stated earlier, these projects are allowed to extract the required amount of aggregate, which is specified in the projects Bill of Quantity, from nearby rivers. The following are some of the major projects that

are currently extracting sand from the Mahakali River: the bridge across the Mahakali to Dodhara-Chandani; a dry-port and a six-lane access highway (which doubles as embankment for flood protection); upgrade of the East-West highway, etc.

Beyond the large-scale infrastructure projects, the demand for sand also comes from private consumers, especially for construction. There is a relatively small but growing urban center in Kanchanpur, i.e., the adjoining district of the extraction sites in the Mahakali River, which is among the smaller Terai districts in terms of population. The fact that this demand is relatively small is evidenced by the fact that there was only one “crusher industry” until very recently; a new one had recently been opened. There were, however, a number of “mobile crushers” that were being used by the contractors of the larger projects in the region.



A recently opened private “crusher” industry in Bhimdutta Municipality where the excavated river aggregates are transported to prior to being sorted and sold to the market.



A ghumti crusher sits idly by the Dodhara-Chandni Bridge over the Mahakali River. These mobile crushers are used by contractors of larger projects given their ability to be transferred closer to the desired sites.

***Monitoring and enforcement:*** In 2018, the Environment and Disaster Management Division of the Ministry of Federal Affairs and General Administration issued a circular to all DCCs to establish District Monitoring and Coordination Committee in their respective districts to monitor the overall process of sand mining.<sup>53</sup> This committee was given authority to direct the concerned municipalities and private contractors with regard to the observance of terms and conditions of the EIA report, approved procedures and rules, revenue leakage and smuggling,

<sup>53</sup> The Himalayan Times 2018

road safety and pollution control, observance of contract, market price control of river and mining products, and standards to be followed by the processing industries.

In reality, however, the committee's performance is limited by the following issues: i) the DCC is a relic of the old political order of Nepal that has lost most of its hold over financial resources, and therefore, its political power, ii) because most of its mandates are unfunded, the committee has very limited resource to carry through its duties, and iii) the committee has no authority to take action against offenders, the most they can do is issue warnings or inform the police.<sup>54</sup> Unfortunately, the police have not been given guidance on how to deal with illegal sand mining; currently, they are limited to seizing the transport vehicles and sending them to concerned municipalities for action. Even the IEE is silent on penalties for non-compliance. Municipalities are yet to formulate policies in this regard, but the research team was informed that the Mahakali Municipality was beginning to penalize NRs. 4000 per truck.

### **3.3 REFLECTIONS ON SAND MINING IN NEPAL**

#### ***3.3.1 Federalism and jurisdictional overlap in a new regime***

The overarching issue of governance in Nepal at this particular point in time, not only with regard to sand mining but almost every sector, is the new regulatory regime introduced by the implementation of federalism. Clearly, getting the key stakeholders to agree to restructure the state as a federated unit was key in successfully bringing an end to years of political turmoil in the country. But the fact that very limited homework had been done to ensure a smooth transition from the old to the new political system is now gradually becoming clear. With regard to sand mining in the Mahakali River, this is most evident in the dispute over sharing of royalty revenue between the Mahakali and the Bhimdutta Municipalities.

As stated earlier, Mahakali municipality is claiming for 70 percent of the revenue generated from sand mining in the Mahakali River. Their claim<sup>55</sup> for a larger share, which they believe is equitable, is because of the limited resources it has, especially when compared to the larger and long-established Bhimdutta municipality that has five other rivers within its jurisdiction to mine from. Bhimdutta, on the other hand, is of the opinion that because the majority of the sand mining sites are within its jurisdiction, it has a right to a larger share of the royalty revenue. The DCC is attempting to mediate the dispute, but without much success; there is confusion among the stakeholders as to whether or not the two municipalities would be willing to accept an agreement to equally share the revenue. Overall, the Constitution of Nepal does envision the possibility of such disputes on sharing of royalty from natural resources and has established the National Natural Resources and Fiscal Commission to oversee any resource-based disagreements. However, with delays in nominating a commissioner and with many other issues to handle, this may not get the due attention any time soon. In the meantime, either the two municipalities come to a mutual agreement or they will most likely continue with the current arrangement of mining without any tendering process.

Another issue that is gradually becoming more pronounced is the relationship between the three levels of government, especially when it comes to the jurisdictional overlaps. As stated earlier, sand mining falls under the concurrent list of power shared by the state, provinces, and the local governments. Roles and jurisdictions between the three levels of governments still remain fuzzy. However, it does offer a unique opportunity to engage with the newer governments in establishing stronger guidelines for sand mining in Nepal.

#### ***3.3.2 The incentives of local governments***

There are a number of structural arrangements that can drive the actions of local governments that relate to sand mining. First and foremost, they do have the unenviable task of trying to find a balance between ensuring affordable amount of sand in the market, an important

<sup>54</sup> As reported by the DCC chair

<sup>55</sup> Personal Interview with Mayor of Mahakali Municipality,

element of modern development paradigm, and overseeing the sustainable extraction of a finite resource.

Having said that, given that royalty from sand mining does bring in a modest amount of revenue for local governments, there is an incentive for the bureaucracy to oversee this sector. The IEE prepared by Bhimdutta Municipality in 2018 estimates the total annual deposit of sand in the three specified zones for extraction in the Mahakali River at 13,51,040 cubic meter. This document also recommends a limit of 67,500 cubic meter per year to be extracted from the river, which amounts to less than five percent of the total annual deposit. However, even the government officials opined that the current extraction limit of 250 cubic meter per day is not a realistic scenario. According to the Engineer of the Planning, Monitoring, and Statistics section of the Bhimdutta Municipality, the current amount of extraction is simply not realistic to meet the local demand for sand and that the replenishment of sand is significantly higher than the established limit.

Some of the “illegality” of mined sand comes not from a thorough scientific calculation around the sustainability of a river, but because of the lack of interest in conducting a comprehensive EIA, which is both time and resource consuming process. The implications of this inconsistency in the natural deposit and the limit of legal extraction is that a lot of sand can be stigmatized as being illegal, even when the extraction may still be environmentally sustainable. This also has a direct implication on lost royalty for the local governments. Based on casual discussions with several stakeholders, the current proposed rate of extraction seems not to be based on the scientific calculation, but because of the fact that the extraction of 300 cubic meter cannot be done with an IEE but instead an EIA; as noted earlier, the EIA is a more complex and more expensive undertaking than the IEE.

### ***3.3.3 Private sector, contracting, and over-extraction***

There are a number of issues that have to be understood as to how the private sector engages in sand mining in Mahakali. The first area deals with the nature of the bidding for the right to extract sand and how the mining is actually done: because the bidding amount is quite sizeable—the estimate given to us was around NRs. 4 Crore, only large-scale contractors are able to respond to the public tender. But while the law imagines that the proposed sand mining is done by single contractor with the necessary capacity, in reality, the contractor, as in many other instances of contracting in Nepal, is there only to serve as an intermediary. At times, this is done through the sale of the entire contract, at a marked-up price, to other contractors or the winning contractor is primarily there to raise rent from other sand miners.<sup>56</sup> This increases the possibility of exceeding the legal limit for extraction as there is a perverse incentive for the contractor that is based on the volume of sand extracted.

Another related issue with contracting is the potential for collusion among the bidders.<sup>57</sup> While interviewing journalists about how the bidding process is practiced in Bhimdutta Municipality, they referred to what happened in the bidding in FY 2017-2018: following the announcement of the winning bid of NRs. 4.25 Crore, the winner forfeited the contract, which forced the municipality to go to the second highest bid which was significantly lower amount. While it is not possible to prove collusion in this particular case, the fact that the public tendering process in Nepal is fraught with such cases across all sectors, events such as this would be a norm rather than an exception.<sup>58</sup>

The second area, which is already touched upon earlier, deals with the issue of over extraction by the private sector. To begin with, the fact that over-extraction is occurring is quite evident:

<sup>56</sup> Interview with Engineer Air

<sup>57</sup> While we had read a number of media reports in the national media on sand mining that had to with the nexus between the private sector and government officials, we did not come across this during our short field visit to the region. For more details on such collusion practiced in Nepal, refer to Duwadi 2018

<sup>58</sup> For more details, see Adhikari 2006

even the private crusher industries admitted that they receive significantly more than the daily 25 tippers that is legally allowed to excavate from the rivers. But the fact that the government has established a very conservative figure and that the contractor has incentives to maximally extract means that there is going to be over-extraction. The over extraction was also reported by contractors of the government-owned projects that are allowed to extract as per the project requirement, who often siphon the extra haulage directly into the private market.

As with the official mentioned earlier, some of the private sector respondents opined that there is a need to come up with a realistic estimate of an environmentally sustainable volume of extractable sand from the river. While this is not going to eradicate all of the illegal sand mining activity, this will, while adding to the government coffers, contribute towards the reining in the current informality that need not be conducted in the informal space.

### ***3.3.4 The impacts of sand mining on communities***

Bhimdutta Municipality, in its 2018 IEE document, provides the following rationale to approve sand mining in Mahakali River: given that the positive impacts outweigh the negative impacts, this document hereby recommends for approval for sand mining (in the Mahakali River), on condition that efforts are in place to ensure that the negatives impacts are minimized. The IEE lists the following as some of the major negative impact on the local communities: disputes among laborers, changes in geological features of the area, sound pollution, changes in river morphology, traffic problems, work-related health problems, and illegal activities in the region. On the other hand, some of the stated positive impacts are as follows: increased employment opportunities and income generation for community members, technological advancement, availability of raw materials, and development of local infrastructure.

During the field survey, local communities also expressed the following impacts on their lives and livelihood. A major problem reported was the dust pollution associated with the excavation and the transportation of sand from the quarry to the storage. Locals also complained about the damage to the local roads, which are not meant to handle vehicles with such heavy loads. As a result of hundreds of tractor sorties per day, the local roads from the major highway to the sand mining sites were in a dilapidated state. This was also a major culprit for the increased dust pollution even for communities living slightly further away. A number of local residents responded that they were apprehensive about potential impacts of river shifting and floods due to aggregate mining in the Mahakali.

A direct benefit was the increased opportunity for labor to local communities. While there was no specific number available with regard to how many jobs were created in the locality as a direct result of sand mining, in our brief visit to the extraction site, we were informed that local community members were involved directly in the sand mining activity. We also observed a number of seasonal migrants, from both Nepal and India, who were working in the sand mines. The sand mining activity had also increased some economic activity in the extraction sites, which was benefitting some of the local tea shops. Also, we were informed during our meeting with officials at the municipality and interviews with local community members residing close to the extraction sites that “quite a few” of locals owned tractors that were being used to transport the mined sand. While it was difficult to get data on ownership of tractors used in sand mining in the Mahakali, this clearly had benefitted the few locals who could afford such an investment.

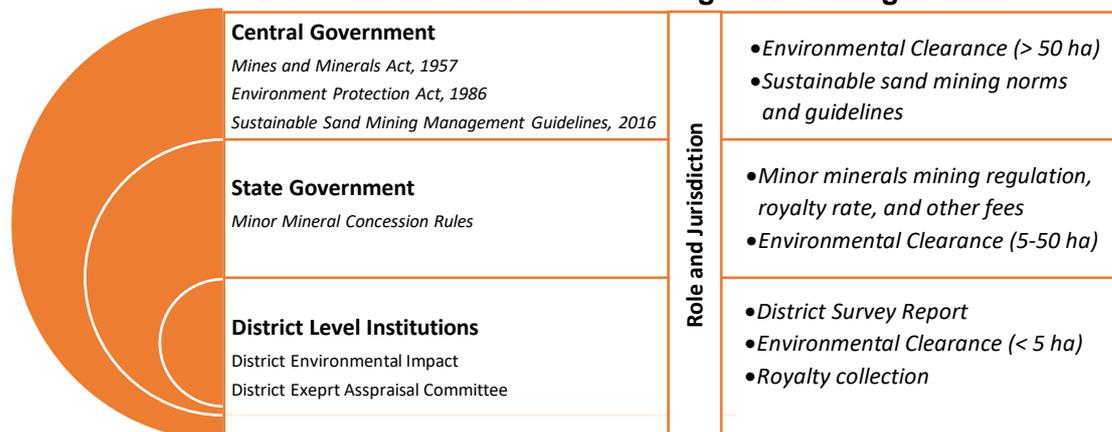
#### 4. SAND MINING IN INDIA: ACCOUNTS FROM THE TEESTA RIVER

This chapter observes the status of sand mining in India with a particular focus on how it is practiced in the Teesta River. The reason for picking the Teesta River is not only because this research is designed to feed directly into the programming aspect of the TROSA program, but also because of the level of sand mining that is reported from this region. It should also be noted here that while Teesta is also a transboundary river between India and Bangladesh, given the limited time and resources available for the research, the analysis is limited to the practice on two states of India, namely Sikkim and West Bengal.

##### 4.1 A BRIEF OVERVIEW OF SAND MINING AND ITS REGULATIONS IN INDIA

As a result of the rapid economic growth and urbanization of recent times, India is among the largest sand consuming countries in the world.<sup>59</sup> The estimated total demand for sand in India in 2017 was around 700 million tons, with an annual demand growth projection of 6-7 percent.<sup>60</sup> India has been producing significant amount of sand in order to meet its internal consumption and as an export commodity. However, with such a fast pace of development, there is not enough sand to meet the increasing demand. With certain states already facing supply deficits, reportedly as high as 65 percent in Tamil Nadu, India is both importing sand as well as promoting the use of alternatives to sand.<sup>61</sup>

##### Policies and Institutions Governing Sand Mining in India



The Government of India (GoI) regulates sand mining through a number of key legislations. The foremost of these is the Mines and Minerals (Development and Regulation) Act of 1957 (hereafter referred to as the Mines and Minerals Act), which is the umbrella legislation for the entire mining sector in the country. This legislation defines sand as a minor mineral,<sup>62</sup> a classification of minerals whose regulatory and administrative jurisdictions is devolved down to the state governments. Consequently, state governments have formulated their respective minor mineral concession rules, which provides the guidance on the norms and processes of sand mining. These established policy regimes reflect the objectives that each state is trying to meet: some states, such as Haryana, Gujarat, Punjab, and Uttar Pradesh have aimed to maximize revenue; others, such as Andhra Pradesh Madhya Pradesh, Chattisgarh, and Tamil Nadu have aimed to maintain stability of the price of sand. The next level of government, i.e., at the district, is the management unit for all transactions of sand mining in India.

<sup>59</sup> IBEF 2009

<sup>60</sup> Ministry of Mines (GoI) Sand Mining Framework 2018

<sup>61</sup> Ministry of Mines (GoI) Sand Mining Framework 2018

<sup>62</sup> The act defines minor mineral as “building stones, gravel, ordinary clay, ordinary sand other than sand used for prescribed purposes, and any other mineral which the central government may, by notification in the official gazette.”

Another legislation that provides some oversight on sand mining in India is the Environmental Protection Act, 1986. The history of this legislation dates back to early 1980s, when growing public awareness on the social and environmental costs of development raised the profile of environmental activism in India. This movement peaked in the aftermath of infamous disasters such as the *Bhopal gas tragedy* in 1984 and the *oleum gas leakage case* in 1985. Activists then, through the use of numerous Public Interest Litigations (PIL), were able to get the judiciary to move the GoI to safeguard the health of both humans and the environment. This resulted in the drafting of the Environmental Protection Act, which provided GoI the authority to formulate rules on environment protection. Thereafter, during the early 1990s, activists began to seek a similar recourse to bring to attention the environmental and social impacts of indiscriminate sand mining in India. This strategy met one of its early successes when the Madras High Court issued a ban on sand mining in the Cauvery River in 1999.<sup>63</sup>

In 2006, the GoI issued the Environmental Impact Assessment (EIA) Notification, which made prior environmental clearances mandatory for the extraction of both major and minor minerals. As per this notification, clearances for mining lease of over 50 hectares must be approved by the Ministry of Environment and Forest (MoEF); for lease size between 5 and 50 hectares the approval from State-level Environment Impact Assessment Authority (SEIAA). However, the notification remained silent on lease size below 5 hectares, which became a key issue as state governments were largely administering sand mining lease contracts below 5 hectares. Furthermore, they began parceling sand mining blocks into smaller units to avoid environmental clearance.

With indiscriminate sand mining unabated by the new law and increasing number of PILs filed by activists, the Supreme Court, in 2012, required all mining leases below 5 hectares to get environmental clearance.<sup>64</sup> In its adjudication, the court, while acknowledging sand mining a “necessary and important economic activity” for the development of the country, also stressed on its “rational and sustainable use.” Furthermore, it directed all government agencies to adopt the recommendations of the 2010 study commissioned by the MoEF within six months. This study had identified the need for “...a simpler but stricter regulatory regime” and had recommended the need to redefine minor minerals; size and period of mining lease; and requirement for mining plan outlining rehabilitation and post mining land use among others.<sup>65</sup>

Subsequently, the National Green Tribunal (NGT), a statutory body established in 2010 “for the effective and expeditious disposal of cases relating to environmental protection,”<sup>66</sup> ordered a nationwide ban on sand mining without the necessary licenses and environmental clearances.<sup>67</sup> Guided by these two decisions, of the Supreme Court and the NGT, Ministry of Environment, Forest, and Climate Change (MoEFCC)<sup>68</sup> drafted the Sustainable Sand Mining Management Guidelines, 2016 (hereafter referred to as the Sand Mining Guidelines). This guideline provides, among other things, the principles, norms, and standards for sustainable sand mining practice in India.<sup>69</sup>

That same year, MoEFCC also amended the existing EIA Notification making it mandatory for all mining lease area of below 5 hectares to obtain environmental clearances, brought cluster mines, i.e., those within 500 meters of each other, under a single lease, and prescribed procedures for the monitoring of sand mining.<sup>70</sup> Furthermore, the document also provided for

<sup>63</sup> Acting on a PIL (5762/90) filed in 1990. See Singh, Mahongnao, Demaria, and Krishna 2014

<sup>64</sup> Vide its order dated 27.2.2012 in I.A. No.12-13 of 2011 in SLP (C) No.19628-19629 (Deepak Kumar etc. v/s State of Haryana & Ors.)

<sup>65</sup> MoEF (GoI) 2010

<sup>66</sup> National Green Tribunal Act (2010)

<sup>67</sup> O.A. No. 277 of 2013 (NGT Bar Association & Other v. Ministry of Environment & Forests and others)

<sup>68</sup> In 2014, the MoEF was the Ministry of Environment, Forest, and Climate Change

<sup>69</sup> MoEFCC Sustainable Sand Mining Management Guidelines 2016

<sup>70</sup> MoEFCC EIA Notification no. S.O.141 (E) dated 15.01.2016 and notification no. S.O. 190(E) dated 20.01.2016

the creation of two district-level bodies with a number of key responsibilities in sand mining, namely the District Environment Impact Assessment Authority (DEIAA) and the District Expert Appraisal Committee (DEAC). Chaired by the District Magistrate, the DEIAA is responsible for preparing the District Survey Report (DSR) and approving environmental clearances. The DEAC, with representation and expertise from a number of technical bodies at the district level, functions as an expert advisory body to the DEIAA. Following these actions of the central government, state governments followed suit by formulating their respective minor mineral concession rules that reflect the intended reforms of the sector.

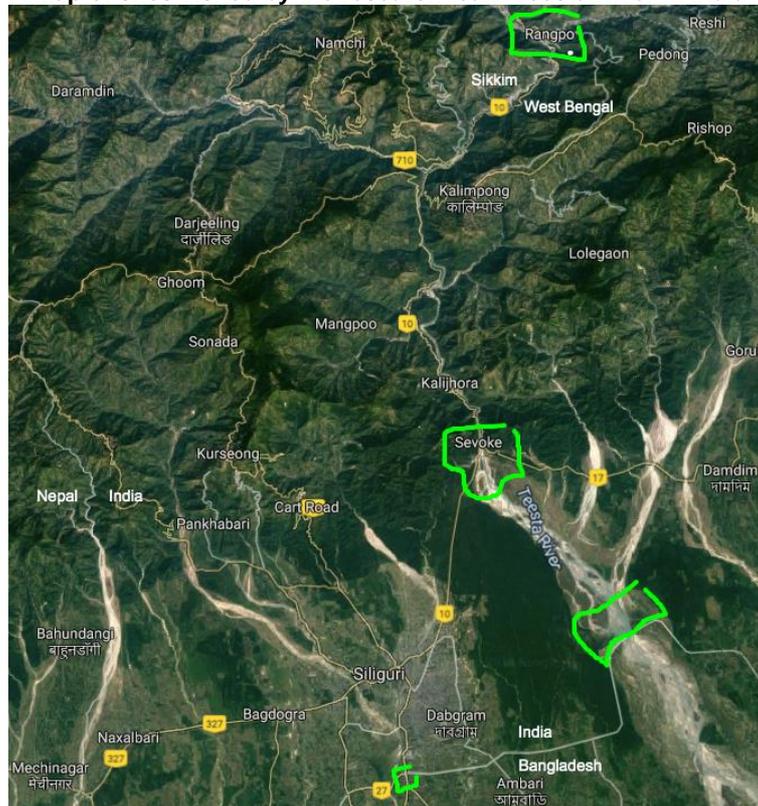
## 4.2 FIELD OBSERVATIONS FROM THE TEESTA

**4.2.1 The River:** The Teesta River is a major transboundary river flowing down the eastern part of the Himalayas, smaller only to the Ganges, Brahmaputra, and Meghna. Originating in Sikkim, the river traverses about 172 kilometers (km) through the hills of Sikkim and Darjeeling and about 98 km in the plains of West Bengal in India. Thereafter, the river enters Bangladesh where it runs for approximately 134 km before joining the Brahmaputra. Throughout its course, Teesta and its tributaries, plays an important role in maintaining the overall ecology of the region and has made fertile the basin that has been home and a source of livelihood to the riverine communities of both India and Bangladesh.

### 4.2.2 The Field Visit

The research team undertook a rapid appraisal transect to visit key sand mining sites in the upstream and downstream areas of the Teesta basin. The started from district of East Sikkim where the team visited areas around Rangpo River, one of the major tributaries of the Teesta. From here, the team travelled to the town of Sevoke in the Darjeeling District, West Bengal, where the Teesta leaves the hills and opens into the plains. From Sevoke, the team travelled south east to visit areas around the Ghish and Chel rivers, both minor tributaries of Teesta, in West Bengal. The transect ended at the Fulbari border between India and Bangladesh. The research team spent a total of three days at these sites, the observations, along with analysis from the desk study, are presented in the following section.

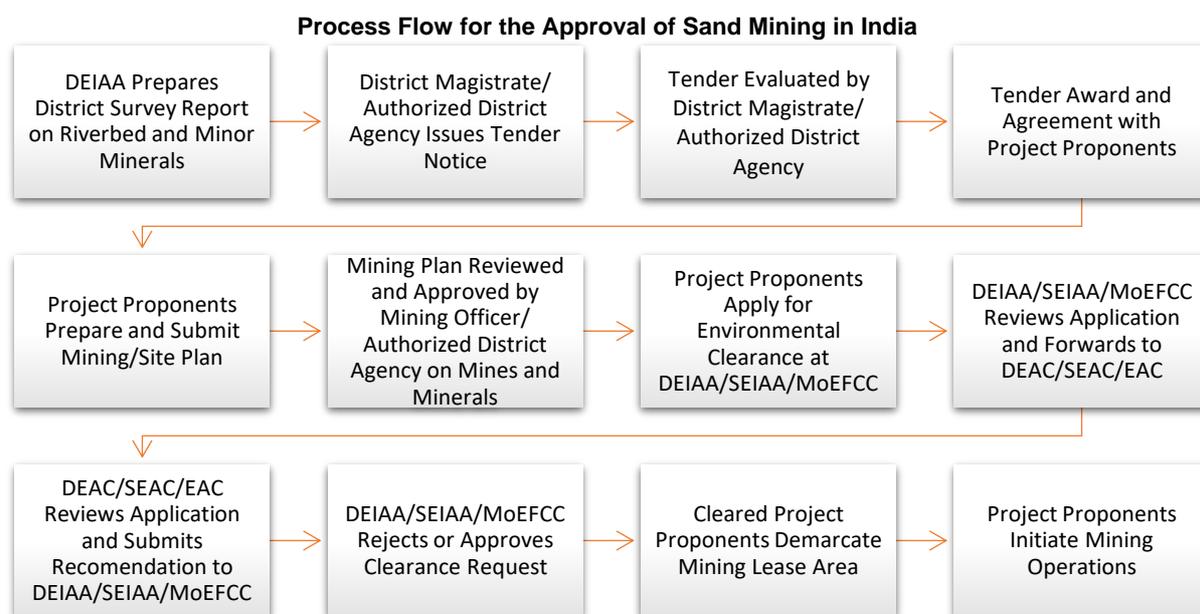
**Map of sites visited by the research team Teesta River in India**



### 4.2.3 Accounts from the Field

We begin this section with several notes. First and foremost, it is important to state that the sand mining industry is in a relatively more mature stage in India, with regard to both the extraction and the institutional arrangements that govern it. Second, given India's federal structure and the relationship between the center and states, there are some similarities in how each state has approached the issue of sand mining, but also plenty of differences, which limits how much can be generalized. Third, the Gorkhaland Territorial Administration (GTA), a semi-autonomous administrative unit that includes the districts of Darjeeling and Kalimpong, is exempt from the laws formulated by the state of West Bengal. And because the GTA is yet to formulate its own rules on minor minerals or institute the mechanisms required by the EIA Notification, it has not granted any mining licenses for sand mining in rivers within its territory, which essentially equates to a *de facto* ban on major stretches of the Teesta River. And finally, as stated in the Nepal chapter, while this section is titled "Accounts from the Field," it relies significantly on official government documents to vet and complete the information received in the field. A more through reflection on the observed practices of sand mining in India is provided in the following section.

**Approval Process:** The DEIAA, with recommendations from the DEAC, first prepares the DSR. Once DSR is finalized by the DEIAA, relevant district authority invites tenders for competitive bidding.<sup>71</sup>



Note: This process flow chart has been put together based on the GoI, MoEFCC Notification, 2016  
 Acronyms: State Environmental Impact Assessment Authority (SEIAA); State Expert Appraisal Committee (SEAC); Expert Appraisal Committee (EAC)

In Sikkim, tenders are issued by the District Forest Office; in West Bengal this is done through the office of the District Magistrate. Prospective leaseholders submit their bids, which is done manually in Sikkim and through e-auction in West Bengal. Submitted bids are then appraised and awarded by the agency responsible for calling out the tender. Though both states have fairly similar requirements for tender submission, Sikkim requires that the license be awarded to a bona fide resident of Sikkim<sup>72</sup> and has provisions for awarding mining licenses on private lands after fulfilling the necessary compliance requirements. The tenure of lease in Sikkim is two years; in West Bengal five years.

<sup>71</sup> For states that are interested in keeping the prices of sand under control, the GoI allows them to use the notified/controlled pricing model.

<sup>72</sup> Sikkim Minor Mineral Concession Rules, 2016. It also states: unless prior approval of the Government has been obtained.

Following the award of license, project proponents are required to prepare and submit a mining plan. This plan is reviewed and approved by the District Mining Officer or the designated authority on mines and minerals by the relevant State Government. Following the approval, depending on the size of lease, project proponents are required to obtain environmental clearances from designated authority, who, after evaluating all of the necessary documents, can either grant or reject environmental clearance. The designated authority and the requirements for the clearances, based on category of project, is provided below.

Category of Project: Area of Lease	Requirements for Clearance	Responsibility for preparing and processing clearance	Clearance appraisal and approval
Category B2: Between 0 and 5 hectares	Prefeasibility Report Approved Mining Plan Form 1M	Project Proponent <sup>73</sup>	DEIAA/DEAC
Category B2: Between 5 and 25 hectares	Prefeasibility Report Approved Mining Plan Environment Management Plan Form 1M		SEIAA/SEAC
Category B1: Between 25 and 50 hectares	EIA EMP Public Hearing		MoEFCC/EAC
Category A: over 50 hectares			

**Guidelines for harvesting:** The Sand Mining Guidelines includes a comprehensive set of norms and procedures intended to promote sustainable sand mining in India. It includes prescriptions on, among other things, the identification and preparation of mining sites; the methodology to prepare the DSR; establishing monitoring systems in the entire mining process; administrative arrangements for obtaining environmental clearance, and the standards of environmental conditions. Examples of specific prescriptions include: suspension of mining activities during the rainy season; when flood plain mining, maintain 3 meters of buffer from the river banks; restriction on blasting and diversion or obstruction of river channel; mining operations to be conducted between 6 am and 7 pm; use of covered trucks for transport and regular water sprinkling to reduce dust pollution; use of appropriate technology to track and monitor harvesting and transport; and mining restrictions within specified distance of key public work infrastructure such as road, dam, and canals.



Sand mining laws prohibit extraction close to public work infrastructure. An excavator busy at work near a bridge in Sevoke, Darjeeling.

<sup>73</sup> The notification specifies that in the case of mining in clusters, clearance is to be prepared and processed by the State, State Agency, Group of project proponents, or the Project Proponent

Sikkim and West Bengal have both adopted many of the prescriptions laid out in the Sand Mining Guidelines, albeit with some modifications. These are reflected in their respective policies related to minor minerals. For example, the West Bengal Minor Minerals Concessional Rules, 2016 prohibits sand mining within 300 meters from specified public work infrastructure such as bridges and beneath three meters of the river bed or ground water level, whichever is less. Similarly, the Sikkim Minor Mineral Concessional Rules, 2016 requires all leaseholders to demarcate their mining lease area with boundary marks and pillars and prohibits mining within 50 meters from railway lines and reservoirs and 60 meters from bridges on highways.<sup>74</sup> However, the research team was informed during the field visit that these requirements are very frequently not fully adhered to in practice.

*Allotment of extraction areas:* The DSR specifies where, when, and how much sand can be extracted from the river. This report provides details on annual deposition rate of sand and the deposition stretch along the river. It includes the calculation of annual rate of and the time required for replenishment of extracted sand. It also maps vulnerable and sensitive areas where mining may pose significant threat, for example, areas of erosion and proximity to infrastructure. It also details out the royalty revenue earned by the district from sand mining as well as the production of minor minerals in the last three years. The fact that States lack the capacity to conduct a comprehensive analysis of these technical characteristics is known to the government, which does impact the effectiveness of the undertaking. The DSR must be updated every five years. These areas of extraction are then publicly tendered out by relevant district level authorities. Both Sikkim and West Bengal require lease holders to periodically pay *dead rent* and *surface rent* for their lease.

Besides the officially allocated sites, sand is also mined in smaller quantities by local residents either for personal consumption or to sell to the market.<sup>75</sup> While mining for commercial sale is prohibited without obtaining license, GoI, in recognizing the customary rights of specific social groups and the needs of local communities, has exempted certain cases from being considered as mining for the purpose of requirement of environment clearance.<sup>76</sup>

<sup>74</sup> Both these have exception stating that this can be changed with permission

<sup>75</sup> Field interview and observations

<sup>76</sup> MoEFCC Sustainable Sand Mining Guidelines 2016. These exceptions include: (i) extraction of ordinary clay or ordinary sand manually by hereditary Kumhars (Potter) who prepare earthen pots on a cottage industry basis; (ii) extraction of ordinary clay or ordinary sand manually by earthen tile makers who prepare earthen tiles on a cottage industry basis; (iii) removal of sand deposited on agricultural field after flood by owner farmers; (iv) customary extraction of sand and ordinary earth from sources situated in Gram Panchayat for personal use or community work in village; (v) community works like de-silting of village ponds/tanks, rural roads under taken in MGNREGS and other Government sponsored schemes..”

**Loading and Transport:** Lease holders are required to specify their methods for loading and transport in their mining plan. While the law allows the loading of sand onto trucks to be done manually or by machinery and mechanized equipment, we observed a heavy reliance on the second method. The law also requires lease holders to maintain a register for record and verification of all day-to-day transactions, which includes information on extracted volume and details of dispatch such as number of vehicles, persons in charge, and volume being transported. Prior to dispatch, lease holders have to obtain a *challan* from the delegated district agency specifying the desired volume of extraction, which requires that all applicable fees and royalties be pre-paid. The *challan* must be carried at all times by the transporting vehicles; failure to do so will result in seizure and/or a penalty.

With due respect and humble submission, I, Sabin Lama  
 s/o Ganesh Lama of Katanga Opimanchi W.P.  
 need of 100000 Cu. ft. of Challan of river CAFL Mining Block no. 15 under  
 Mouza Chalabari J.L. No. 20

I have deposited a sum of Rs. 16500/- (Including the Cess) on 12/06/19 (date) in  
 the bank NICI as fee through e-challan bearing GRN No. 19-10030-00230052-5  
 and DMF fund of amounting Rs. 15000/- in the current Account no. 0239013470440 of United  
 Bank of India for District Mineral Foundation Trust, Jalpaiguri.

Details of paid amount.

Sl. No.	Particulars	Amount (Rs.)
1	Royalty of <u>10000</u> cft RBM	<u>15000.00</u>
2	Public Work Cess of <u>10000</u> cft RBM (Rs.3/100cft)	<u>3000.00</u>
3	Road Cess <u>10000</u> cft RBM. (Rs.3/100cft)	<u>3000.00</u>
4	Rural Employment Cess <u>10000</u> cft RBM. (Rs.3/100cft)	<u>3000.00</u>
5	Rural Education Cess <u>10000</u> cft RBM. (Rs.6/100cft)	<u>6000.00</u>
	<b>Total</b>	<b><u>165000.00</u></b>

Thanking you

Date: 12/06/19  
 Place: MAL (SPLD)  
 (Signature of applicant)

A manually issued *challan* to transport 100,000 cubic feet of sand in West Bengal



Tippers and tractors being used for transport of sand from the Rangpo River

A common phenomenon in transporting sand is overloading, where trucks are often loaded three times the permissible load. As was reported by stakeholders, monitoring of collection volumes and transport is a very difficult task as most contractors have internal arrangements and systems in place with authorities.<sup>77</sup>

The Sand Mining Guidelines and the EIA Notification both stress the need for developing an effective monitoring of the transportation system and for making it systematic and scientific using available modern technology. Accordingly, an array of recommendations, ranging from the incorporation of digitized security features in *challans*, installation of CCTV cameras at mining sites, and the use of RFID tags to track transport vehicles, were forwarded to the state governments to adopt. Sikkim and West Bengal are, however, yet to adopt many of these recommendations, e.g., both states still issue their *challans* manually.

<sup>77</sup> We were informed about the use of magnetic stripe cards that are held by the transporting vehicles to validate confirmation of illegal payments made to authorities along the way.

*Royalty and collection:* The Mines and Minerals Act empowers the State Governments to make rules “for the fixing and collection of rent, royalty, fees, dead rent, fines or other charges and the time within which and the manner in which these shall be payable” with regard to all minor minerals.<sup>78</sup> Both Sikkim and West Bengal levy royalty on river aggregates based on the volume of extraction, the details of which, including the applicable rates, are notified in their respective minor mineral concessional rules. In Sikkim, the state government has set the royalty for sand at INR 37 per cubic meter, which is collected by the District Forest Office. In West Bengal, this royalty is set at INR 53 per cubic meter and is collected by the Sub-Divisional Land and Land Reform Office. Lease holders in West Bengal are levied additional fees of INR 1.06 per cubic meter each for Public Work Cess,<sup>79</sup> Road Cess, and Rural Employment Cess, and INR 2.12 per cubic meter for Rural Education Cess.

All mining license holders (of major and minor minerals) are required to contribute a percent of their total royalty payments to the District Mineral Foundation (DMF), a non-profit trust established through a 2015 amendment to the Mines and Minerals 2015. DMF is mandated to work in the interest and benefit of communities and areas impacted or affected by mining. Since its establishment, it has been implementing the *Pradhan Mantri Khanij Kshetra Kalyan Yojana* which runs various development and welfare schemes and programs to manage and mitigate the negative impacts on the lives and the environment of the mining affected areas.<sup>80</sup> As of February 2018, 505 DMFs had been established nationwide with a total of deposit of about INR 17,500 crore. A major percentage of this, however, came from states producing major minerals.

*Demand for Sand:* India’s economic growth of recent years has meant significant increase in infrastructure development and a corresponding demand for sand, which places significant burden on rivers across the entire country. This is also applicable in the case of Teesta River, where increasing public infrastructure and real estate development in Sikkim and West Bengal account for the increasing demand for river aggregates.

In Sikkim, increasing urbanization and growth of key economic sectors such as manufacturing and hospitality sectors have contributed to a rise in infrastructure development.<sup>81</sup> The state is also rich in hydropower potential with a total installed capacity of over 1200 megawatt (MW) and in the process of adding another 300 MW. Additionally, the strategic importance of the state has facilitated large investments from the central government in public infrastructure, especially in building roads to the Chinese and Bhutanese borders.<sup>82</sup> During field survey local license holders informed us that many of them were providing dedicated supply of river aggregates to the Border Road Organization<sup>83</sup>. The GoI has identified 26 major infrastructure projects for Sikkim, including the project to upgrade the 327 km Namchi Chungthang Road.<sup>84</sup> The rollout of all these infrastructures is sure to place significant pressure on existing supply of sand.

<sup>78</sup> Mines and Minerals (Development and Regulation) Act 1957. Section 15g

<sup>79</sup> Cess is an alternative term for tax that is used in several countries, including India

<sup>80</sup> MoM (GoI) 2015

<sup>81</sup> Central and State tax incentive have led to growth in manufacturing investment in the State. At present, the state host 14 major pharmaceutical companies and a number of breweries.

<sup>82</sup> GKToday 2016

<sup>83</sup> Border Roads Organization is a GoI agency, established in the 1960, with the mandate to develop and maintain strategic road network on India’s northern and north-eastern frontiers.

<sup>84</sup> National Investment Promotion & Facilitation Agency (n.d)



A local crusher industry located along the banks of the Rangpo River

The demand for sand in West Bengal is also being driven by similar forces as in Sikkim. The two districts that were included in the field visit, namely Darjeeling and Jalpaiguri, have been experiencing a major trend of urbanization: Darjeeling witnessed an urban population growth of 47 percent in the last two decades;<sup>85</sup> Jalpaiguri, too, had similar accrument of population with a decadal growth of 33.7 percent.<sup>86</sup> Similarly, Siliguri, a metropolis that spans across both districts, experienced rapid population growth in the last two decades to become the second largest urban area in West Bengal.<sup>87</sup> The northern hilly regions of West Bengal also has some potential for hydropower; it currently has an installed capacity of around 1400 MW, with several hundred more currently under construction. Furthermore, projects worth trillions of rupees in various sectors such as transportation, energy, and water supply are being built by the government and the private sector in West Bengal.<sup>88</sup> These projects are in various stages of the construction, all of which are placing significant strain on the demand for sand.

The Teesta basin in West Bengal is also a major block for quarrying river stones and boulders. We were informed by local officials that the primary market for a majority of these extractions is Bangladesh. Hundreds of trucks haul stone and boulders into Bangladesh every day via the Banglabandha-Fulbari border crossing. During peak season, this number averages between 450 and 500 trucks.<sup>89</sup>

<sup>85</sup> ORGCCI (Gol) 2011

<sup>86</sup> ORGCCI (Gol) 2011

<sup>87</sup> Debnath and Ray 2017

<sup>88</sup> DoEA (Gol) (n.d)

<sup>89</sup> Field interview



Trucks along the Indo-Bangladesh border waiting to enter and deliver their sand load into Bangladesh

**Monitoring and Enforcement:** The 2016 amendment to the EIA Notification establishes the institutional arrangements for monitoring of sand mining, which is done primarily through the DEIAA and the SEIAA. The notification also introduces a number of provisions intended to strengthen the monitoring of the entire sand mining process, which includes the use of bar codes for *challans*, CCTV cameras in mining sites, and RFIDs to track vehicular movement. Despite these reform initiatives, although not all of which have been implemented, the effort of the government to curb illegal and unsustainable sand mining has been less than stellar. One factor behind this is the systemic failure in the monitoring and enforcement of provisions expressed and emphasized in the law. In conversations with stakeholders from across the spectrum—from government bureaucrats, private sector, to communities, this was one of the topics that was most frequently raised. While it is difficult to vet these claims, the fact that these were consistently and collectively raised, gives some credibility to them. This section is entirely based on some of the key statements offered to us.

A primary driver for the increasing levels of illegal sand mining is the potential for immense profit from engaging in this endeavor, which is a product of the market whenever there is discrepancy between the demand and supply. For example, despite the ban on sand mining from the right banks of the Teesta River in the GTA territory, we came across groups of miners busy extracting sand with mechanized equipment at Sevoke Ghat, all within close proximity to local authorities and clearly visible from the highway.



Sand being mined illegally from the Teesta at Sevoke Ghat in the right bank of the Teesta that falls under the jurisdiction of the GTA.

However, according to local officials, since the issuance of the EIA notification there has been a drastic reduction in the instances of sand mining without the required licenses. The persisting problem, however, is over extraction; with weak monitoring and lack of adequate oversight from the regulators, most leaser holders are extracting far beyond their licensed amount.<sup>90</sup> As a result, transport vehicles also end up carrying loads far beyond their approved *challans*.<sup>91</sup> While transport agencies and the police regularly inspect trucks en route, this, we were informed, is done largely to collect rent. During field survey, a local truck entrepreneur reported of having to make around 17 illegal payments in a single journey from Sevoke Ghat to the Fulbari-Banglabandha border. Some trucks are occasionally seized, but the profits from selling sand in the illegal market far outweighs the penalty for having engaged in such illegal activities, thus providing very little incentive for these operators to discontinue.

### **4.3 REFLECTIONS ON SAND MINING IN INDIA**

Despite instituting stronger regulatory oversights sand mining and associated activities are still very poorly regulated. Strong nexus between regulators and those regulated enable all forms of illegal mining activities to continue unabated. This is more pronounced in West Bengal, where authorities still do not have a clear idea on the exact size and scale of sector operations.

#### ***4.3.1 The role of activism and the judiciary in India's sand mining***

Having felt that the government was failing to adequately recognize and respond to the social and environmental concerns of development and modernization, activists in India, starting from the 1980s, began petitioning the judiciary through a number of PILs. Since then, these two entities have been the champions of environmental rights and are even credited for the push to promulgate the Environmental Protection Act. Their role has also been instrumental in bring about the current policy regime that is meant to protect the riverine environment from indiscriminate sand mining. Most notably, the decision of the Supreme Court in 2012 to require all lease holders to obtain the necessary environmental clearance regardless of their lease size and the order of the National Green Tribunal in 2015 that placed a nationwide restraint on all mining activities without prior environmental clearances remain landmark judgments for the sector. These key rulings were instrumental in pushing MoEFCC to issue the EIA Notification and the Sand Mining Guidelines.

Not surprisingly, there has been opposition to these ruling not only from the construction lobby but also state governments who see these requirements as an unnecessary hurdle and also restricting their choice to exploit their resource as per their needs.<sup>92</sup> Some even went as far as criticizing these policy decisions as being anti-development and anti-progress.<sup>93</sup> However, these decisions can be seen as the reaffirmation of the responsibility of the government for environmentally sound development and progress as guaranteed by the Indian constitution.<sup>94</sup> These decisions by no means represent the motive of the government to completely stop sand mining in India, but attempt to make such practices environmentally sound and sustainable to avoid potential future catastrophic consequences.

However, even with the new regulatory measures the government is having limited success to adequately control illegal sand mining across India. Between 2016 and 2019, a whopping

<sup>90</sup> Field Interview

<sup>91</sup> Field Interview

<sup>92</sup> Goswami 2013

<sup>93</sup> The Hindu 2013

<sup>94</sup> Article 48A, which states that “the State endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country; and Article 51A.g, which specifies the fundamental duties of every citizen of India “to protect and improve the natural environment including forest, lakes, rivers, and wildlife.

328,737 cases of illegal mining were reported across the country.<sup>95</sup> As a result, activists have once again seeking a judicial recourse: in the same period, a total of 45,242 cases related to illegal sand mining were filed with the judiciary across India.<sup>96</sup> This high volume of court cases suggests that the current framework is proving to be inadequate to ensure sustainable sand mining. In this regard, activists have also approached the Supreme Court requesting for further reforms in the sector.

#### **4.3.2 The nexus narrative of India's sand mining industry**

Terms such as *sand mafia* and *the nexus* have become the key buzzwords in describing the state of India's sand mining industry and is used extensively in the commentaries against illegal and unsustainable sand mining in the country. Here, these words commonly denote the actors and the nature of their collusion with political actors and authorities to engage in illegal sand mining.<sup>97</sup> Very similar to the nature of organized crimes elsewhere, sand mafias in India are said to have invested in cultivating political protection.<sup>98</sup> In India's federal system, because States hold the authority to formulate policies on natural resources as well as law and order, state-level politicians and authorities use discretionary power to extend patronage to sand mafias in return for financial kickbacks.<sup>99</sup>

The nexus between *mafias*, politicians, and the authorities was identified as being the major hindrance for effective monitoring and regulatory enforcement in West Bengal.<sup>100</sup> In return for kickbacks, local authorities often turn blind eye to illegal operations at the site and *challans* are seldom matched to actual truck loads during en route inspections.<sup>101</sup> Ironically, local authorities have sought to systematize kickbacks by issuing some form of identification markers to transport vehicles to ensure they are not hassled by their colleagues at highway checkpoints.<sup>102</sup> A similar practice of issuing and monitoring illegal payments through magnetic stripe cards was also reported in West Bengal during the field survey.<sup>103</sup>

Due to the lure of large profits, this has also caught the interest of people with nefarious intent. Furthermore, mining in the lower Teesta basin has also become a law and order issue. The sector in West Bengal has witnessed growing incidence of threats and deaths. In 2017, eight miners were killed because of politically motivated territorial fight between license holders.<sup>104</sup> In addition to kickbacks, in some cases is also related to the potential threats and consequences of taking action. The sand mafia across India have time and again resorted to violence to deter oversight. News on local officials being mobbed and beaten or having encountered fatal encounters for having tried to investigate and take action against illegal operations are common.<sup>105</sup> Given the nexus of the sand mafia and their potential for using muscle and violence, many local authorities observe extreme caution and or avoid monitoring.

#### **4.3.3 Sand mining, communities, and their livelihood**

The presence of sand mining in many instances is not only because it benefits those involved in illegal schemes, but also because it is a key source of employment for many communities along the river. This is especially the case for those that are living in poverty and may not have

<sup>95</sup> Hon'ble Minister of Mines Shri Pralhad Joshi in his reply to unstarred question no. 2742 in the Lok Sabha on 10th July, 2019

<sup>96</sup> Hon'ble Minister of Mines Shri Pralhad Joshi in his reply to unstarred question no. 2742 in the Lok Sabha on 10th July, 2019

<sup>97</sup> Madhavan 2019

<sup>98</sup> Madhavan 2019

<sup>99</sup> Madhavan 2019

<sup>100</sup> Field Interview with Sub-divisional Land and Land Reforms Officer

<sup>101</sup> Field interview

<sup>102</sup> Beiser 2015

<sup>103</sup> Field Interview

<sup>104</sup> Dutta 2017

<sup>105</sup> Madhavan 2019

opportunities to earn a stable income. For them, regulations require manual extraction sand result in employment. But besides many of them being employed as daily laborers, there are other opportunities that extend to other positions such as site manager, storekeeper, security guards, drivers, and equipment handlers. Also, community members with some capital were found to have invested in transport vehicles that they lease out to the mining companies.<sup>106</sup> With livelihoods rooted to the stability of local mining operations, communities were found to strong voice their support for undisrupted mining operations.

For example, in Sevoke, a small highway settlement in the Darjeeling district of West Bengal, in absence of official mining tenders, communities were engaged in illegal sand mining to support their families. The settlement comprises of around 100 families who are all directly or indirectly depended on mining activity in the river. Without much options for livelihood, the communities here have little consideration for the mining ban and continue extracting sand illegally. Furthermore, they expressed that, because their extract was illegal, they were forced to pay higher rents/bribes to local authorities during transport. Communities reported that they have to allocate around a third of their total earning to bribe local authorities for different functions. The situation is such that, the communities are ready to formalize all their engagements rather than paying large sums of money for bribes. Unfortunately, for such communities' issues of livelihood takes precedence over that of environment and sustainability. At Sevoke, communities reported having progressively observed river shifting and deepening as result of mining activities. Yet, driven by dependency and or greed, such local observations of changing river morphology is still not perceived to be a "crisis phenomena" for locals to stop or regulate mining operations. Increasing depth of the river was chiefly attributed to the adaptive mining practices of local communities with the local hydropower project operation context. It was reported that upstream dams stored water during the day, presenting a dry river bed for local extraction. Similarly, during peak load operations the reservoir gates are opened, and bring fresh deposits every day for local harvest.

Similar stories are also available from other places in Mumbai, where generations that have relied on fishing have moved onto illegal sand mining to make ends meet. With drastic drop in fish stock as many as 80,000 fishermen around the Thane coast have taken up illegal mining.<sup>107</sup> These are generally people who do not have the opportunities and hence point to the need for strategic engagements with mining communities to support livelihood diversification and improvement.

The DMF was created in 2015 to address these very concerns of the people and the environment of the mining districts in India. It was instituted through an amendment under India's central mining law-the Mines and Minerals (Development and Regulation) Act, 1957. The law requires all major and minor mineral lease holders to make a percentage contribution of their total royalty payments for the fund – 10 percent for major minerals and percentage specified by respective state governments in the case of minor minerals.<sup>108</sup> The Rule in Sikkim requires lease holders to pay one percent of their royalty, one third of royalty payments in West Bengal. The DMF has also been aligned to the Gol Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY) launched in September 2015 and is mandated to implement welfare programs and projects in mining-affected areas, including on alleviating the adverse impacts of mining on people and environment; and create long-term sustainable livelihood opportunities for mining-affected people. The establishment of the DMF, for the first time, recognizes the right of the people to benefit from natural resources.<sup>109</sup>

<sup>106</sup> Field interviews in Sikkim and in West Bengal

<sup>107</sup> Maharashtra Today 2017

<sup>108</sup> CSE 2017

<sup>109</sup> CSE 2017

In its fifth year, the response and performance of the DMF to its establishment mandate has been mixed.<sup>110</sup> Not all states have formulated rules to support its establishment and where established many are yet to be registered.<sup>111</sup> In many cases, the DMFs have been operating without adequate human resource and required institutional and financial operating procedures.<sup>112</sup> The strongest criticism of the DMF however has been on issues related to low levels of fund utilization; ad hoc and misplaced funding priorities; and centralized allocation planning. The average fund utilization rate of the DMF is as low as 33 percent.<sup>113</sup> Contrary to its mandate, environmental conservation activities have not received allocation priority and funds of the DMF have been diverted for the implementation of other national programs such as the MGNREGA, NRDWP, Ujjwala, etc.<sup>114</sup> Similarly, despite the DMF's mandate for inclusive planning, participation of the *Gram Sabhas* and local communities remains poor.<sup>115</sup>

<sup>110</sup> For details on DMF performance status and outcomes see CSE 2017

<sup>111</sup> CSE 2017

<sup>112</sup> Upadhyaya 2017

<sup>113</sup> Oxfam India 2018

<sup>114</sup> Oxfam India 2018

<sup>115</sup> Banarjee and Rajan 2018

## 5. CONCLUSION

In this final chapter, we bring together the overall discussion on sand mining that have been presented in earlier chapters, including the reflections from the field visits to the Mahakali River in Nepal and the Teesta River in India, to draw some overarching observations. Based on this exercise, we propose a number of recommendations for the TROSA project.

### 5.1 THE OVERARCHING OBSERVATIONS

First and foremost, it must be noted that the framing of the issue around sand mining in Nepal and India are vastly different, which is also reflected in who the actors involved are and the policies and institutions that have been established to deal with the problem at hand. In Nepal, given that the scale of operation of sand mining in terms of the market and the corresponding supply of sand from the Mahakali River is relatively small and the institutions that have been established to manage the industry is fairly straightforward. Furthermore, given the current political transition in the country, the primary issue in the Mahakali region was less about illegal sand mining, and more about the jurisdictional overlaps and the mechanisms to distribute royalty from the natural resource among the administrative units. In India, however, given the huge market demand, a willing supply chain, a mature and vocal activism, an active judiciary, and a corresponding act of the central and state governments, the policies and institutions to oversee sand mining is more complex.

Secondly, the regulatory regimes that Nepal and India have established has provisions, at least in paper, that promote sustainable sand mining. This includes, among other things, requirement for environmental clearances, clearly defined processes for mining, zoning and limits of extraction based on environmental considerations, and mitigation measures and benefit sharing mechanisms with affected local communities. However, having observed how sand mining is being conducted in the Mahakali and the Teesta Rivers, it is evident to us that the proliferation of illegal sand mining is less about the absence of policies and more about the failure to adequately implement existing laws. This is due to two primary issues: i) the constraints in capacity of the local institutions; followed by the limited resources that is made available, and ii) the structuring of the institutional incentives and its influence in how people respond.

#### *5.1.1 Capacity and resource constraints can impede implementation*

Local bodies in Nepal have been constitutionally given a significant amount of responsibility. In addition to the protection of watersheds, wildlife, mines and minerals, other responsibilities range from the collection of local taxes, to the management of services such as security, education, water supply, and health, disaster management.<sup>116</sup> This devolving of authority, however, has not been adequately matched with regard to the capacity of the human resource of its local bodies, both in terms of numbers and knowhow. In such situations, local officials, with their limited capacity, are forced to prioritize their engagements, which can be based on their immediate needs, the demands from residents, or to adhere to the base requirements of the law. In sand mining, for example, the focus of local governments is limited to getting the necessary IEE approved as sufficient conditions to allow mining; there is limited consideration, if at all, towards ensuring environmental compliance during extraction and of the overall long-term sustainability of the river. This lack of adequate human resource capacity is further exacerbated by the fact that many of the mandates given to the local governments are also largely unfunded.

This human resource and capacity constraint seem to be relatively less of a problem in India. Because sand mining is more mature here, the government has been able to put in place a number of policies and institutions that are in direct response to the problems identified. Also given that the management of sand mining falls under the administrative control of the districts, there is more resources to draw from in order to meet the requirements of the sector. This is

<sup>116</sup> Schedule 8, List of Local Level Power. Constitution of Nepal

not to say, however, that there is sufficient capacity to ensure sustainable mining of sand. Clearly, because this issue is a relatively more recent phenomenon for the mining industry, which may not have the adequate and appropriate expertise even within the state ministry. For example, even the government's framework accepts that there is limited capacity to undertake the necessary study on the replenishment rate of sand, which is crucial to understanding the sustainable extraction of sand. As a result, despite being required by policy, there is a huge discrepancy in the content of the DSR.

### ***5.1.2 The underlying incentives and its impact on governance of sand mining***

The other reason behind the failure to implement existing laws, and one that perhaps reflects the reality of many developing countries with weaker institutions, is the underlying incentives that result in systemic constraints in governing common pool resources. In sand mining, these perverse incentives exist in almost every step of the process, some of which we highlight here. It begins as early as in deciding from where and how much to extract: for example, the decision to limit daily sand extraction to 250 cubic meter in Nepal or to parcel mining leases to under 5 hectares in India are both decisions based on the desire of local officials not to bother with the more comprehensive but cumbersome EIA process.

Next, the tendering process for sand mining is fraught with influences of cartels and kickbacks. Cartels ensure collusion among the private sector to secure the cheapest contract for them; kickbacks ensure commissions for the willing officials to be coopted into the illegal sand mining scheme. This is not a surprise given that both Nepal and India rank fairly low in the Corruption Perception Index maintained by Transparency International.<sup>117</sup> While the research team did not directly observe the nexus between the regulators and the regulated at play in the Mahakali River, the number of reporting on such collusive practices in Nepal indicate that such practices are more likely to be occurring than not. In India, on the other hand, this nexus has been extensively reported in the local and national media from across the country and the issue was more openly discussed by a wide range of stakeholders during the field trip to the Teesta.

Most importantly, the incentive to over-extract is deeply engrained in the system. With the increasing demand for sand and the limited supply in response, the result is a market shortage that is reflected by a higher market price. The resulting profit incentivizes private extractors to extract more than what they are allowed for. While the natural check against such illegal act would be strong governance by officials, this is a challenge as unscrupulous characters are willing to join the fray. A key obstacle to overcoming this particular set up is the absence of the rule of law, where corruption, violence, and impunity reign. As long as this systemic arrangement remain, overcoming these political realities will require a major overhaul in the mindset and the market. On the contrary, the least incentivized task in sand mining is in ensuring effective monitoring of the laws that govern its sustainability. Even more so, those tasked to oversee this are also incentivized to act in cahoots. This is where the role of activists and media has come.

### ***5.1.3 Assessing alternatives to river sand***

Beyond establishing regulations, there are several other measures being adopted to minimize indiscriminate sand mining. The first of these is the ban on illegal sand mining, an approached being forced by the judiciary in India. However, the effectiveness of trying to curb illegal sand mining through ban is questionable. While there may some success stories of the ban in restoring the deteriorating local environment and ecology of some rivers, given the constant demand for river aggregates, this may have only shifted the problem. With attention of policy makers and activists centered on major rivers, the intensity of mining, both legal and illegal, has increased across minor rivers and smaller tributaries. For example, the de-facto ban on sand mining on the GTA side of the Teesta has constrained the supply to the growing demand

<sup>117</sup> In 2018, Nepal ranked 124 least corrupt nation out of 175 countries; India did much better at rank 78

Darjeeling district, which is being met through illegal extraction in the Teesta River and through licensed extraction from the smaller Chel and Ghis rivers.<sup>118</sup>

There is also the push to promote alternatives to river sand. One such option is manufactured sand, i.e., sand produced by crushing granite stones, which is considered as one of the several sustainable alternatives. Popularly known as *m-sand*, this option offers a variety of benefits over its river-based counterpart. The first of these benefits has to do with its availability and price: because m-sand is manufactured in factories, the overall supply can be made fairly stable throughout the year; it can also be cheaper, given that production can be shifted and located near the construction sites;<sup>119</sup> and due to a stable supply, the market price is also relatively constant. The second type of benefit of m-sand over river sand is that of quality and strength: because m-sand is manufactured in a controlled environment, it has minimum silt content; moreover, production of m-sand can be designed in a way to ensure uniformity across the various sizes necessary for construction; m-sand also has higher bond strength and results in mortar having higher compressive strength.<sup>120</sup> However, despite all the benefits that can be derived from m-sand, lack of awareness and presumptive preference among consumers have limited its widespread use. There are efforts by government to introduce policies to promote the substitution of river sand to m-sand. This is especially true in India, where the GoI has specifically recommended that states invest in promoting sand alternatives. As a result, a number of states, such as Andhra Pradesh, Gujarat, and Telangana have come up with policy for m-sand. The exemplary case, however, is Karnataka, which produces 20 million tons of m-sand, amounting to over 400 per cent of its total river sand production.<sup>121</sup>

## 5.2 RECOMMENDATIONS

It should be obvious by now that the underlying drivers that promote sand mining and the impact it can have on the ecosystem around it is a complex issue. Complexities arise because the issues around sand mining are technical in nature, both in terms of the technicalities of modern infrastructure development and of water and riverine ecosystems where sand is an instrumental element to both. This is about the economics of the sand market as much as it is about the governance of a natural resource. Attempting to put together is not only a daunting task, but it is also an experience that inspires humility. Based on our experience with the subject matter, in this section, we recommend a number of activities that the TROSA project can realize in the coming years. These are divided into two categories: the low hanging fruits and the long(er) term engagements.

### 5.2.1 The Low Hanging Fruits

This set of recommendations involve possible activities for TROSA project to undertake during its lifetime. Not only can these provide quick wins for the project, the success of these initiatives can also give impetus for the stakeholders to engage in longer term initiatives.

*Collaborate with local institutions:* TROSA project should be partnering with local institutions, both governmental and non-governmental, for them to be able to engage, monitor, and provide oversight of the entire mining process. This can be done in two particular ways:

*i) In developing and aligning policies:* Given the lack of clarity in functional jurisdictions due to federalism, TROSA can work with relevant government bodies, including the provincial and local governments of Sudurpaschhim Province to develop and align the policies on sand mining. TROSA can also work not only with the two municipalities, Bhimdutta and Mahakali, that are currently at dispute over resource sharing, but also

<sup>118</sup> Field interview

<sup>119</sup> For instance, the cost of M-sand in Pune is INR. 685 per ton, while that of river sand is around 1,957 per ton. How manufactured sand is helping reduce indiscriminate sand mining and saving riverine ecosystems, 2015

<sup>120</sup> MoEFCC Sustainable Sand Mining Management Guidelines 2016

<sup>121</sup> MoEFCC Sustainable Sand Mining Management Guidelines 2016

include the DCC, provincial and any other related government agency to bring clarity on this critical issue,

*ii) In getting better estimates of demand and supply of sand:* Sustainability of sand mining depends largely on the ability of the government to accurately estimate the demand and supply of sand, and there is significant room for improvement in both Nepal and India.

In India, the government has developed a framework that assists the states to take on this task. However, this framework also notes, for example, that there is a need to inter alia build capacity at the state level in areas of conducting replenishment studies. For this, it suggests that the states work with local academic institutions to help build such capacity of the state and also conduct “first few rounds” of such studies themselves. Taking this cue, TROSA can work with institutions such as the Sikkim University and/or the West Bengal University to produce these studies.

In Nepal, there is no sand mining specific guidance from the government on how such forecasts are to be made and the lack of comprehensiveness in the current practice of conducting demand and supply estimates is quite evident. TROSA can work at multiple levels: with the Sudurpaschim Provincial government to draft a provincial level sand mining framework; with the municipal offices of Bhimdutta and Mahakali municipalities to produce better estimates of the demand and supply of sand within their jurisdictions.

*iii) In increasing the capacity of relevant institutions:* There are a number of agencies and even more individuals that share a range of responsibilities in overseeing sand mining within their jurisdiction. Many of them may not have the required training or the exposure with regard to sustainable sand mining practice. In this regard, TROSA can train members of relevant government agencies, which would include the DCC and the municipal offices in Nepal and the DEIAA and the DEAC in India, on some of the essential technical skills on sand mining.

TROSA can design and deliver bespoke short-term courses to government officials, political actors, and civil society members on the technicalities and the impact of sand mining. Given that sand mining policies and institutions in India are at a relatively more advanced stage, TROSA can also arrange an exposure visit for Nepali bureaucrats from the provincial, district, and local level government bodies.

*Contribute towards a more effective benefit sharing mechanism:* The policy regimes for sand mining in Nepal and India recognize the principle of benefit sharing, whereby both countries require a fraction of the mining revenue be allocated for the benefit of communities and the river. However, the governance of these funds and their effectiveness is not readily known to neither the local officials nor the affected communities.

Discussions on benefit sharing can also serve as a non-political and non-sensitive entry point for reform advocacy engagement in improving sustainability and governance of sand mining. There is immense scope for TROSA to engage on this that ranges from: i) conducting research to evaluate the effectiveness of current benefit sharing mechanisms; ii) arranging advocacy forums and public hearings designed to promote transparency and accountability of spending; and iii) supporting relevant government bodies in Nepal and India to prepare a benefit sharing plan.

*Provide local, regional, and national-level policy platforms:* Pressure from local groups can incentivize policymakers to act and be accountable to the people they represent. To promote such engagements, TROSA should promote local and national-level policy platforms that offer space for constructive criticisms and solutions-oriented dialogues. Tentative topics for these

dialogues can be as follows: promoting alternatives to river sand; overcoming challenges in governance.

### ***5.2.2 The Long(er)-Term Engagements***

This set of recommendations are contributions that TROSA can make beyond the life of the project to the larger initiative to bring the issue of sand mining into the forefront of policy discourse and to change the overall approach to sand mining.

*Invest in building knowledge:* The current gap in fully understanding and estimating the nature and level of impacts of sand mining warrants an in-depth scientific inquiry. Such an endeavor must be able to generate long-term information not only from the immediate basin but also in areas much further downstream. The knowledge generated from this initiative should be the basis for reform activism and evidence-based policy action. For this, TROSA can collaborate and fund academic institutions or scientific research organizations to initiate this process. This can be combined with the shorter-term demand and supply of sand study mentioned in the earlier section. While it is certain that the output of this proposed initiative may not materialize by the end of project period, it will, nevertheless, help lay the groundwork for future work.

*Connect global networks:* Indiscriminate, unsustainable, and illegal sand mining is a global phenomenon. As with many other natural resources that is being over exploited, it is also a commons problem, where the benefits are concentrated to a few and the costs borne by the general public at large. But there is an increasing number of non-governmental institutions around the world that are beginning to highlight the issues around sand mining. Even multilateral institutions, such as the United Nations, has been putting together platforms to discuss these issues. TROSA can help set and promote the agenda within a network that involves the major players of the construction sector, especially the multilateral banks such as the World Bank, the Asian Development Bank, and the Asian Infrastructure Investment Bank, among others, and the governments of the region to discuss this agenda.

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