

INDIA RIVER WEEK 2020

Is Sand Mining Killing Our Rivers?

Mining Riparian Health: West Zone Regional Report



K. J. Joy, Neha Bhadbhade, Sarita Bhagat, Kiran Lohakare, Nagmani Rao and Abraham Samuel

Society for Promoting Participative Ecosystem Management (SOPPECOM)

Website: www.soppecom.org; www.waterconflictforum.org

Contact: soppecom@gmail.com

November, 2020

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K. J. Joy

Neha Bhadbhade

Sarita Bhagat

Kiran Lohakare

Nagmani Rao

Abraham Samuel

With support and inputs from:

Rajasthan: Mohan Dangi, Manna Ram Dangi, Viren Lobo and M. S. Rathore

Madhya Pradesh: Rehmat, Rahul, Mukesh and Jitendra

Gujarat: Rohit Prajapati, Krishnakant and Shakti Bhat

Maharashtra: Bharat Patankar, Gopakumar Nityata, Malhar Indukar and Pravin Satoskar

Goa: Sarang Jambhale, Shailesh Shetye, Viraj Bakre, Arun Madgavkar and Sujeet Dongre

Special thanks to:

Tarun Nair, Jagdish Krishnaswamy, Siddharth Patil and Himanshu Kulkarni

Cover Image: Social Issues India, 2017

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Executive Summary

Introduction

The theme for India River Week 2020 is “Is sand mining killing our rivers?” It has been projected as a national issue through four regional dialogues. Society for Promoting Participative Ecosystem Management (SOPPECOM) is coordinating the regional dialogue for the west zone. Through this report we hope to address all the issues related to sand mining in the west region. We have also attempted to engage with the alternatives by discussing alternative ways of construction which can bring down the sand consumption in the construction industry substantially. The report is organized in two parts. Part one gives a regional overview of the west zone and the issues related to sand mining. Part two covers the details of all the issues around sand mining for the five states in the west zone: Rajasthan, Gujarat, Madhya Pradesh, Maharashtra and Goa.

The region and its rivers

Western region administratively consists of the states of Rajasthan, Gujarat, Maharashtra, Madhya Pradesh and Goa. The west zone cuts through arid to semi arid region in Rajasthan and Gujarat to sub tropical to tropical agro-climatic zones in Western Ghats in Maharashtra and Goa. The major rivers in the western region are Narmada, Tapi, Krishna, Godavari, Mahi, Chambal, Sabarmati, Banas, Betwa, Ken, Mahadeyi, Zuari, Son, Wainganga. Many of these rivers are also heavily regulated with dams, barrages and other diversion structures. These structures have not only disrupted the flows but also sediment transport. Coupled with unchecked sand mining, many of these rivers have lost their original characteristics and habitats causing great irreversible damage.

Extent of Sand mining

According to (Gol, 2018) sand consumption can be estimated on the basis of the cement consumption and then using a normative ratio of 1:2.5, that is the cement to sand ratio that is normally used in the construction industry. According to IBEF (2020) the average per capita cement consumption for the 2019 in the country was 235 kg. Therefore the average per capita sand consumption by using the factor of 2.5 would be 588 kg. Based on these values the total sand consumption in the west zone is around 185 million metric tonnes (MMT) (Gujarat: 35.54 MMT, Rajasthan: 40.31 MMT, Madhya Pradesh: 42.70 MMT, Maharashtra: 66.07 MMT and Goa: 0.86 MMT). Aghor et al (2015) in their article mentioned that the per capita sand consumption in the country is 200 kg. Using this value the total sand consumption in west zone is 63 MMT (Gujarat: 12.08 MMT, Rajasthan:13.71 MMT, Madhya Pradesh: 14.53 MMT, Maharashtra: 22.47 MMT and Goa: 0.29 MMT). It should be noted that the numbers estimated are upper bound figures. As the amount of sand consumed has been estimated based on the average cement consumption it would include all the types of sand used i.e. beach sand, river sand and even manufactured sand.

Ecological impacts of sand mining

Sediments play a decisive role in the development and quality of the riverine environment, and sediment dynamics determine river morphology and habitat-forming processes. Abiotic impacts to river systems include changes in channel morphology and larger scale river features, altered composition and movement of sediment leading to the redistribution of river habitats, disruptions in the hydrodynamic regime of the river, increased salt water intrusion and impacts on water quality. This in turn impacts the riparian vegetation decreasing the riparian species diversity. Increased turbidity levels affect the populations of the invertebrates and it hampers the spawning sites of fish and their movements. Sand mining also destroys the nesting sites and habitats of amphibians like turtles and crocodiles. Thus, sand mining causes many ecological changes which can lead to destruction of a number riparian habitats and species loss. A few examples of these are loss of blue cheeked bee-eaters habitat in Gujarat, nesting sites of lapwings in Madhya Pradesh and also destruction of corridor of the Asiatic lions. The details can be found in the state reports.

River Bed Sand mining and groundwater

Given the unique hydrogeological properties of sand, such a strip can hold and transmit groundwater, naturally harvesting the groundwater outflow/ discharge from upstream and from aquifers beneath the flood-plain, through the river banks. A conservative estimate of specific yield of such sand is 15% or 0.15. Therefore, a 1m thick sand layer in a 100 m wide riverbed that stretches over 1 km, can potentially store up to 1500 m³ of water. Hence, mining this strip of sand implies a loss of potential in-channel natural storage of 1.5 million litres. One truck load of capable of carrying 20 tonnes of sand has a volume of 12 cubic metres, which translates into 1.8 cubic metres of groundwater storage potential.

Impacts on lives and livelihoods

Sand mining has adverse impacts on the lives and livelihoods of the people, especially those staying in close proximity to the river banks. One of the common problems faced due to sand extraction is river bank erosion. During heavy rains, water enters into the fields and other areas, destroying the crops. It also pollutes the local drinking water resources in the village. Sand mining has affected the ground water tables significantly which has caused shortage of drinking water. Reduction in groundwater has also reduced the area under cultivation, and therefore food and fodder availability. Fishing communities are also the most affected due to loss of local species like clamps, shell fish, crabs and reductions in the fish catch. Sand mining has also impacted the river bank farming. There is also loss of labour. One argument that has been posed is that sand mining provides labour opportunities to the people. However, from the interviews with the key informants it appears that most of the labour involved in sand mining is not local and come everyone involved in sand mining right from the labour to transport to contractors are all from outside, i.e. not local. This has also led to conflicts with local people.

Legal and institutional issues

Sand is classified as a minor mineral, as defined in the Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act). As per section 15 of the MMDR Act, every state is empowered to frame rules for regulating the license, control and monitoring of the sand mining in the region. Further Section 23C of the Act empowers state government to frame rules to prevent illegal mining, transportation and storage of minerals. The Ministry of Environment, Forest and Climate Change (MoEFCC) issued the Sustainable Sand Mining Management Guidelines, 2016, which emphasize that every district in the state should prepare a district survey report, based on which the district administration is to identify sites for sand excavation and give license. The details of the rule, regulations and governance of sand mining for each state can be found in Part two of the report.

Illegal mining and violence

Illegal mining is rampant in all the states in the west zone. The highest amount is in Gujarat and Madhya Pradesh. Between 2009 to 2015, Madhya Pradesh reported 42,152 cases filed against illegal mining. In Gujarat about 60% of the mining is illegal. In the last five years there would more than 38,000 cases filed for illegal mining in the Gujarat. In Rajasthan, illegal mining continues in Tonk district in spite of the ban by the Supreme Court. Illegal mining is also rampant in Maharashtra and Goa. Cases of violence have been reported to be highest from Madhya Pradesh. There have been reports of extreme violence from the state in form of killing of people trying to stop or probe illegal sand mining.

Social Movements and resistances

There have been both organised and spontaneous struggles against river sand mining in various states in the west zone. There have been also many legal cases against illegal sand mining. However, looking at the different states in the west zone, it appears that there have been only a few long term struggles or social movements around this issue. Most of them have been isolated protests going on in cyclical manner whenever extreme events have happened because of sand mining. One of the most notable struggles against sand mining has been that of Mukti Sangharsh Movement (MSM) in Sangli District and Panegaon in Ahmednagar district in Maharashtra. In Rajasthan too, the local struggle led by Meval Kshetra Paryavaran Evam Manav Vikas Lok Manch against sand mining mobilized 100 villages and the NGT finally passed an order in 2015 to ban sand mining in the region. In Goa many civil society organisations, like the Rainbow Warriors, have come forward to form the Goa River Sand Protectors Network to monitor the illegal sand mining activities.

Alternatives

There have been many strategies suggested to tackle the sand sustainability crisis and they could be broadly grouped under: 1) resource avoidance and/or reduction, 2) alternative materials, and 3) best practices to minimize extraction impacts. While the sand sustainability crisis and the need for alternatives has been recognised by the government [see MoEFCC (2015) Sustainable Sand Mining Management Guideline, and Bureau of Indian

Standards Codes (e.g IS 383: 2016, IS 10262: 2019)], these have not been promoted or adopted widely enough. And while the growth of an alternative aggregate industry is encouraging, it must be monitored for pollution, quality control, and regulation related issues. Another route specially to bring down the use of sand in construction is to conceptualise construction as well as materials differently. SOPPECOM over the last three decades or so have developed technologies based on renewable materials that can reduce the use of fossil based material and can potentially bring down the use of sand by about 30%. However, if these technologies have to be mainstreamed then they need policy support and also a social demand from below.

Way Forward

The strategies suggested for facilitating sustainable excavation fails mainly due to absence of data on annual replenishment rate (possible load of excavation without harming the environment), participatory management possibilities at local body and community level, lack of enforcement mechanisms at various scales, the poor quality of District Reports and the inefficiency of DEIAA, DEAC etc. Therefore, recommendations to make sand mining more sustainable are:

- **Empowering Gram Sabhas/ Gram Panchyats/ Urban Local Bodies:** Gram Sabhas Gram Panchayats and Urban Local Bodies (ULBs - in case of urban stretches of the rivers) should be given the right to decide on the management of sand resources especially the riparian rights of sand in the river/ drainage course and the revenue sharing mechanisms.
- **Prioritization of sand use to meet local needs and non-mechanized ways of mining and transportation:** Bullock carts, mules and other animals are exempted from any mining tax. Such provisions encourage local participation and regulate sand mines. It is recommended that local needs and requirements should be fulfilled on priority basis.
- **Self Help Groups and Cooperatives:** Cooperatives are the best way to involve people with collective ownership. It is recommended that sand mines may be managed with cooperative arrangements taking local women's participation.
- **Shifting Management and regulation to hydrological units:** Flood plains and riverbed regulation zones to be created and the river sand excavation mechanism to be entrusted with River Basin/Sub-basin Organizations with participation of concerned Gram Panchayats and ULBs so as to understand the overall impact on river ecology
- **Reorienting the district reports:** The district level reports should be not just a document for estimating the quantum of sand to be excavated, but should contain detailed assessment for environmental, ecological, social and economic impacts.
- **Water conservation efforts should not go against the interests of rivers:** Massive excavations have been made in many river systems in the state using heavy earth moving machinery and also removed huge quantities of river bed material for water

conservation. Such activities should not be allowed. The annual incremental silt accumulation behind structures in the rivers and streams could be done under strict regulatory controls.

- **Role of knowledge, data and informed public discourse:** There is a need to create river basin specific knowledge and data about the river morphology, ecology, yearly replenishment of sand, livelihood dependence of people, violations, etc., etc. Real time data on sand excavation need to be developed. All the knowledge and data generated need to be on public domain which can help to make the whole sand mining operations more transparent and accountable.
- **Social demand for potential alternatives:** It is important to generate social demand from below so that serious efforts at policy level are made to search for alternatives as discussed in this section especially the alternative approach to construction which has the potential to reduce sand consumption in construction by about 30%.

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The intricate relationships between the fishers, the small-scale sand miners, the sand farmers, the birds and the trees pertain not only to the possibilities of developing sustainable ways of human life in an economic sense, but also sustaining all life forms and their relationships.

(Yemuna Sunny 2020)

Part One: The West Zone Regional Scale

Introduction

Context of this report

The Organising Committee (OC) of the India River Week (IRW) decided on “river sand mining” (Is sand mining destroying our rivers?) as the theme of this year’s IRW and project, through four regional and one national dialogues on the issue. The OC asked Society for Promoting Participative Ecosystem Management (SOPPECOM) to coordinate the west zone engagement – preparation of the west zone report on river sand mining and organisation of the west zone dialogue on the issue. SOPPECOM accepted this responsibility fully realising that it is not going to be easy to prepare a comprehensive report at such a short notice. However, we got into this recognising the importance of the issue – the impact of river sand mining on the riparian health, the life forms that are part of the riverine ecosystem and the life and livelihoods of people that are dependent on these rivers. This report is basically a work in progress and we hope to build on this over time.

Importance of the issue and scope of the report

The concept note prepared by the OC for the IRW clearly brings out the significance of river sand mining – more broadly called mining of River Bed Material (RBM) including sand, gravel, boulders – on various fronts: impacts on riverine ecology and riparian health, the relationship between river sand deposits and aquifers, impacts on the lives and livelihoods of the local communities, governance and regulatory issues related to sand mining, possible alternatives including measures to regulate sand extraction within renewable limits and so on. The concept note says that sand is the second highest natural resource extracted after water.

In this report we hope to engage with these issues both at the west zone as well as state levels. Any critical discussion on river sand excavation and its impacts often ends up with the question, “so, what’s the alternative?” This is an important issue because sand still continues as a basic material in all types of construction (and also raw material for glass manufacturing and electronic industry). The mainstream alternative that is being suggested and being practiced in many states is to shift to M-sand (manufactured sand) which is

basically crushing of rock/stone mined from the increasing number of stone quarries dotted on all our hills and mountains. Western Ghats is a good example of this. Shifting to M-sand is only shifting the locale of the problem – from the rivers to the mountains! In this report we would try to engage with this issue and discuss about a different way of construction that has the potential to bring down sand footprint in construction substantially.

Methodology

We have used both secondary and primary sources to put this report together. South Asia Network on Dams Rivers (SANDRP) blogs on river sand mining has been an important secondary source. The websites of different states, especially of the mines and minerals departments have been useful. Also, we could lay our hands on a few academic as well as popular articles on river sand mining. Report of the Environmental Impact of Excavation of Sand in River Yerala, Sangli District, and verdict of the Supreme Court on a Public Interest Litigation (PIL) on sand excavation in River Yerala, the two study reports on the impact of sand excavation in Udaipur region provided us very valuable, site specific insights for this report. We held detailed interviews with a few key informants from the states in the west zone that gave us contextual insights about sand mining in the states.

Structure of the report

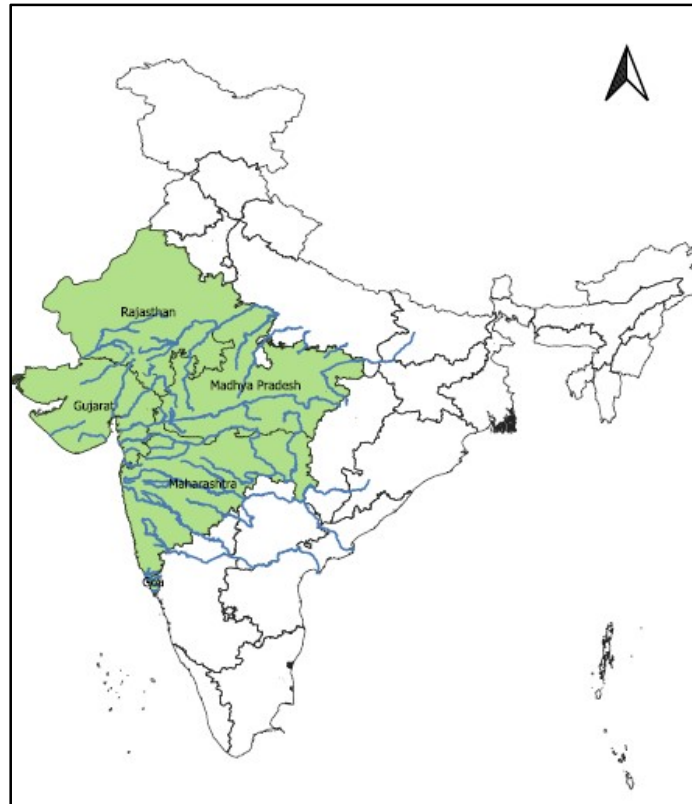
The report is organised under two parts. Part One deals with the issues at the west zone regional scale. It gives details about the region and the rivers and then discusses issues like the extent of sand mining, impacts of river sand mining on the freshwater ecosystems, river bed sand mining and groundwater, impacts on lives and livelihoods, legal and institutional mechanisms, illegal mining and violence, judicial interventions, social movements and resistances, possible alternatives and way forward. In Part Two we try to cover the same issues but in much detail for the five states (Rajasthan, Madhya Pradesh, Gujarat, Maharashtra and Goa) that consist the west zone. Here we also try to bring in some of the micro details that we have been able to collect from our discussions with key informants from these states.

The region and its rivers

Western region administratively consists of the states of Rajasthan, Gujarat, Maharashtra, Madhya Pradesh and Goa. The region is bounded by the Thar Desert in the north, the Vindhya range in the east and the Arabian Sea in the west. The west zone also shares the Deccan plateau with the South and Central India. The west zone cuts through arid to semi arid region in Rajasthan and Gujarat to sub tropical to tropical agro-climatic zones in Western Ghats in Maharashtra and Goa. There is a huge variability in the rainfall in the west zone. The average annual rainfall in Goa is 3000 mm, in Maharashtra it varies between 500 mm (in the semi-arid zones) to 3000 mm (in the Western Ghats), in Gujarat the average rainfall varies between 578 mm (in Saurashtra) and 1100 mm (in Gujarat region), in Rajasthan it varies between 313 mm (west Rajasthan) and 675 mm (east Rajasthan) and in

Madhya Pradesh it is around 1200 mm. Therefore, in the west region the rainfall varies from around 300 mm in the arid areas to 3000 mm in the Western Ghats.

Figure 1: River system in Western India



The major rivers in the western region are Narmada, Tapi (Tapti), Krishna, Godavari, Mahi, Chambal, Sabarmati, Banas, Betwa, Ken, Mahadevi (Mandovi), Zuari, Son and Wainganga. The west region is one of the most industrialized regions with very high urban population.

All the major rivers in the west zone are heavily regulated. The Tribunals for Krishna and the Narmada Rivers have already been awarded and the states have been fighting for each drop of water for human consumption. In order to utilize the water dams, barrages and other diversion structures have been built of the rivers. The outflows of Narmada have drastically reduced and now there is sea water intrusion at Bharuch where Narmada flows into the Arabian sea. Similar is the fate of Krishna, whose lean season flows have decreased drastically. Before 1960 the annual discharge of the river was close to 57 billion cubic meters (BCM). By 2000 they dropped down to 10.8 BCM and now they are close to negligible (Joy et al., 2011). Similar is the fate of the other rivers like Tapi, Sabarmati, Mahi, Chambal, Tapi and Betwa. These rivers are heavily regulated. Dams not only disrupt the flow in the rivers but also sediment flows. This coupled with unchecked and unregulated sand mining has caused irreversible damage to the rivers.

Extent of sand mining

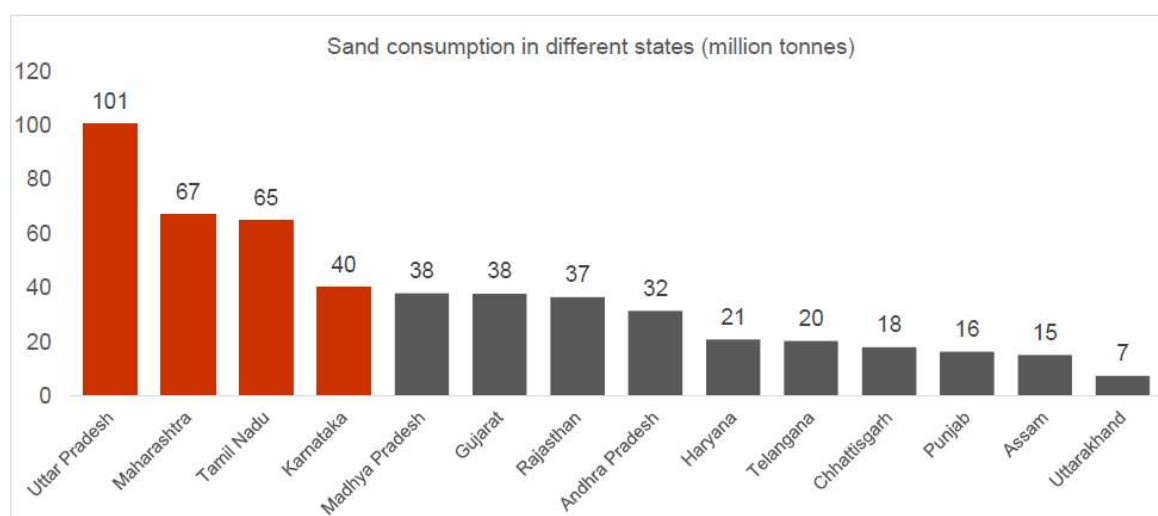
Sand is considered as the highest volume of raw material used and after water as the most consumed commodity. In India it is the fourth most important minor mineral in terms of production.

With illegal sand mining rampant all over the country it is extremely difficult to estimate the actual amount of sand that has been excavated. According to Gol (2018) sand consumption can be estimated on the basis of the cement consumption and then using a normative ratio of 1:2.5, that is the cement to sand ratio that is normally used in the construction industry. According to IBEF (India Brand Equity Foundation, 2020) the average per capita cement consumption for 2019 in the country was 235 kg. Therefore the average per capita sand consumption by using the factor of 2.5 would be 588 kg. Based on these values Table 1 below shows a rough estimated state-wise sand consumption for the west zone. Also according to Aghor et al (2015), the average per capita sand consumption in the country is around 200 kg. This value also has been used to estimate the total sand consumption. Since there are different ways of estimating the sand consumed, a range of values have been produced which give a ball park estimate of the sand consumption.

Table 1: Estimation of state-wise sand consumption in west zone

State	Total (MMT) (Estimated using the 1:2.5 ratio of cement to sand)	Total (MMT) (Estimated using the per capita sand consumption value as mentioned in Aghor et al (2015))
Gujarat	35.54	12.08
Rajasthan	40.31	13.71
Madhya Pradesh	42.70	14.53
Maharashtra	66.07	22.47
Goa	0.86	0.29

The numbers estimated for the statewide sand consumption in Table 1 are upper bound figures. As the amount of sand consumed has been estimated based on the average cement consumption, it would include all the types of sand used i.e. beach sand, river sand and even manufactured sand. Though river sand is most the preferred in construction industry, many governments like the Government of Maharashtra has put regulation on river sand and come out with a Government Resolution (GR) to use M-sand in all its public works projects (Abdulali, 2019). Therefore considering the different kinds of sands that would be used in the construction industry (M-sand, beach sand and river sand), the actual consumption of river sand could be lower.

Figure 2: Sand consumption in some of the major states of India

Source: Extracted from Sand Mining Framework (2018), as analysed by RBI

Also, according to GoI (2018), the rate of sand production is estimated to grow annually at 6%. Using this value and the amount of sand produced in the states of Gujarat, Rajasthan and Madhya Pradesh in the year 2017, projections for sand productions were made till the year 2025 which are shown in Table 2. The estimated production of sand for Maharashtra and Goa could not be found, as no data was available.

Table 2: Projections for sand consumption in the west zone

Year	Gujarat (MMT)	Rajasthan (MMT)	Madhya Pradesh (MMT)
2017	49.64	49.14	56.80
2018	52.62	52.09	60.21
2019	55.78	55.21	63.82
2020	59.12	58.53	67.65
2021	62.67	62.04	71.71
2022	66.43	65.76	76.01
2023	70.42	69.71	80.57
2024	74.64	73.89	85.41
2025	79.12	78.32	90.53

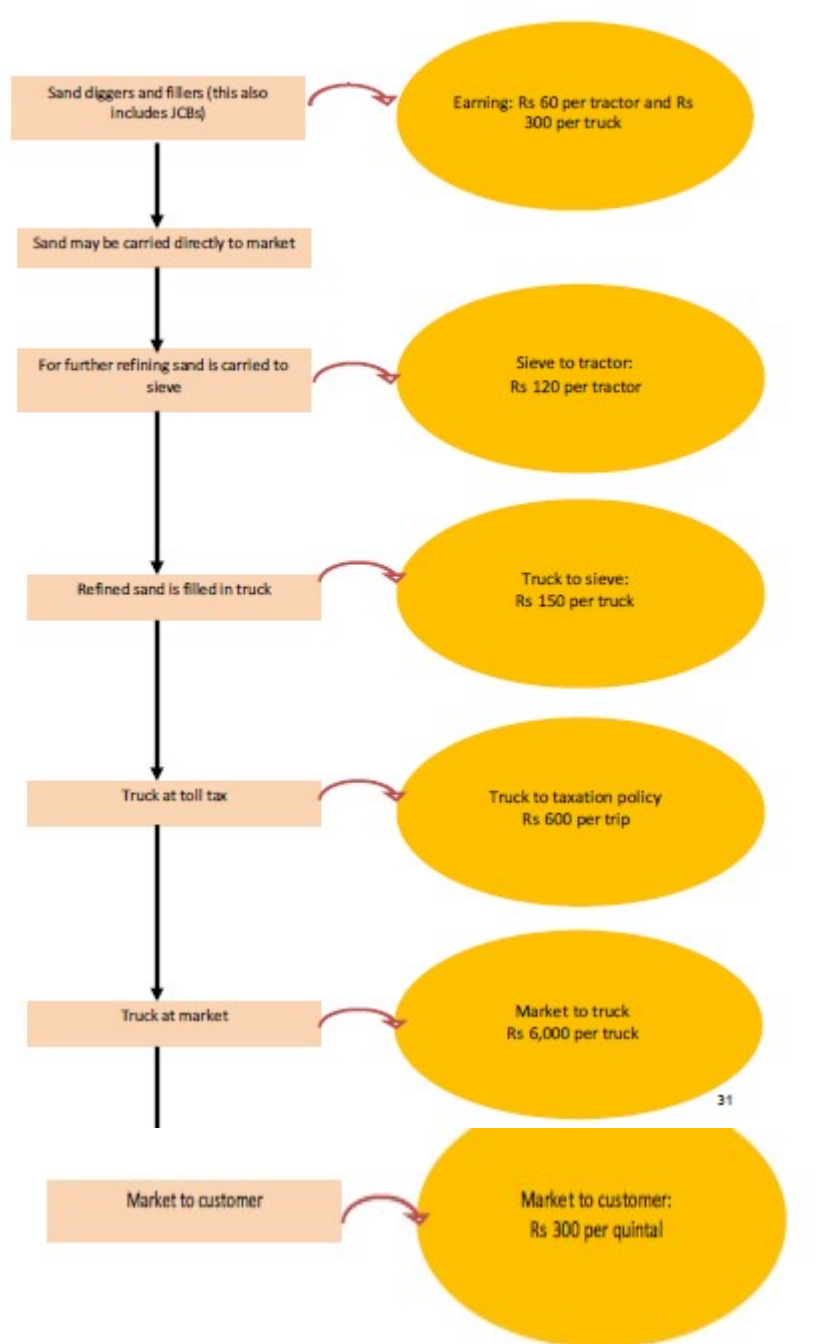
Impacts of river sand mining on freshwater ecosystems¹

Sediments play a decisive role in the development and quality of the riverine environment, and sediment dynamics determine river morphology and habitat-forming processes. A summary of a recent review (Koehnken et al, 2020) of scientific evidence on the biophysical impacts of riverine sand mining on freshwater ecosystems is provided here. ‘Sand mining’ is

¹ This section has been primarily contributed by Tarun Nair, ATREE, Bengaluru and we have further developed it with insights from the states in the west zone.

used here as a generic term to include mining of any riverine aggregate regardless of particle size.

Figure 3: Value chain of sand mining



Source: Prayatna Samiti Report, 2011-12

Broadly, the ecological impacts of sand mining on rivers may be *direct* where aggregate removal is directly responsible for ecosystem damage, habitat loss and other physical changes to the ecosystem, or *indirect* where aggregate removal can alter channel morphology which in turn can alter the distribution of habitats and ecosystem functioning,

deterioration of water quality, and hydraulic changes affecting movement of fish and habitat availability.

Abiotic impacts to river systems

Abiotic impacts to river systems include changes in channel morphology and larger scale river features (e.g. channel incision, thalweg relocation, channel widening, erosion, decreased floodplain connectivity, lowering groundwater levels); altered composition and movement of sediment leading to the redistribution of river habitats (e.g. gravel bars, pool-riffle sequences); disruptions in the hydrodynamic regime of the river; increased salt water intrusion; and impacts on water quality. The nature and extent of these impacts are often contrasting and this reflects their site-specificity.

Impacts on riverine vegetation

The impacts include fragmentation of riparian forests and other riparian vegetation types due to the creation of accessible roads and storage sites; prevention of the re-establishment of pioneer vegetation due to lowering of the water table on previously cleared riparian habitats, and the diminishing of landform specific relationships with vegetation; decrease in cover of aquatic plant communities due to increased scouring, decreased light penetration and changing substrate compositions; and colonisation of incision-induced narrowed reaches by a range of pioneer vegetation species through the exposure of nutrients and moisture at eroded sites, and even stabilization of established islands through the reduction of the active channel.

A phytosociological study of a riverine sand mine and its surrounding areas in Rajasthan found that while the primary impact was the direct removal of vegetation, the mining and dumping of tailings also altered soil profiles, changed the area's hydrology and topography, and altered the nutrient concentrations of the substrate and that changes in vegetation altered the rates of carbon and nitrogen cycling, the productivity of the ecosystem, and the structure of the microbial community.

Impacts on invertebrates

Increased turbidity and suspended sediment concentrations lead to decreased invertebrate populations either through direct removal during mining activities, or habitat loss and disruption through the filling of interstitial spaces of the bed substrate. Suspended fine sediments can infill bed materials, changing rugose sediment surfaces to indurated and embedded substrate leading to a decrease in macroinvertebrate taxa diversity and density.

Changes in turbidity affect invertebrate drift, which in turn compromise the ability of macroinvertebrates to colonize new river sections, escape sub-optimal habitats and avoid intra specific competition and alter the availability of invertebrates as a food source. Low water levels due to incision or channel widening associated with mining and bar scalping can result in increased risk of stranding and mortality, and in increased water temperatures

resulting in lower dissolved oxygen concentrations and increases in the toxicity of pollutants such as heavy metals, insecticides, and natural toxicants.

Impacts on fish

One of the significant impacts is the severe population declines through physical changes to habitat availability and structure, destruction of spawning grounds, and interference to migration routes. Changes in river hydraulics and habitat modifications arising from the removal of riffle-sequences due to mining, channel incision and widening (in conjunction with stressors such as dams) lead to the replacement of lotic species by lentic species and allowed generalist and invasive species to displace native habitat specialists.

Selective removal of sediments, particularly of sizes that are used by fish to construct spawning beds or nests, results in the destruction of spawning habitats. Fish reproduction is also hampered by mining-related rearrangement of benthic sediments which decreases the stability of the sediment deposits and impacts embryos sheltering within them. Decreased habitat complexity through the replacement of rugose substrates by well-embedded fine-grained substrates threatens reproductive guilds requiring coarse substrates for nesting, and these fine sediments also directly impact silt sensitive fish species.

In Madhya Pradesh, there has been a decline in the fish population, including species (mahseer, common carb, rohu [not the cultivated variety], etc.), mainly because of the increasing turbidity of the rivers and changes in the local ecosystems (for example, certain grasses are not there and they are important for the “vegetarian” fishes, or sunlight does not reach deeper levels, etc). The overall change in the Narmada river system is also affecting the terrestrial habitats.

Sand mining can also modify feeding and food web structures — sight feeders such as trout and bass are more likely to be harmed than non-sight feeders such as catfish at higher levels of turbidity, and fish from undredged sites have been shown to obtain nutrients from the benthos, whereas fish in dredged areas relied on phytoplankton and terrestrial detritus and occupied lower trophic positions. Lowering of ground water levels due to mining has also been shown to reduce the intensity of cold water plumes created by groundwater seeps, and these thermal refugia are critical for poikilothermic fish seeking to escape warm summer river temperatures.

Other vertebrate fauna, especially **freshwater turtles, crocodiles and birds are also impacted** (Larson, 2018) through loss of nests and nesting beaches and emergent sand bar habitats (this was reported especially in the coastal areas of Maharashtra, Goa and Gujarat); mining related disturbances and displacement due to the presence and movement of people and machinery; loss of lateral and longitudinal connectivity through the construction of associated infrastructure like bridges, culverts, bunds and embankments; and disrupted food webs through depletion and modification of lower trophic levels. There were reports

that illegal sand mining in the eco-sensitive zone along the Dhatardi River are threatening the habitat and the corridor of the Asiatic lions. (Times of India, 2018)

There are sand nesting birds. Lapwings coexist with people who grow melons and cucumbers on the sands of the Narmada. They call and fly around and do not perch on trees like the egret. They stand on the ground as their feet cannot make a grip on tree trunks. They lay their eggs, like the curlew, on the sand without elaborate nest building (Sunny, 2020). Their habitats are completely destroyed because of river sand mining.

Sand mining is linked to many changes in ecological structure, process, and biodiversity of freshwater systems. However, responses of river ecosystems to sand mining are complex, with no simple cause–effect relationship applicable to all systems. The variability in responses is linked to the inherent characteristics of impacted river systems and other stressors such as sediment trapping behind dams and land-use/ land-cover changes in the catchment.

River bed sand mining and groundwater²

Common perceptions around groundwater and rivers in India have tended to revolve around a simplistic notion of rivers recharging aquifers. This perception has become more and more pronounced with the decline of groundwater levels on one side and rivers drying up on the other. Internationally and in scientific literature on hydrogeology, aquifers are also recognised for their role in sustaining river flows, at least, during the lean or dry periods, when groundwater is discharged by aquifers to river channels. Either way, rivers and aquifers bear a complex but significant relationship, both in the context of development paradigms and from the perspective of ecosystem and the environment. It is in this short background that one must examine the case of sand mining from riverbeds in different parts of India.

In order to assess and quantify the impact of sand mining of riverbeds on river flows and groundwater, it becomes fundamentally important to establish the concept of base flows. This is particularly relevant for rivers from western and southern India, essentially rivers that are entirely dependent upon rainfall, predominantly monsoonal rainfall. These regions host some of the major river systems of India such as Krishna, Godavari, Tapi, Sabarmati, Narmada, Cauvery, etc., many of which also have their source regions in the Western Ghats. Many of these rivers show natural routing of rainfall through recharge into aquifers that discharge downstream, often through river bank out-seeps and springs. As a matter of fact, many of these rivers also show seeps and springs in their uppermost catchment regions. Such groundwater discharges make up the base flow component of a river.

A deposit of sand in a river bed bears a distinct identity representing the geomorphology, catchment character and even a history of agro-climatic conditions. A river sand-bed

² This section has been mainly written by Siddharth Patil and Himanshu Kulkarni, ACWADAM, Pune and we have further contextualised it with insights from the states in the west zone.

represents the 'provenance' of the sand deposit, i.e. the source region and the erosional and depositional history of the system. Sand is also useful for many purposes and like many other resources, it tends to be exploited at much greater rates than the rates of deposition (in other words, its replenishment in the river bed).

A river channel can be considered as a locus of the lowest points in an area, implying that it is connected to aquifers upstream and downstream. Complex exchanges of groundwater with the river-flow are bound to occur, depending upon the morphology of the river, the aquifer boundaries and the hydrological conditions in the river and the interconnected aquifers. These exchanges are variable in space and time. However, a strip of sand deposit in a river channel plays an important role in this exchange. In simplistic terms, one can consider a strip of sand to be like a long, narrow, thin (shallow) aquifer, sometimes in continuation with aquifers on either side of the channel, under the river flood plain. Given the unique hydrogeological properties of sand, such a strip can hold and transmit groundwater, naturally harvesting the groundwater outflow/ discharge from upstream and from aquifers beneath the flood-plain, through the river banks. At other times or in other places, it receives the runoff from the upstream part, which it assimilates in its storage and slowly releases downstream to add to the base flow of the river. Either way, it behaves like a sustained release mechanism converting runoff (that includes both overland flow and base flow from upstream) to groundwater flow to base flow through a portion of the channel. Such a flow regime that operated over several years sustains ecosystems of different types and enables water in the channel (both as natural stocks and sustained flows) for longer periods of time, even perennially.

Intensive aquifer exploitation, especially in parts of Western India, has meant that aquifers underneath the larger flood plain are not able to naturally discharge onto the riverbeds, turning historically perennial rivers seasonal. However, the presence of thick sand deposits in the riverbeds ensure at least some stocks that enable drinking water for humans and livestock in many such regions. As a matter of fact, such 'strips' of sand are also used for tapping (often temporarily) irrigation supplies from shallow wells in riverbeds.

The sand in the riverbeds in Western India is generally coarse. A conservative estimate of specific yield of such sand is 15% or 0.15. Specific yield represents the 'yielding' pore volume of rocks and material derived from rocks. Therefore, a 1 m thick sand layer in a 100 m wide riverbed that stretches over 1 km, can potentially store up to 1500 m^3 of water. Hence, mining this strip of sand implies a loss of potential in-channel natural storage of 1.5 million litres!

Taking the argument further, one truck load capable of carrying 20 tonnes of sand has a volume of 12 cubic metres, which translates into 1.8 cubic metres of groundwater storage potential that permanently taken away when a truck load of sand is mined. This can be perceived in two ways – one, the storage capacity at that location is lost and two, the capacity to release water downstream has also reduced by the same volume.

Reports from all the states also clearly indicate the decline in the water tables due to sand mining and thereby its effect on the livelihoods of the people. Due to reduction in the groundwater levels the area under cultivation has reduced in Rajasthan, Maharashtra and Gujarat. Also, good quality of drinking water which was earlier available at few depths is now available at deeper depths. This also impacts the quality of groundwater. In Maharashtra, Panegoan village unanimously took decision to stop sand mining, here water is easily available at 50-60 m. However, in the adjoining villages, people have dug borewells up to 300 feet.

Sand mining, therefore, has serious implications on the morphology, hydrology and hydrogeology of a river system. A strip of river sand therefore represents not only a part of the earth's history but is a living ecosystem that further enhances and supports other systems.

Impacts on lives and livelihoods

The overall character of sand mining has changed. Earlier, the local labourers used to get work. For example, in the case of one truckload of sand nearly 30% of its monetary value was the labour cost. Now only a few people who are connected with the contractors get work. Similarly in Rajasthan and Gujarat, mechanization has displaced labour. Rapid rate of sand mining has put some 200-ha patch from Aavara village in Rajasthan to sand deficit area. These accounts for the fact that each month 4 people involved in sand mining are losing their jobs.

Sand mining has adverse impacts on the lives and livelihoods of the people, especially those staying in close proximity to the river banks. One of the common problems faced due to sand extraction is river bank erosion. During heavy rains, water enters into the fields and other areas, destroying the crops. It also pollutes the local drinking water resources in the village. Many coconut and *supari* plantations have been lost due to sudden floods in the coastal areas in Maharashtra and Goa

Sand erosion has an indirect impact on the availability of water. As explained above, sand extraction leads to reduction in the groundwater tables. Groundwater which was easily available within few meters depth, people have now started digging deep borewells to access water. Due to shortage of drinking water, some villages have to start depending on drinking water from November-January itself. Reduction in groundwater has also reduced the area under cultivation, and therefore food and fodder availability.

Fishing communities are also the most affected. Many fisherfolk have reported loss of local species like clamps, shell fish, crabs and reduction in the fish catch. Sand mining has also impacted the river bank farming.

Figure 4: Sand farming in Hoshangabad, Madhya Pradesh



Photo credit: Yemuna Sunny

Legal and institutional issues

Sand is classified as a minor mineral, as defined in the Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act). As per section 15 of the MMDR Act, every state is empowered to frame rules for regulating the license, control and monitoring of the sand mining in the region. Further Section 23C of the Act empowers the state government to frame rules to prevent illegal mining, transportation and storage of minerals.

With large number of ongoing infrastructures projects in the country, the demand for sand has increased. In order to meet the rising demand, the illegal mining in the country has increased, creating adverse impacts on the environment and surrounding ecology Apex constitutional bodies like the National Green Tribunal (NGT), Supreme Courts and the High Courts have addressed and put restrictions on sand mining activities in states to prevent further damage to the environment.

The Ministry of Environment, Forest and Climate Change (MoEFCC) issued the Sustainable Sand Mining Management Guidelines, 2016, which emphasize that every district in the state should prepare a district survey report. Based on this report, the district administration is to identify appropriate sites for sand excavation and issue license. This is either done through auctioning or interested parties have to submit duly filled forms to the concerned authorities. As per the guidelines every state is to prepare sustainable sand extraction plans.

Following is a summary of the different institutions and sand mining rules which exists in the west regional zone. Every state has different institutional set up for issuing license and regulatory mechanism to control and monitor the sand extraction works. This is described in detail in the state level report.

Table 3: Comparison of the sand mining institutions and regulatory mechanisms across states in west zone

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Particular Features	Rajasthan	Madhya Pradesh	Gujarat	Maharashtra	Goa
Rule	The Rajasthan Minor Mineral Concession Rules, 2017.	Madhya Pradesh Sand Mining Policy, 2017 (Draft for 2019 available)	The Gujarat Minor Mineral Concession Rules 2016	The Maharashtra Minor Minerals Mining (Development and Regulation) Rules, 2013 (Last Amended 2019)	The Goa, Daman and Diu Minor Mineral Concession Rules 1985 (Last amended 2012)
Identification of sand reaches and mining concession	Department of Mines and Geology, Rajasthan	District Collector and approval is done by Directorate of Geology and Mining, Madhya Pradesh	CGM, Industries and Mines Department, Gujarat	Mining department of the Collectorate office in every district	Directorate of Mining and Geology Department
Process for issuing license	Online tender cum auction and thereby selection of successful bidder	Auction to be done at district level	Online auction done through IT platform or vendor and thereby selecting successful bidder	Sand auctioning and no objection certificate from the Gram Sabha	Interested parties to fill forms and selection of nominees
Area of sand reach allotted to a license holder (in hectares)	5 ha	1 ha	Minimum 1 ha and maximum 50 ha	Upto 5 ha	Up to 5 ha
Mining lease period for river sand	5 years	3 years	5 years	5 years	1 year
Depth up to which sand can be extracted from the river bed (in meters)	1 m	3 m	3 m	3 m	1 m
Operations and monitoring of the sand extraction	License holder and the Department of Mines & Geology, Rajasthan	Mining and loading operations to be seen by the Gram panchayats. Task force teams set under each district for overall monitoring	District Monitoring Committee	License holder and the District Collector	Flying squad in every taluka set after NGT order, CCTV cameras to be installed in identified stretches

Illegal mining and violence

Illegal mining is carried out in all the states in the west zone. In Madhya Pradesh between 2009- 2015, there were a total of 42,152 cases of illegal sand mining registered. Even after the stay by the High Court, Shiva Corporation, one of the biggest company from Rajasthan continues to mine in the Narmada. In terms of violence Madhya Pradesh has had the highest cases of extreme form of violence. A few examples include killing of a journalist probing illegal sand mining in 2018 where he was mowed by a truck and the killing of forest rangers in Morena district, which were shot dead for trying to stop illegal sand mining.

In Gujarat, 60% of the sand mining is illegal as said in an interview with the activist Rohit Prajapati. In the last five years there were more than 38,000 cases of illegal mining filed in Gujarat for which First Information Report (FIRs) were filed only for 2% cases. The State government also launched a drone surveillance system called 'Trinetra' which did not achieve much success as most of the illegal activities were carried out at night. There have been also few violent incidents. One example is of a RTI activist, a local farmer, brutally beaten up by the sand mafia when he was trying to stop the illegal sand mining on Ozat river in his village.

In Rajasthan despite the SC ban, illegal sand mining continues in Tonk district. In the last five years the amount of sand extracted illegally in Rajasthan is around 99 lakh metric tonnes (Outlook India, 2018, as cited in SANDRP, 2019). In Rajasthan there have been violent incidents in Dholpur district where the sand mafia have openly attacked SP (DSP) level officers.

There have been a number of cases of illegal mining in Goa and Maharashtra too. In Goa, although there is vigil watch kept by the local activists, response to the complaints are often delayed. There are no extreme violent incidents reported. The details can be found in the detailed overview of each state.

Social movements and resistances

There have been both organised and spontaneous struggles against river sand mining in various states in the west zone. There have been also many legal cases against illegal sand mining. However, looking at the different states in the west zone, it appears that there have been only a few long term struggles or social movements around this issue. Most of them have been isolated protests going on in cyclical manner whenever extreme events have happened because of sand mining.

In Rajasthan, a social struggle against sand mining happened in the catchment of the Jaisamand or Dhebar Lake in Udaipur district. There was severe scarcity of water in this region because of sand mining and around 100 villages came together to protest against the illegal sand mining in the region. In 2015 NGT passed an order to ban sand mining. The movement was led by Meval Kshetra Paryavaran Evam Manav Vikas Lok Manch.

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In Madhya Pradesh, the Narmada Bachao Andolan is the strongest and largest social movement. Though they have been primarily fighting for the rights of the project affected persons (PAPs), some of the activists have raised issues on sand mining a couple of times. However, as a movement they have not taken this as an important issue. The other rivers like Chambal, Betwa, Son which are heavily mined, there are no social movements.

Similarly, in Gujarat also the protests are at local level but there are no sustained social movements that have been able to put a stop to sand mining.

The notable struggle and movement in Maharashtra had been the one led by Mukti Sangharsh Movement (MSM) in Sangli district. There had been also an effort in Panegoan, Ahmednagar district. Here the villagers came together for 19 years. Through the petition filed in the Mumbai High Court they were able to get a ban on the sand mining in their village.

In Goa many civil society organisations, like the Rainbow Warriors, have come forward to form the Goa River Sand Protectors Network to monitor the illegal sand mining activities. The members of this network have been actively writing, reporting in newspapers and video blogging the illegal activities in the state.

The state reports would give more details on these. However, we would like to discuss the Mukti Sangharsh Movement case here as it is instructive of both the nature of a social movement around sand mining as well as the potential of such movements in regulating sand mining.

Sand excavation from the Yerala River, a tributary of River Krishna, took commercial proportion from the beginning of the 1980, especially coincided with the drought in 1981-82. Apparently, the sand for Yerala River was preferred because it had very little silt content. The labour involved was mainly from the local area. Till about 1985-86 the sand excavation went on and nobody paid much attention to it. However, it was around this time the people from the adjoining started realising the impact of sand mining as they noticed that the water levels in their wells on either side of the river and the jack wells constructed in the river bed itself going down. This forced the Mukti Sangharsh Movement (MSM) that was organising the people around issues of drought and water and also the workers on the Employment Guarantee Schemes (EGS) to take up a systematic study of the issue by undertaking a *padayatra* through the river bed trying to understand the extent of sand mining, and its impacts especially on groundwater recharge. Through this MSM a *prima facie* case regarding the impact of sand excavation was established. From 1986-87 onward for the next five years or so MSM led an intense struggle against the sand mining, forcing the District Collector to constitute an expert committee (including a representative of MSM) in April 1988 under the chairpersonship of the Collector to look into the issues raised by

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MSM.³ Meanwhile MSM also wrote a letter to the Chief Justice of India (CJI) on this issue, which the CJI converted into a PIL.

The Committee further constituted five sub-committees to look into the following:

1. Rate of sand deposition and flood characteristics in the river Yerala
2. Groundwater aspect in and around Yerala river bed and probable effects of excavation of river sand
3. Change in the course of stream/soil erosion
4. Effect of sand excavation on irrigation
5. Adverse effect on drinking water from jack wells

The committee in its report agreed with the contention of MSM that the commercial sand excavation is having a negative impact on the water. It also said that the present excavation is much higher than the annual replenishment rate. However, it said that the committee cannot recommend a total ban on sand excavation as sand is needed for both local and non-local needs (including for government projects). The major recommendations included:

1. Need to minimise exploitation of sand from Yerala River
2. Identification of suitable sites for sand excavation and sites from where sand has not been exploited
3. Following rules were framed by the Committee for exploitation of sand to avoid environmental effects of Yerala River
 - No sand should be excavated within 2 metres from the river bank
 - Depth of sand to be excavated should not be more than 1 metre
 - Safe distance of 50 metres should be left while excavation of sand in the periphery of existing structures like dams, bridges, road, jackwells and any other public structures
 - Permits for excavation of sand to cater to the local need of constructions of houses, wells etc up to 20 brass (1 brass = 100 cubic feet = 2.835 m³) sand may be given by Tehsildar to the people from the villages up to a distance of 8 kilometres on either side of Yerala river with proper verification
 - Requirement of sand of about 20 brass to 200 brass for house building etc for private purposes may also be given by Tehsildar but with a certificate from civil engineer
 - Permits for small requirements of 200 brass should be given to the individual only once for single purpose
 - Selection of places of sand excavation, its priority, quality for the requirement for government works, will be decided by a team of members consisting of Dy.

³ See Joy and Rao, 1988 for details

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Director, Geology and Mining Department, Tehsildar and representative of the Collector

This report was submitted to the SC by the Collector saying the recommendations of the Committee would be implemented. The SC gave a verdict saying it does not feel the need to intervene in the issue at present as the Collector gave an undertaking to implement the recommendations of the Committee. In the verdict the SC appreciated the efforts put in by MSM to protect Yerela River and further said that the MSM can approach the SC again in case of violations of the recommendations. The Collector did constitute a committee to oversee the sand mining operations in the Yerela River which used to meet regularly till about 2011-12. One of the reasons for this could be that the pressure of then movement became less as MSM got integrated with a larger movement (covering a much a larger geographical area in South Maharashtra) and the focus of the movement became primarily drought proofing and equitable access to water.

The much talked about Baliraja Smruthi Dharan (Dam in memory of King Bali) on Yerela between Balawadi and Tandulwadi villages is a lasting symbol of their struggles against commercial sand excavation. The name Bali that the people chose to name this small dam (more of a small a weir of about 2.5 meters) itself is very evocative – Mahabali (Maveli) was the bahun, peasant king in whose times there was no exploitation, there was equality and prosperity and the Onam festival in Kerala is the occasion when king Bali comes to visit his people. A similar sentiment is echoed in Maharashtra among the bahujans when they say, 'Ida PeedaTalo, Baliche Rajya Yevo' (Let all sorrows go, let the kingdom of Bali come'.

Figure 5: Overflowing Baliraja dam, Sangli, Maharashtra



Potential alternatives

One of the issues that naturally comes up in any discussions on sand mining is, “so, what’s the alternative?” There have been many strategies suggested to tackle the sand sustainability crisis and they could be broadly grouped under: 1) resource avoidance and/or reduction, 2) alternative materials, and 3) best practices to minimize extraction impacts.

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However, the adoption of these measures is ultimately reliant on improved governance to implement these strategies and prevent illegal mining. Environmental and social costs and benefits of aggregate alternatives will also have to be considered, in addition to their long-term stability, energy use in production and transport, potential waste generation and disposal issues, and other potential environmental impacts. (Koehnekn and Rintoul, 2018; UNEP, 2019)

Some specific alternatives suggested include:

- Desilting dams and reservoirs (CWC 2015 & 2019), and dry mining off-channel or floodplain deposits, instead of in-stream or in-channel mining. In the case of mining in floodplain areas care to be taken to scarp out only the incremental deposits over time
- Manufactured Sand (M-Sand) through reusing/recycling construction and demolition waste (and not in the sense of crushed stones from stone quarries)
- 'Green concrete' forms such as bottom ash or fly ash concrete, geopolymers concrete, etc.
- Waste by-products like quarry dust, waste foundry sand, copper slag, stainless steel slag, granulated blast furnace slag, sheet glass powder, etc

While the sand sustainability crisis and the need for alternatives has been recognised by the government [see MoEFCC (2015) Sustainable Sand Mining Management Guidelines, and Bureau of Indian Standards Codes (e.g, IS 383 : 2016, IS 10262 : 2019)], these have not been promoted or adopted widely enough. And while the growth of an alternative aggregate industry (Press Trust of India, 2018) is encouraging, it must be monitored for pollution, quality control, and regulation related issues (Times of India, 2019; The New India Express, 2020; The Hindu, 2020a & 2020b).

Another route specially to bring down the use of sand in construction is to conceptualise construction as well as materials differently. SOPPECOM over the last three decades or so have developed technologies based on renewable materials like small dimension timber, bamboo and natural fibres in the form of composite material that can reduce the use of fossil based material like steel, cement and also sand. Vilas Gore, who is spearheading this programme in SOPPECOM and who is also one of our panellists for the webinar-dialogue is of the opinion that the use of a range of technologies available for construction in the areas of buildings, water harvesting structures, roads, retaining walls, etc., can potentially bring down the use of sand by about 30%. This is a huge saving of sand. However, if these technologies have to be mainstreamed then they need policy support and also a social demand from below. It should be noted that the required biomass can be produced as part of watershed development and wasteland development programmes and by treating agriculture as part of a broader biomass production system with proper land use planning.

Given below are a few visuals of the alternative approach to construction that can reduce the use of sand.

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Figure 6: Timber crib dam that can replace concrete water harvesting structures (Odisha)



Figure 7: Office building of Inspiration, Kochi, Kerala



Potential ways forward

Policy related issues

The MoEFCC formulated the Sustainable Sand Management Guidelines 2016 which focuses on the management of sand mining in the country. Besides this, the Ministry of Mines has come out with the Sand Mining Framework in 2018. In 2020, the Ministry (MoEFCC) came out with 'Enforcement and Monitoring Guidelines for Sand Mining'. Section 23C of Mines and Minerals (Development and Regulation) Act 1957 empowered the State Government to make rules for preventing illegal mining, transportation and storage of minerals including sand. However, unprecedented sand mining (legal and illegal) as a result of construction and infrastructural boom during last three decades prompted the need for policy guidelines and enforcement mechanisms for controlling illegal sand mining in the country.

Prior to the formulation of guidelines there were couple of important legal interventions such as the SC order in 2013 that any person carrying on sand mining on land which is less

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than five hectares,⁴ requires clearance from the Ministry of Environment and Forests or the State Environment Impact Assessment Authority (SEIAA). Besides this, NGT restrained sand mining without any license or environmental clearance from river beds across the country in 2013. However, most of these policies and legal interventions had very limited impact as a result of lacunae in the guidelines, poor enforcements and monitoring, lack of data and the spread and dispersed nature and scale of the action.

While there are 15 general provisions in the 2016 guidelines on sustainable extraction of sand, all these provisions are in relation to technical aspects of how mining should be carried out and how the clearance should be granted taking into consideration the physical and morphological characteristic of the river, channels, rate of depositions, flood discharge capacity of the river, river banks and flood plain habitat, etc. There is hardly any mention of the governance-institutional mechanisms or the role of the riparian community in managing and regulating sand mining in more sustainable lines.

The most crucial need, as per the 2016 Guidelines, is the preparation of a district survey report which maps the status of sand resources to be carried out by the District Environmental Impact Assessment Authority (DEIAA) with the support of various technical and developmental departments such as Geology, Mining, Irrigation, Public Works, etc. 'Besides calculating the carrying capacity of the river / stream beds / other sources to find out **maximum quantity available to be allowed for removal each year from the sources**, it should also provide various measures to regulate sand and aggregate mining in a systemic way. It has to provide for environmentally safe depth of mining and safeguards of banks by prescribing safe distance from banks'. A District-level Expert Appraisal Committee (DEAC) is to assess the environmental impact of sand mines and suggest mechanism for ensuring environmental safeguards. The reading of these policies gives the impression that they are aimed to facilitate mining. The strategies suggested for facilitating sustainable excavation fails mainly due to absence of data on annual replenishment rate (possible load of excavation without harming the environment), participatory management possibilities at local body and community level, lack of enforcement mechanisms at various scales, the poor quality of District Reports and the inefficiency of DEIAA, DEAC etc.

Role of Gram Sabhas/Gram Panchayats and Urban Local Bodies

Local people are the key players in governance of natural resources including sand. Plenty or scarce or whatever be the case in relation to sand availability, local people should be made aware of any planning for sand mining (Action Aid study). Gram Sabhas, Gram Panchayats and Urban Local Bodies (ULBs - in case of urban stretches of the rivers) should be given the right to decide on the management of sand resources especially the riparian rights of sand in the river/ drainage course and the revenue sharing mechanisms. In fact, the erstwhile

⁴Under the EIA above 50 ha was category 'A' project and 5 to 50 ha was Category 'B' and both needed clearance under EIA 2006 for minor minerals. Later court added that land leases less than 5 ha also needed clearance as sand mining is dispersed rather than contiguous even in a river bank.

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Mukti Sangharsh Movement in Sangli district had demanded that all operations related to sand mining should be entrusted to the Gram Panchayats. **The Gram Sabhas/Gram Panchayats and ULBs need to be politically empowered to carry out this regulatory function by further strengthening the 73rd and 74th constitutional amendments.**

Prioritisation of sand use to meet local needs and non-mechanised ways of mining and transportation

The Action Aid study found that many states have come out with progressive policies related to sand mining. Andhra Pradesh, for instance allows only manual labour and bullocks to mine sand in river beds. Bullock carts, mules and other animals are exempted from any mining tax. Such provisions encourage local participation and regulate sand mines. It is recommended that local needs and requirements should be fulfilled on priority basis. A similar demand was also made by Mukti Sangharsh Movement in Maharashtra saying that people living in a 5-km distance from either side of the banks should be allowed to take sand on a permit basis to meet their own needs and the sand should be transported by bullock carts or such non-motorised means. S

Self Help Groups and Cooperatives

Andhra Pradesh Sand Mines Policy again ensures women's participation through Self Help Groups (SHG) in sand mining activities and benefit sharing. Cooperatives are the best way to involve people with collective ownership. It is recommended that sand mines may be managed with cooperative arrangements taking local women's participation.

Public hearings

Public hearing on sand mining in Gram Sabha highlighting the ecological and socio-economic issues, etc., should be strengthened. Even though there is a provision for the same in the earlier environmental clearance regime it was not enforced and with the new Guidelines for Environmental Impact Assessment this provision may also be taken away creating a more porous system.

Shifting management and regulation to hydrological units

Flood plains and riverbed regulation zones to be created and the river sand excavation mechanism to be entrusted with the River Basin/ Sub-basin Organizations with participation of the concerned Gram Panchayats and ULBs. At present the management is at district level (administrative unit as the basis for regulation), which may not take a holistic view of sand excavation and its impact on riverine ecology. So, changing the unit to a hydrological one might help in this regard.

Reorienting the district reports

The present content of the District level report needs reorientation. It should be not just a document for estimating the quantum of sand to be excavated, but should contain detailed assessment for environmental, ecological, social and economic impacts of mining highlighting the cost and the expected benefits from undertaking the sand mining in a

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particular location. It should also view the contiguity of the riverine ecology rather than restricting to districts as the unit (see the point above).

Water conservation efforts should not go against the interests of rivers

There are many so-called water conservation projects that are promoted by governments and NGOs which can compromise the rivers and their functioning in many ways. One example is the erstwhile Jalyukt Shivaar Abhiyan of the Government of Maharashtra which undertook river deepening, widening and strengthening of the rivers. Massive excavations have been made in many river systems in the state using heavy earth moving machinery and also removed huge quantities of river bed material impacting the morphological and hydrological characteristics of rivers. Such activities should not be allowed. The annual incremental silt accumulation behind structures in the rivers and streams could be done under strict regulatory controls.

Role of knowledge, data and informed public discourse

There is a virtual absence of knowledge and data in all spheres related to river sand mining – be it policy formulations, regulatory mechanisms, actual mining, and also the public discourse around sand mining. There is a need to create river basin specific knowledge and data about the river morphology, ecology, yearly replenishment of sand, livelihood dependence of people, violations, etc. Real time data on sand excavation need to be developed. All the knowledge and data generated need to be on public domain which can help to make the whole sand mining operations more transparent and accountable. Details of contracts awarded for sand mining need to be displayed at Gram Panchayats, sites of excavation, etc. Though there is reporting on river sand mining in the print and visual media often they are limited to incidences of violence and/or illegal mining. There is very little research popular writing. This has been pointed out, time and again, by activists involved in struggles around sand mining. Such writings can definitely contribute to ‘popular knowledge’ about the impacts of sand mining and make public discourse more informed which in turn can help build pressure from below for regulating sand mining.

The experience of Mukti Sangharsh Movement in Sangli district with regard to sand mining from Yerala River, discussed earlier in the section on social movements and resistances, is a good example of the potential of a scientifically social movement in regulating river sand mining.

Social demand for potential alternatives

It is important to generate social demand from below so that serious efforts at policy level are made to search for alternatives as discussed in this section especially the alternative approach to construction which has the potential to reduce sand consumption in construction by about 30%.

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Part Two: State-wise reports

Rajasthan

River systems and sand excavation

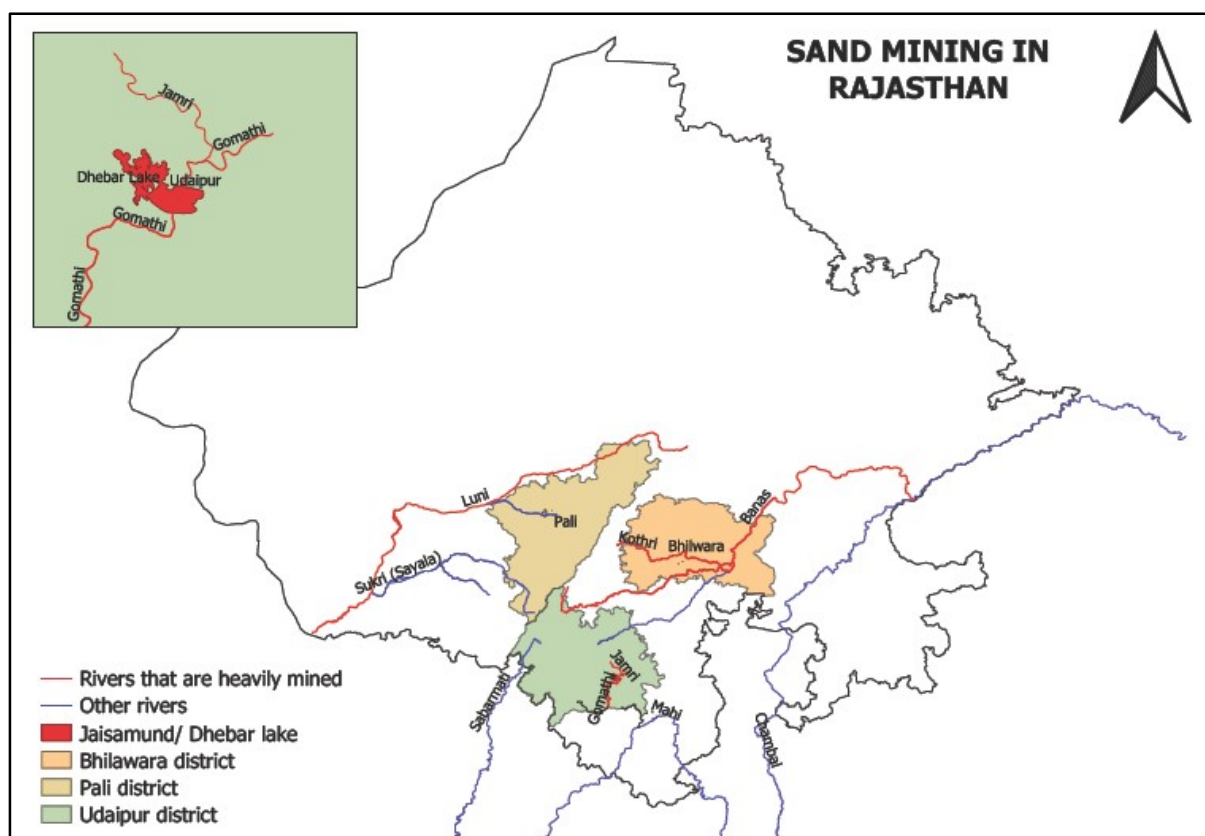
As one of the driest states in India, Rajasthan's entire river surface constitutes merely 1% of the total surface water resources in India. These are entirely rain-fed, divided into 14 basins covering 59 sub-basins. The Aravalli constitutes the main watershed, its drainage divided between the Arabian Sea and Bay of Bengal. The state has 7 major reservoirs and 41 rivers, most of which are seasonal. Only the Chambal and Mahi river basins are perennial. The rivers are classified into three main types based on their drainage pattern:

Drainage into the Arabian Sea: Luni, Sabarmati, Mahi

Drainage into Bay of Bengal: Banas, Chambal, Banaganga

Inland drainage: Sota-Sabi (Sahibi), Kantli, Ruparel

Figure 8: Main sand mining rivers in the state of Rajasthan



The Luni river system rises from the western slopes of the Aravalli range (near Ajmer), while Banas and other streams rise from the eastern slopes of this range and join the Chambal. The main river courses like Sabarmati, Banas, etc. and tributaries of the Luni run more or less parallel to Aravalli range (www.rajrass.in).

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Jaisamand Lake (earlier known as Dhebar Lake) is a water structure situated on Udaipur-Banswara road, around 52 kms from Udaipur town in Rajasthan. The lake was constructed during 1711-30 AD in the regime of Maharana Jai Singh of Mewar in whose memory the lake has been named. It was the largest artificial lake of the country for quite some time. The purpose of construction of this lake was to provide facilities for regeneration and preservation of wildlife. The catchment area of 180,974 comprises of 6% irrigated and 16% un-irrigated land, 16% forests 25% culturable wasteland and 37% not available for cultivation. Jaisamand catchment area can be sub divided into 2 main basins, (1) Gomti river basin, (2) Jhamri river basin – (Sub Basin-I: Makradi Nadi and Sub Basin-II: Ruparel Nadi). Jhamri River basin covers about 40% of Jaisamand catchment area. The remaining area is covered by Gomti river basin. The catchment area comprises of parts of Girwa, Salumber, Sarada, Dhariyavad and Vallabhnagar Tehsil of Udaipur district. (Purohit, undated)

Jaisamand River in Udaipur has 9 rivers and 99 nalas in its catchment area draining into the Jaisamand Lake. This is part of the Mewar region. Other rivers where large scale sand excavations have been carried out are, 1) Udaipur: Khadka River, 2) Bhilwara: Banas River, Manik River, located on the right bank of the Banas River about 50 kms northeast of Udaipur and 5 kms from Nathdwara, 3) Pali district: Luni River.

Extent of sand excavation and revenue generation

The annual demand of sand in the state is around 100 metric tonnes. So far most of it was sourced from the river. The ban has affected the real estate sector and infrastructure development. Government was seen making some effort to promote the M-sand as viable alternative. Jaipur Development Authority (JDA) allowed use of M-Sand in infrastructure projects. Realtors are also moving to alternative of river sand. In July 2018, the mining department held a seminar promoting the use of M-sand. Now the Government is readying the M-sand policy. However, several issues are involved in making M-Sand. It needs excavation of rocks and gravels as raw material which would affect the environment negatively. The process of production creates lot of noise and air pollution. The obtained sand then needs to be washed with water to remove the impurities which will lead to water extraction and wastage.

Production of one tonne of M-sand cost Rs. 500 which is almost equal to cost 1 tonne river sand. So far there are 20 units in Rajasthan manufacturing the M-sand which as per reports are meeting only a small fraction of demand. Quarry owners capable of producing M-sand fear economic losses in setting up plants once the SC ban is lifted.

Economy of sand mining

15-20 years back sand mining was manual. Now the sand mining is completely mechanized. 1 tonne costs about Rs 3500/-. Labour used to be paid about 30% of the cost before but now the labour gets only close to 10% due to the mechanized mining. Most of the business is contract based. There are approximately 1000 contractors in Rajasthan. One contractor had around 50 sand filters at one site. NGT order asked for them to be removed. After 2005 the

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manual mining almost vanished and now it has increased (interview with Mohan Dangi – MD)

As per all Rajasthan Bajri Truck Operators Welfare Society, prior to the ban, the cost of sand was Rs. 600 per tonne but now it is increased to Rs. 1500-2000 per tonne (ToI 26/10/2018 as cited in SANDRP 2019)

In November 2018, the state government informed the SC that it received Rs 5,000 crore in royalties from only legal sand mining. In 2013, Alwar District Forest Officer P. Kathirvel had calculated that the state had lost around Rs 50,000 crore over 15 years in just Bhiwadi area due to unaccounted illegal mining.

Historical trend of sand excavation

This area had reasonable rainfall earlier with average annual precipitation of “25-40, which reduced drastically, by 1960s to 15-25”. According to MD this ecological deterioration started due to massive deforestation

“River Gomathi drains into the lake. There are about 100 villages around the lake where sand mining has been going on” (Extracts from interviews with Mannaram Dangi). Till 1980 the rivers had abundant sand deposits Sand mining in this region began in the 1980s, but by 1990 it rose to a large commercial scale and mostly mechanized mining in the early 2000s. Since 1995-2004 this region has also experienced drought and in 2003 people had started raising issues against the mining but the government did not really pay heed” (Extracts from interviews with Mohan Dangi).

According to the community members, the rampant sand mining is visible since 30 years. Rapid digging of river bed operates 20 hours a day with continuous movement of trolleys in and out of the villages. A count by locals indicates 600 trucks (19,200 tonnes) carry the sand daily to Udaipur city which is 55 km from the affected villages (Purohit, undated).

Figure 9: Current status of sand mining in Jaisamand catchment area

	River Name	Stream Length	Average width of stream bed	Stream bed area under sand mining
1	Gomti River	11.5 kms	170 meters	195 hectares
2	Jhamri River	18 kms	190 meters	335 hectares
3	Makradi River	8.5 kms	110 meters	95 hectares
4	Kurabad River	8.5 kms	160 meters	135 hectares
		46.5 kms	165 mrtres	760 hactares

Source: Purohit, undated

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Ecological impacts

A Supreme Court bench had banned illegal mining in Aravali when the committee it had appointed said that 31 of the 128 of Aravali hills have vanished (Times of India, 2018a). The court observed that “humans seem to be flying away with the hills just like Hanuman”, adding that the destruction of the Aravalis endangers lives of millions of people in Delhi as well (Joshi, H., The Wire).

The sand mining has caused severe ecological damage in the villages in the catchment area of the Jaisamand lake especially 8 villages – Buthel, Bassa, Charmar, Kot, Kharka, Kenpura, Lodha and Uttarda (interview with Mannaram Dangi)

Impacts on the river

“The water quality has become hard. They have destroyed the banks. River bed farming is completely destroyed. This water stored in the sandy aquifer was used in drought years but now this water is not available” (Mohan Dangi). It has also affected the bio-diversity in the entire region, affecting aquatic life, and fauna. New technologies like JCBs, large sieves and dumpers which are capable of refining 34 tonnes in 2 hours in comparison to 5 hours using the manual process are considered more efficient. This technology driven enhancement of mining speed has impacted on the hastening of the degradation rate. According to local sources 600 trucks move daily from the area of 1000 ha which carries 19,200 tons of sand (Prayatna Samiti Report).

Impacts on land, water and vegetation

“Due to the physical impact of lowered stream beds there is damage to infrastructure such as bridge piers caused by channels incision and substantial deposits of streambed sediments in downstream areas as a result of steep slopes created by water flow changes. Channel incision also causes lateral instability in the form of accelerated stream bank erosion and channel widening. Sand mining also has a change effect on the depth of the river at various points. Mining and dredging activities, poorly planned stockpiling and uncontrolled dumping of overburden, and fuel spills will cause reduced water quality for downstream users and aquatic life. Increased riverbed and bank erosion increase suspended solids in the water at the excavation site and downstream. Suspended solids may adversely affect water users and aquatic ecosystems. The in-stream sand mining transforms the riverbeds into large and deep pits; as a result, the groundwater table drops leaving the open wells on the embankments of these rivers dry. Bed degradation from in-stream mining lowers the elevation of stream flow and the floodplain water table which in turn can eliminate water table-dependent woody vegetation in riparian areas, and decrease wetted periods in riparian wetlands” (Purohit, undated).

In-stream sand mining can have other effects beyond the immediate mine sites. Many hectares of fertile streamside land are lost annually, as well as valuable biological resources in the riparian areas. Large scale alteration in the eco-system has disturbed the habitat balance. This has negatively impacted on biodiversity and productivity in the area and

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created inhospitable conditions for aquatic life. “The complete removal of vegetation and destruction of the soil profile destroys habitat both above and below the ground as well as within the aquatic ecosystem, resulting in the reduction in faunal populations” (*ibid.* pg 6).

Socio-economic impacts

Impact of this is seen on some development projects and also increased cost of sand for construction works. This leads to cost escalation of projects that are pending. The study report, “A Sheer Murder of the River – A Sand Mining Case Study (Prayatna Samiti 2012) highlights that when talking against sand mining, one of the issues is the intricate relationship between income opportunities in the short run (when the resource is in abundance) and the long term sustainability issues due to impacts of degradation. It seems difficult to get full support for the demand of sand mining ban when half of the people from the same village are involved in mining. In Dhmidi itself 20 out of 50 families earn incomes through sand mining. Although people from Kalodia have filed several appeals in Gram Panchayat but none of them is heard, says Ratan Lal Patel from Kalodia. According to the people the orders of sand mining are passed by the state government. They need a unity to fight against State government to curb such a critical phenomenon (Prayatna Samiti, pg.36). This brings out that given competing interests and development needs, unless alternate satisfactory livelihood avenues as well as substitute construction material are created, it is not easy to forge such a unity against non-sustainable ecologically disastrous practices like sand mining, also, given the nexus of powerful commercial interests in sand mining business.

Construction industry work depends on regular supply of sand in the absence of any other alternative viable construction material available on a large enough scale to meet the demands of supply and affordability. The sand ban has negatively impacted on this sector, both for the business and the labourers. “Faced with the unprecedented crisis of construction sand, in June 2018, the real estate developers sought relaxation in the prescribed deadline for completion of their projects registered with RERA. According to the real estate developer’s body, short supply of construction sand had slowed down the construction works by almost 50%. There were over 700 real estate projects registered with RERA, Rajasthan. The alternates such as stone dust and other manufactured sand were insufficient to meet the demand and to miss the completion deadline may subject the developers to penalty up to 10% of the project cost and even imprisonment” (DNA News report, June 16th 2018, as cited in SANDRP, 2019).

The primary investigation after seizing trucks transporting illegally mined sand in Shivdaspora area suggests that the truck driver and cleaner get nearly Rs 1000 each for mining of sand and dropping it to the site asked by the persons. As per an official the cost of one truck of sand was just triple of what it used to be, after the ban (ToI 19/5/2018 as cited in SANDRP 2019).

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Estimates show that the mining will retard in coming times. Varying patterns of rainfall and loss of sand will surely disturb the land productivity. Reduction in well water will account for the loss in 3 quintals of agriculture in the coming 4 years. Unavailability of water will strike the livestock sector. Income level will fall down at rate of Rs. 1,200 per annum. At this stage willingness of farmers to adapt the improved varieties of crops and bio fertilizers will positively play the role to sustain the incomes (Prayatna Samiti, pg 38).

Impacts on local people

Sand mining has largely impacted the livelihoods of the local people that were earlier involved in sand mining as most of it has become mechanized. Secondly, it has left the rivers dry and reduced the water tables and ground water levels affecting agriculture in the 100 villages near the mining areas as well as a negative impact on livestock breeding (Mohan Dangi). Massive degradation of river at such an escalating speed has almost finished the water-holding capacity of the river; livelihood based agricultural activities are being disturbed; floral and faunal loss has affected the animal husbandry trends. Wells' water levels are fast depleting with implications on agriculture, livestock and dwellers' lives. The loss of groundwater availability has resulted in reduction in cropped area which subsequently reduced food and fodder availability. This ultimately reflects in increased vulnerability of local communities (Purohit, undated)

A study carried out by a team from Prayatna Samiti in 2011-12 in five representative villages (Bori, Aavara, Gudel, Kalodi, Dhimli) with support from SPWD captures stories of the degradation as well as competing interests in sand mining.

Figure 10: Measuring the degradation due to sand mining



Source: Prayatna Samiti study report

The river Aavara covering approximately 32 km stretches across the villages of Bori, Aavara, Gudel, Kalodia and Dhimid. The study looked at the relationship of people in sand mining activities and its impact on livelihoods in these villages. Some key findings from this study are summarised below:

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- Loss of common land and decline in agricultural productivity has compelled migration of villagers. Almost 50% of the members from each family migrate for six months as labour to Udaipur, Ahmedabad, Surat, and Mumbai. Working in hotels, mills and factories they earn from Rs 6,000 to 8,000 per month.
- Sand mining is a source of income for some sections of villagers – those living on river banks who lease out the commons under their vigilance area⁵ and the labourers who earn through manual digging, sieving and loading. However, in recent years mechanization has displaced labour. Also, rapid rate of sand mining has put some 200-ha patch from Aavara village to sand deficit area. These accounts for the fact that each month 4 people involved in sand mining are losing their jobs.
- Appeals against sand mining under provisions of FRA, PESA remain unheard and unacted upon
- Massive degradation of river at such an escalating speed has almost finished the water holding capacity of the river, affecting livelihood through agriculture and animal husbandry. The river is deepening at the rate of 4.7 ft per year.
- Water contamination is projected to increase leading to enhanced disease load. As the bed rock of the area comprises of fluoride rich material, rapid vibrations, digging and erosion of sand mixes fluoride with air and water leading to contamination. The consumed water causes diseases like thyroid, bronchitis and arthritis. Most of the villages have reported arthritis as one of the prominent diseases, starting from the age of 45 for both men and women.

Figure 11: Impacts of sand excavation on water contamination near river bed



⁵The practice here is that the common land which falls under the vigilance of the farmer is his/her property. When this land becomes unusable as it lies under the river, such territory is leased to the sand miners. The lease to the miners is at the rate of tractors' and trucks' trips, ranging from Rs 20 to 2,000. Such practices of private holdings on commons highlight the encroachment of commons by the community.

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Source: Prayatna Samiti Study Report

Legal provisions and institutions to regulate sand excavation and monitoring

The Minor Mineral rules applicable in Rajasthan are *Rajasthan Minor Mineral Concession Rules, 2017* and the responsibility of the minor mineral “sand” is with the Department of Mines & Geology, Rajasthan. Sand is allocated in the state through online tender cum auction and the concession applicable in the state is mineral lease which is granted on lease for five years for river sand. Reserve Price for the auction is 20% of the royalty payable on river sand, and currently the royalty for sand in the state is in the range of Rs 30 per tonne/ Rs 35 per tonne.

There is no maximum limit defined in the Act of the area to be held by a particular individual/company/firm. But the Act specifies that the plots would not be less than 0.18 hectare. The only restriction on awarding of lease is on nationality (only Indian) and that in PESA areas the lease can be given only on recommendation of the Panchayati Raj Institution

Rules for sand mining:

The process of sand mining is on auctioning of the sand mining blocks. The rule is that sand can be mined up to 1m below the water level. But they keep going deeper.

Local level people are taking sand if they need it to build their homes. There is no system for permission for that.

In areas where the PESA act is applicable, the Gram Panchayat is supposed to give permission but this is not followed. The royalty is also supposed to be given to the Gram Panchayat but they are not getting it in the form of money but should get developmental work done in the village instead. So, the way the sand mining should probably be done is that the original contour of the river should be determined and at only 1m below that contour should be allowed to be mined (Mohan Dangi)

Institutions involved:

Revenue and mining department are mainly involved in the mining. However, the mining department has failed to draw up a policy for decisions about granting small leases.

Figure 12: A sand mining site

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Source: Tol image sourced from SANDRP, 2019

Violations and illegal mining

On 16 November 2017, the SC banned sand mining by 82 lease holders due to their non-adherence to legal norms; despite this illegal mining and violence against police officials continues through 2018. The NGT had ordered the concerned authorities to do an entire loss assessment which has not been done to date and even if not on a very huge scale there is still illegal sand mining going on in this region. This is mainly because of the close nexus of the politicians, local government officials and sand mafia (Extracted from interview with Dangi).

The then opposition party, Congress, raised protests both within the Assembly as well as outside in February 2018 due to the state deliberately ignoring the SC order. It accused the government of shielding certain individuals who are hand in glove with the sand mafia and also for not addressing the wage losses incurred by construction site labourers due to the sand mining ban.

Despite the SC ban, extensive illegal mining continues in Tonk District, allegedly with the connivance of mining and police departments. The administration reportedly turned a blind eye towards illegal mining and the mafia was ferrying sand in hundreds of trucks every day from the Banas River near Deoli-Aacher, Shivad, Baroni and Boli villages (Tol March 19, 2018 as cited in SANDRP 2019).

“A whopping 98.87 lakh metric tonnes of minerals were illegally excavated in a period of five years in five Rajasthan districts, as per a Comptroller and Auditor General report tabled in the state Assembly on Feb. 27, 2018 (Outlook India 28/2/18, as cited in SANDRP 2019).

“Many people mint money with this activity here. The politicians put pressure on bureaucrats and even they (bureaucrats) find it lucrative. There was one officer who earned so much money during his tenure that he later became directly involved in the mining

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activity. The court has ordered mining to be stopped several times, but the government is not keen” said 44-year-old Haribol baba (Joshi, H. The Wire, 8/11/18).

Figure 13: Sand mining done on a dry river bed



Source: SANDRP 2019

The Rajasthan Police seized vehicles involved in illegal sand mining from Rajasthan’s Banas River. In total, 36 trailers have been seized by the Bayana Circle Police while earlier in the day, 11 more trailers had been seized during search (SANDRP, 2019).

Jaipur police arrested 10 persons and have seized 12 trucks and four tractor trolleys carrying the illegally mined sand from various police station areas in the city during early hours of May 18. As per police the sand was mined from the Banas river belt. The caught trucks and vehicles were handed over to mining department for further action.

In a similar action, Bhankrota police also seized four trucks carrying sand and have arrested six persons in this connection. Similarly, two trucks were seized from Shivdasapura area (Tol 19/5/2018, cited in SANDRP 2019).

Court Cases

An overview of some important hearings drawn from the local news reports, interview with Mohan Dangi and SANDRP compilation (2019):

- 2012: PIL filed in the Rajasthan High Court against the illegal sand mining in Jaisamand lake
- Dissatisfied with the ruling in 2014 another case was filed before the NGT. In 2018, the NGT gave the state an order for complete ban on sand mining in the Jaisamand lake region
- May 2018 in SC: State government asked for relief, accepting failure to prevent illegal sand mining. NGO Dastak argued for appointment of a court commissioner to look at

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the nexus aspects in government failure. SC did not accede to both requests and slated the matter to further hearings. Subsequent hearings in July and August and November also did not resolve the matter

- October 2018: SC Justices Madan Lokur and Deepak Gupta ordered complete ban on sand mining in Aravali region within 48 hours of its orders, strongly castigated the state government for taking the matter too lightly.
- November 28th 2018: Rajasthan H.C. lifted stay on short term permits for sand mining on small agricultural plots
- December 2018: NGT issued order for immediate ban on mining from eco-sensitive zone of Sariska Tiger Reserve till the Standing Committee of National Board of Wildlife clears mining leases.

Incidences of violence

There were a number of incidents in Bhilwara district. No casualties. The mining mafia's terror is such that they have openly attacked SP (DSP) level officers in Dholpur (ToI 26/10/18 as cited SANDRP 2019). Also, with the involvement of members of ruling and opposition parties in the sand mining business the political will to make implement the ban and make this an election issue is obviously missing.

Social movements/resistances

The nature and people centred social movements began spreading from 2003 as they reached out to people to raise awareness about damages caused by commercial sand excavation, which received support from many organisations, institutions and conscious citizens. This led to the establishment of Mewal Environment and People's Development Lok Manch, a platform initiated and led by Mannaram Dangi, to build widespread awareness about illegal sand mining.

Mannaram. Dangi said that they went from village to village and campaigned against the sand mining. They formed a team of around 100-200 people in which around 50-60 people were very active and they formed committees with these people in the villages to make people aware. They managed to mobilize the communities there and help put up the case in NGT. Though there were attempts made to attack and threaten him, since he belonged to the region, he had the support and the sympathy of the people and hence he said that he did not really face too much trouble. Lastly, he said that there is a dire need carry out a very detailed demand assessment of the sand.

Since 2003, Haribol baba, a *sadhu*-activist has been fighting against illegal mining in Aravali.

Stalling of development works due to sand mining ban

In Dec. 2017, due to ban on river sand mining, the state forest department deferred its plans to introduce tigers in the Mukundra Hills Tiger Reserve, till Feb 2018. River sand was not available due to the mining ban. As a result, the department was not able to complete the

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construction of fence around the reserve to prevent human and cattle intrusion (SANDRP 2019)

Media reporting

There is some reporting at local level. Media reports in both regional and English print media point to some discussions highlighting ecological impacts, the movement campaigns and demands, cases in the High Court, Supreme Court and before the NGT and in some the implications for stalled development projects are discussed. The SANDRP compilation by Bhim Singh Rawat (2019) suggests that mainstream as well as alternate media have carried several on-line articles on the subject as well as presentations on some You-tube links.

Way forward

River sand mining should be restricted only up to 1 m of the old contour of the river. In some places right now people have gone as deep as 50 ft (Mohan Dangi). Assessment about this will have to be done through mapping.

Immediate demands put forward by the movement (Mewal Lok Manch) include:

- Complete ban on sand mining on Jaisamand river bed
- Appointment of a high level committee to study and submit a report (within six months of its appointment) and assessment of the environmental damage caused by sand mining on all riverbeds in Rajasthan
- Local village committees to control and regulate sand mining in all villages in Jaisamand watershed area
- Development of a comprehensive integrated development plan of villages with peoples' participation to generate alternate livelihoods

Sand mining offers lucrative money making prospects and there are competing economic interests involved. Alternative modes of generating sand for construction are beset with problems of affordability, meeting supply demands and also ecological degradation prospects. Hence, when talking of alternatives and mobilising support against river sand mining, the long term costs of ecological degradation and their impacts on agriculture and allied livelihoods need to be systematically documented and highlighted against these ground realities.

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Madhya Pradesh

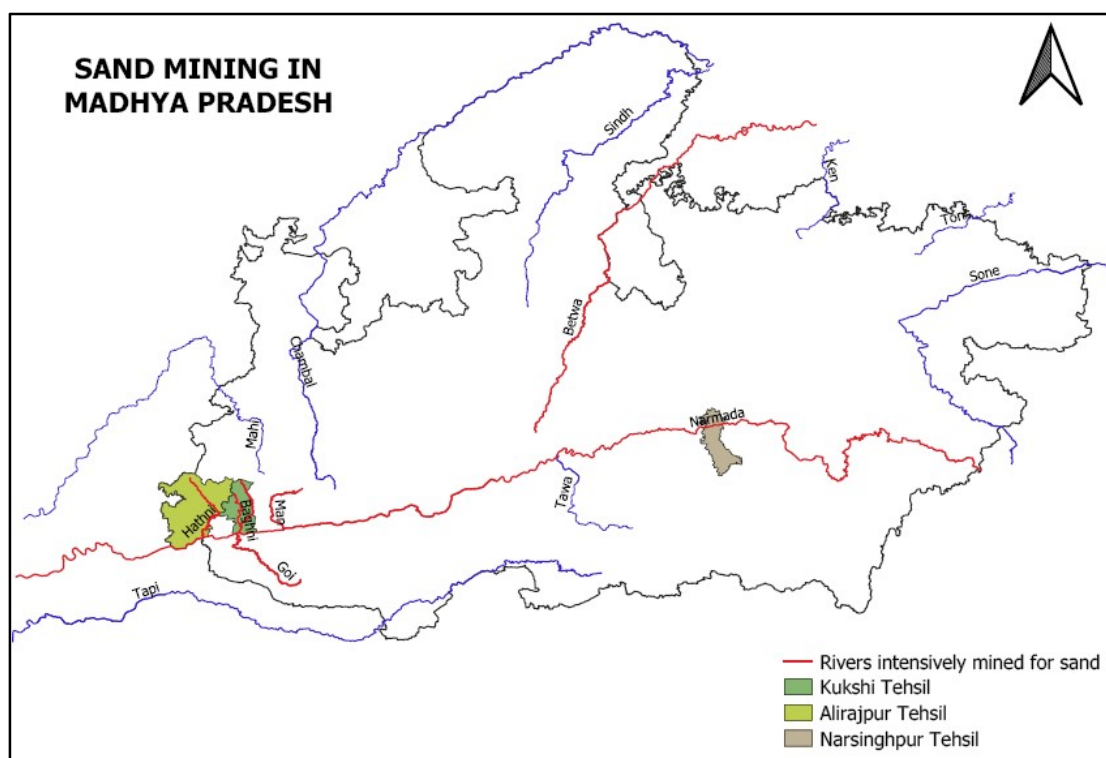
River systems in the State

Madhya Pradesh falls in five major river basins. The northern part of the state falls within the Ganges Basin where the Betwa, Chambal and Son flow. South of the Ganges Basin is the Narmada Basin, the second largest by surface area. The other three basins cover small portions of Madhya Pradesh, namely, the Mahi Basin to the west, the Tapi (Tapti) Basin and the Godavari Basin to the south. The largest of these by volume is the Narmada, followed by the Tapi. The state is categorised as subtropical with an average annual rainfall of about 1,194 mm.

Hot spots of sand excavation

There are 1266 sand mines identified in the state, out of which 160 are identified on Narmada River and 1106 on other rivers. According to Rehmat of Manthan Adhyan Kendra, Badwani, there is no concept of a hot spot (of sand mining) anymore. It has become completely decentralized in Madhya Pradesh. Narmada along with all its tributaries like Hathni, Uri Bagni, Man, Goi, etc. are in pretty bad shape.

Figure 14: Sand mining rivers in Madhya Pradesh



The speciality of Narmada, especially downstream of Maheshwar dam, is that most of the mining is taking place not on the river bed, but on a 2-3 km stretch of area on either side of the banks (laterally, basically the floodplain areas). The contractors mine sand to a depth of more than 40 ft. This is contributing to the degradation of the catchment of the Narmada and also bringing in lots of silt into the river bed.

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The ownership of the land from which sand is taken out is rather mixed – some land belongs to the farmers, to the revenue department and also to the Narmada Basin Development Authority (NBDA), basically the submergence area that has been acquired from the farmers. According to the Narmada Water Disputes Tribunal (NWDT) award the farmers from whom the land was acquired have the right to use this land for cultivation. Customarily the farmers take one crop once the water in the reservoir recedes after January-February. This is basically illegal mining because the government cannot lease out the submergence area for sand mining.

Yemuna Sunny reports that “the last six-seven years have seen large-scale sand mining along the rivers in Madhya Pradesh (MP). Mining has altered the landscape, river flow, water availability and sand deposit patterns; rivers have dried up, farming has become difficult” (Yemuna, 2020, “How sand mining along the Narmada is choking web of life”, *Down to Earth*, 2020)



Extent of sand excavation

The contractors very often mine a much larger area than the leased area. Sometimes this is more than 5-10 times. The state government, local politicians, sand contractors and police work in tandem or have a nexus. Generally, there is no monitoring. Rehmat told us that whatever data was there on the government website on sand mining are all taken off recently. At least 586 approved mines spread over 4,537 hectares in 33 districts were operational in 2015.

The royalty (lease amount) is very minimal. Sometimes the contractors do not pay even this. As per the latest figures released by the government, in 2016-17, the state earned Rs 240 crore royalty from sand mining (SANDRP, 2019).

The larger sand contractors are from Rajasthan. There is political patronage (allegedly even from the Chief Minister himself). Sometimes cases are filed against those who violate rules and involved in illegal mining. But the authorities leave enough loopholes in the cases and as a result the cases do not stand in the courts and the culprits are acquitted. Even when fines

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are imposed, they are not recovered. Thus, in short, the state exchequer does not benefit much from sand mining.

Figure 15: From Amarkantak to Jabalpur, mining sites shown in the picture are common in Madhya Pradesh



Source: Manish Chandra Mishra, First Post

Historical trend

Since 2008-10, the scale of sand mining has gone up in the state, especially around Narmada and its tributaries. It's the time when machines replaced manual labour. The sand is also getting exported out of the area to cities like Indore and even outside the state. Prior to 2008-10, sand was primarily put to local uses. It was more labour intensive as all operations – scooping out sand, loading and unloading, etc. – were done manually. Then came the earth moving machinery, the JCBs. With this, the labour-capital relationship changed.

Ecological impacts of sand excavation

Unsustainable sand mining has caused great damage to Narmada and its tributaries and also Ken, Betwa, Sindh, Chambal and Son Rivers. Sand mining has affected the diverse life forms in the rivers and their riparian areas. As Rehmat puts it “since these life forms are not part of our immediate use, we do not pay much attention to them”. There has been a decline in the fish population, including species (mahseer, common carb, rohu [not the cultivated variety], etc.), mainly because of the increasing turbidity of the rivers and changes in the local ecosystems (for e.g. certain grasses are not there and they are important for the “vegetarian” fishes, or sunlight does not reach deeper levels, etc). The overall change in the Narmada river system is also affecting the terrestrial habitats. Because of these changes, it is reported that the populations of crocodiles and alligators have increased.

‘Large-scale sand mining disrupts the web of life and pays no heed to their sustainability. Even as most birds living in the water front — such as the cormorants, egrets and storks —

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breed during the monsoons, there are several others who nest in the sands before that. Moreover, several livelihoods are nurtured by the sand before the monsoon. There are sand nesting birds. Lapwings coexist with people who grow melons and cucumbers on the sands of the Narmada. They call and fly around and do not perch on trees like the egret. They stand on the ground as their feet cannot make a grip on tree trunks. They lay their eggs, like the curlew, on the sand without elaborate nest building (Sunny, 2020). Their habitats are completely destroyed because of river sand mining.

Figure 16: The red-wattled lapwing found commonly in the region, breeds from March to August



Photo: Yemuna Sunny

Socio-economic impacts on local communities

As discussed above, since 2008-10, the overall character of sand mining has changed. Earlier, the local labourers used to get work. For example, in the case of one truckload of sand nearly 30% of its monetary value was the labour cost. Now only a few people who are connected with the contractors get work. This creates conflicts within the local community. The cultivable lands where mining is happening has been impacted. Similarly, vegetable and melon cultivation near the river banks and riverbed (closer to the banks) have been impacted. Because of the reduction in fish, the livelihood of fishers is also affected. There is no evidence yet on the impact on groundwater in the region.

Earlier the local people used to collect sand from the rivers near their areas for their own uses. Now they buy from the contractors.

Yemuna Sunny vividly describes the impact of sand mining on the rural population, especially the resource poor. To quote from her article:

“The Narmada and other rivers in MP have been sustaining thousands of sand farmers, fetching enough to see them through the four monsoon months, when there is no income generation. Villages such as Devachar in Narasimpur district

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were well-known for sweet cucumbers cultivated by the Majhi, Kushwaha, Mehra and Kahar communities. Rampant sand mining has deprived their livelihoods as well as the availability of good quality cucumbers. Sanju, who sells water melons in Hoshangabad town, said: "Around five years ago we had to stop cultivation because of sand mining in the summers. We now buy melons from other places and sell them."...A conspicuous decline in livelihoods of landless people can be noted since the sand mining policy of 2015. Mining has altered the landscape, the river flow, water availability and sand deposit patterns. Streams now dry up from January onwards, including Shed and Shakkar in Narsinghpur district, which had previously held water all the year round" (Sunny 2020).

Legal provisions and institutions

The Department of Mineral Resources is responsible for regulating sand mining in the state. Madhya Pradesh Sand Mining Policy, 2017 has been formulated by the state government to ensure the availability of sand minerals at affordable rates to the general public in the state and to ensure the role of local bodies in sand mining. The policy lays emphasis on conservation of ecological systems of rivers. In order to make the sand mineral accessible in the state without any obligation to the common people, the department has developed a self portal⁶. In 2015 Bharatiya Janata Party government brought in a new sand mining policy that identified more and more mining areas in the state. With this policy sand became the first mineral to be e-auctioned in the state (Sunny, 2020). Sand can be easily obtained from any sand mine in the state through this portal. In the portal there is a facility for the direct users, private contractors and government construction department contractors to do the booking. They have streamlined the procedure for these three categories, and everything can be done online from registration to payments.

In November 2017, the government had passed a proposal in the state cabinet and as per this proposal, 821 of the 1,266 sand mines in the state would be handed over to the Panchayats, while the remaining 445 would be given through auction.

In 2018 Gram Panchayats (GPs) were given the powers to collect the royalty as well as regulate mining. They can also levy a tax.

Madhya Pradesh has a new sand mining policy in place since 2019.⁷ The Rules for this new policy was brought out on 30 August 2019.⁸ According to the new mining policy, auction would be held in district-wise groups. The offset price would vary, depending on the number

⁶<http://ekhanij.mp.gov.in/appprevious/sandmp.aspx>

⁷ This text on the new sand mining policy heavily draws from Sirothia Ankur, 14 November 2019, "New mining policy in place for Madhya Pradesh, but operations to begin from next year", available at <https://timesofindia.indiatimes.com/city/bhopal/new-mining-policy-in-place-for-madhya-pradesh-but-operations-to-begin-from-next-year/articleshow/72061574.cms>

⁸ The Rules are available at: <http://ekhanij.mp.gov.in/AppPrevious/Documents/New%20Sand%20Policy.pdf>

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of mines and availability of sand. There are mines in 43 districts of the state. The offset price of Hoshangabad is a maximum Rs. 96 crore. The offset price of five districts is more than Rs. 25 crore.

Sand mining lease would be allotted for three years in the state and not one year as practiced earlier. Once allotted, the contractor would pay increased royalty of 10% per year and continue to operate the mines for three years. Officials said the decision to give lease for three years is meant to ease the sector from getting into the lease process every year. The government expects to earn Rs.600 crore revenue every year, while in 2018-19, it had earned just Rs. 69 crore when the sand mines were with Panchayats.

In the new mining policy, the government has banned storage and sale of sand within 2 km from a mine. Moreover, the policy states that only the licensed contractor or the one having a mining lease would be allowed to sell sand within 50 km from any sanctioned sand quarry. However, these restrictions would not be applicable for major cities, including Bhopal, Indore, Gwalior and Jabalpur.

The policy has continued with the state government's directive for a complete ban on mechanized mining from the quarries along Narmada River. As many as 1,438 mines have been identified in the state and of them 400 are new mines.

Illegal mining

SANDRP blog (8 February, 2019) reports that Madhya Pradesh is one of the most notorious states as far as illegal sand mining is concerned. The state registered a total of 42,152 cases of illegal mining for major and minor minerals during 2009- 2015 (Ranjan and Shruti Tomar, 27 March 2018 as reported in SANDRP Blog, 8 February 2019).

In 2016 many FIRs were filed and 30-40 tractors were confiscated by the police. However, the culprits were let out on bail and the confiscated tractors returned as the district magistrate has the powers to return/deliver the property to the person entitled to his possession under IPC 523.

Though there was a stay by the High Court in 2015 on the mining operations of Shiva Corporation, a mining company from Rajasthan, mining is still happening in and around Narmada.

Vinayak Parihar, activist, says "The recent CAG report estimated a revenue loss of Rs. 600 crore due to illegal sand mining. It's just a sample report. The actual loss may be hundred fold. According to our assessment, the state has lost over Rs. 2 lakh crore in the last 10 years, which is more than the debt burden on the MP government". According to him, 90% of sand mining sites in the state is illegal (SANDRP Blog, 2019).

The district collectors and superintendent of police (SP) often take the stand that it is not their work and it is of the work of the mining department. The former state home minister

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Babulal Gaur accepted, during his tour to Gwalior-Chambal region in 2013 that many police officers wanted transfer from the region because they could not manage the impunity of illegal sand mining in the area and associated political pressure. He said, “Illegal mining cannot flourish in the state without political patronage irrespective of the party in power” (SANDRP Blog, 8 February 2019). The same sentiment had been expressed by the then Congress MP Jyotiraditya Scindia when he said “Earlier also a police officer was murdered in 2012 while exposing sand mafia. Madhya Pradesh is no. 1 in illegal mining- it is clear it’s not possible without government’s protection.” If the political class of the state is aware of this nexus then why is it that nothing being done to break it? Illegal sand mining seldom becomes an election issue though in 2006 it did become one as the SC imposed a ban on sand mining in Chambal River to protect flora and fauna in the region. After that, the mafia became active here. Rampant illegal sand mining is affecting development works in hundreds of villages along Chambal River in Morena. All six assembly constituencies of Morena were affected by illegal sand mining for the past one decade.

Figure 17: A tractor trolley being used to transport sand illegally mined from Chambal River



Source: Hindu Times

“The party candidates change every election but not our condition. The authorities are terror stricken by the sand mining mafia and hence they choose to overlook our plight. As in the last two elections, we want a solution to the problem related to illegal sand mining,” said Ramvillas Verma, a resident of Malhar Ka Pura (Tomar Shruti, 27 November 2018, “Development sinking in illegal sand mining quagmire”, Hindustan Times, as cited in SANDRP Blog 2019).

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In 2018 there was a change in the government in the state and a Congress led government came into power under the Chief Ministership of Kamal Nath. The Minister for Mineral Resources, Pradeep Jaiswal did recognise that illegal sand mining is the biggest challenge for the government. “A few big companies enjoy a monopoly in this activity. We plan to focus on eliminating that along with illegal mining. We are planning to empower the local bodies and strengthen them to give permits for excavation of sand.” The Minister also said the government was working on a new policy, to be named ‘Navin Khanij Kar Evam Ret Niti’ (New Minerals and Sand Policy). “The government is trying to double the revenue from sand mining by minimising the role of middlemen. We are also planning to restore the powers of mining officers to make the system simpler,” he said.

People have been stopping tractors involved in illegal sand mining. Quite a number of FIRs have been filed. Because of the intervention of the high court, check posts have been set up. The sand contractors have filed cases against the activists (for example Rahul) even under the SC-ST (Prevention of Atrocities) Act as the driver of the tractor was an Adivasi.

Sand mining and violence

Madhya Pradesh has seen extreme forms of violence on those who have tried to control illegal mining in the state including government officials, police personnel, media persons and activists. SANDRP blog (8 Feb 2019) reports in detail the type of violence unleashed by the sand mafia. See the following chilling incidents in just one year, 2018:

- Feb 2018: Sand mafia tries to kill IFS officer, Abhishek Tomar, in Chhattarpur: mafia tried to crush him under a tractor, and when he escaped, they fired at him
- A week earlier in Chhattarpur, sand mafia tried to kill a Tehsildar who stopped them from carrying out illegal mining in Urmil River
- March 2018: Journalist, Sandeep Sharma, probing illegal sand mining cases in Bindmowd down by truck
- May 2018: Shantanu, a village youth from Sitapur village in Anoopur District, was threatened and beaten by the people involved in the mining and the local police for objecting to illegal sand mining in Son River – a case of police working hand in glove with illegal sand miners
- June 2018 : Sand mafia led by BJP corporator attacks NBA activists in Badwani, cops refuse to act – stone pelting on activists associated with NBA on the Badwani – Nisarpur state highway, near Rajghat, when they tried stopping 3 tractors filled with sand, allegedly being smuggled from the Narmada River
- Sep 2018: A Deputy ranger Subedar Singh Kushwaha was crushed to death when he tried to stop a tractor laden with illegally-mined sand in Morena district
- Sep 2018: Two forest guards shot at in Gwalior after allegedly killing the deputy ranger in Morena, the sand mafia allegedly shot at two forest guards

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The State saw the most attacks on media persons in 2015 and 2016 with 19 and 24 cases respectively (reply given in Rajya Sabha on 7 Feb, 2018 as reported in SANDRP Blog, 8 February 2019).

There have been many incidences of violence on the activists and also on the NBA office.

District Mineral Foundation⁹

In a report on revenue receipts, tabled in the state assembly on January 10, 2019, the Comptroller and Auditor General of India (CAG) has indicted the Madhya Pradesh mineral resources department for the “half-hearted implementation” of District Mineral Foundation (DMF). While the new sand mining policy announced in December 2017, prescribed that Rs. 50 per m³ out of the royalty on sand shall be paid to the DMF, the state government did not prescribe any contribution to the DMF in respect to other minor minerals until April 2018. CAG auditors also highlighted that the department was working with insufficient manpower and does not have an Internal Audit Wing or Departmental Manual.

The performance audit highlights the failure of the department to monitor compliance to the conditions laid down by the State Environmental Impact Assessment Authority while granting environmental clearances for sand mining. Auditors further highlighted the abysmal state of affairs on the implementation of environmental management plans, since the department failed to ensure submission of quarterly returns prescribed for monitoring the same. Thus, the department exhibited scant commitment to assess the impacts of sand mining activities on the environment.

CAG auditors flagged that instances of illegal mining cannot be ruled out since the department has so far, not evolved any system or module for submission of quarterly returns by mineral carriers, although the same was envisioned more than a decade ago as per Rule 5A of Madhya Pradesh Minerals (Prevention of Illegal Mining, Transportation and Storage) Rules, 2006 — which was amended in 2012. It is important to note that the then government of Shivraj Chouhan kept sitting on this CAG audit report—which was sent to the govt on August 3, 2018—deliberately, and did not table any of the CAG audit reports that should have entered public domain in 2018.

Way Forward

The activists are of the opinion that if the existing rules and regulations are strictly implemented, then it can definitely decrease the magnitude of the problem. Also, they think that we need to re-imagine infrastructure differently and this can also reduce the pressure on river sand. Though there have been incident-based frequent reporting on sand mining, there have been very little research-based writing in the media. There is a need for more reach based writings on this issue.

⁹Upadhyaya Himanshu, 23 January 2019, “District Mineral Foundation’s implementation in MP half-hearted”, Down to Earth, as given in SANDRP Blog 2019.

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Gujarat

River systems and hot spots of sand excavation

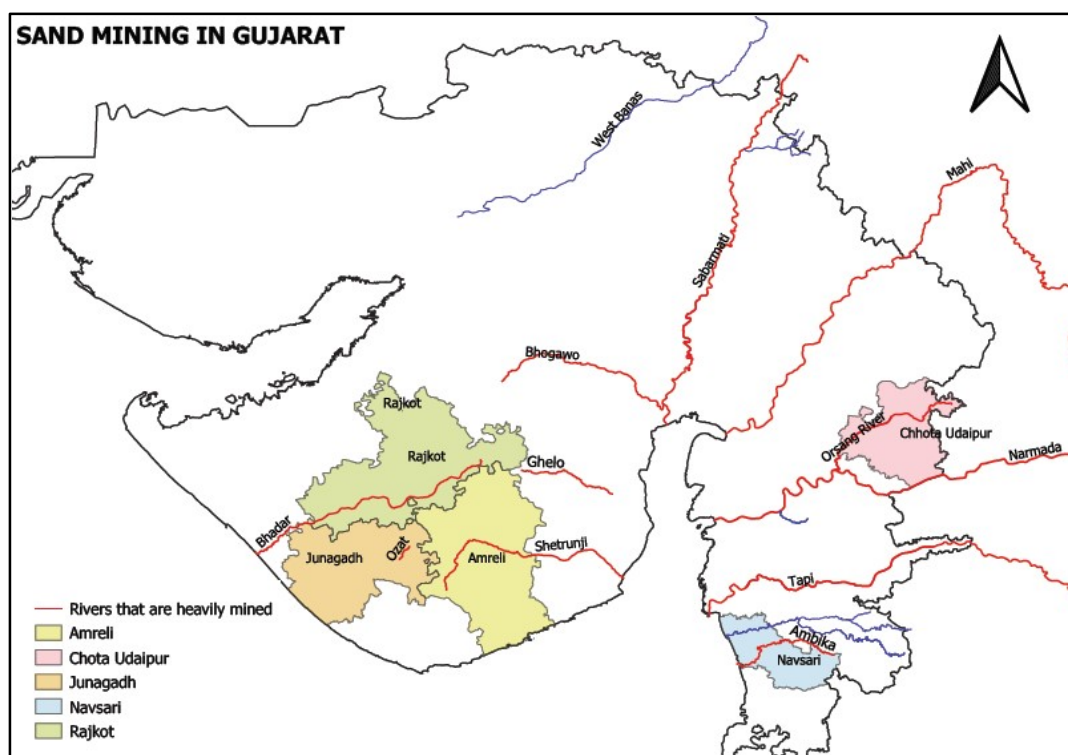
Overview of rivers in Gujarat

The state of Gujarat has all west flowing rivers in the country. The major rivers in the state of Gujarat are Narmada, Tapi, Sabarmati and the Mahi. Figure 18 shows the map of the major river systems in Gujarat. Apart from these major rivers, the other rivers in the state are Banas, Shetrunji, Bhadar, Sukhbhadar, Keri, Purna, Rupen, Dhatardi, Ambika, Daman Ganga, Ozat, Orsang and Aji. All the rivers in the state are seasonal rivers.

Sand mining hotspots

Sand mining is rampant in most of the rivers in the state. Sand mining is carried out on a large scale in Narmada, Tapi, Mahi and Ambika among the large rivers. In Kutchh and Saurashtra sand mining is rampant in smaller rivers like Shetrunji, Gelo, Bogavo. The Orsang River in the Chhota Udepur district and the Ozat River in Junagadh district are also heavily mined.

Figure 18: River system in Gujarat



Extent of sand excavation

It is extremely hard to determine the actual amount of sand that could be excavated owing to illegal sand mining and the movement of the sand within and outside the state. There is a high demand for cement as current government is focussed on developing infrastructure and housing for all by 2022. The average per capita cement consumption in the country in 2019 stood at 235 kg (IBEF, 2020). This figure can be used to estimate the amount of sand

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consumed by using the normative cement to sand ratio of 1:2.5, as used in the construction industry (Gol, 2018). Therefore the average per capita sand consumption in the country is close to 588 kg. Thus on an average about 0.5 tonne of sand is required per person.

According to the 2011 Census the population of Gujarat for 60 million people with a decadal growth of 19.28%. Therefore, the current cement consumption of Gujarat stands at **35.53 MMT**. According to Gol (2018) the total production of the sand in the state was **49.64 MMT** and it generated total revenue of Rs. 160.34 crores. It is expected to grow at a rate of 5-6% annually and therefore by 2025 the production of sand in the state would be close to 80 MMT.

However, these are only the figures that are available from the official sources. Also, it can be seen the current consumption based on the cement consumption in the state is much lower than the actual sand produced in the 2017, which shows that largely a lot of the sand produced is being exported to many other states. With the amount of illegal sand mining going on in the state the figures of production of sand would be definitely much higher.

“In Orsang area, some areas are as wide as 300m, at a time 20-25 trucks can be lined up. In one day I recall counting close to 600 trucks around 25 tonne each carrying sand. This is just one site. Imagine how much must be going on in the entire state” – Shakti Bhat, Activist

Historical trend of sand mining in Gujarat

Sand mining has been going on since the past few decades in the state. However, it was never done at such huge commercial scales. Since 2000 it has really grown and the issues related to illegal sand mining have increased since then. According, to the interview with Rohit Prajapati, an activist from the state, the sand mining initially used to be manual and large labour was employed for the same. Over the past 10-15 years heavy machinery in form of JCBs and huge sand filters and excavators are being used which are responsible for large scale destruction of the rivers.

Ecological impacts of sand excavation

Erosion and deposition are natural processes of the river and sediment transport is one of the basic functions of the river. Sediment transport is extremely important and it maintains the natural habitats and the biophysical characteristics of the river and is needed to maintain the balance. Indiscriminate sand mining has resulted in the destruction of the riverine ecosystems. In the case of Mahi and Narmada the damage caused is absolutely irreversible. The river channels are mostly dry and hardly have any aquatic life left in them. The river banks have been destroyed and there is large scale river bank erosion taking place which is changing the characteristics of the river. The groundwater table have also significantly reduced in these regions. The rivers in Gujarat are seasonal rivers; however sand mining goes around all year round except a couple of months during monsoon. After monsoon the sediment transported due to small and large floods are deposited on the

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banks which make the soil fertile. Sand mining has destroyed this fertile soil along the banks which otherwise can be used for cultivating. Overall the quality of the water has become very poor. In May 2018, the sand mining trucks completely destroyed the nesting sites and habitats of the blue cheeked bee-eaters near Indroda Fort, Danginagar (Times of India, 2018b). Similarly there were reports that illegal sand mining in the eco-sensitive zone along the Dhatardi River are threatening the habitat and the corridor of the Asiatic lions (Times of India, 2018c).

“The NWDT had awarded 600 cusecs as e-flow for the Narmada river. This water is not being released. No e-flows combined with sand mining have completely destroyed the Narmada river below the Sardar Sarovar dam. The river bed is so dry that water does not reach Bharuch and there is a lot of seawater intrusion in Bharuch. The Total Dissolved Solids (TDS) of the Narmada have gone up” – *Rohit Prajapati, Activist*

“Different sands from different regions in Gujarat have different characteristics. The sand found in Orsang, Tapi and Narmada is black and is exported right upto Kashi, Banaras and Haryana” – *Shakti Bhat, Activist*

Socio-economic impacts on local communities

The ecological impacts in the rivers have impacted the communities in the villages in which sand mining is carried out. River bank erosion is the most common issue observed due to sand mining which tends to wash away the crops during the rainy season. The groundwater levels in the region have dropped in many regions affecting the availability of drinking water during the summer months. The connection of the people with the river has definitely reduced in the region where sand mining is carried out. Their access to the river is cut off and they cannot swim there. River bed sedimentation has reduced affecting river bed and river bank cultivation. There is also a lot of encroachment by the sand mafia on the river banks which has led to decline of river bank cultivation. Thus, there is an overall decrease the village commons like grazing areas.

As most of the sand mining is now done in a mechanized manner there are no opportunities created for labour in the villages where mining is carried out. Moreover, the labour that is needed to facilitate the mining is all brought from outside the state. The village roads have completely been destroyed and the number of accidents has increased. According to a study by Action Aid in 2016, they observed that the highest accidents were reported from the state of Gujarat. Apart from this large pits created in the sand mining region were responsible for causing death by drowning of children and cattle. A case study in the report has described the story of Phulbati Natarbhai Rathva of Suskal village who lost her son after in drowned in a deep pit created due to sand mining. Protests were organized but they ended up getting threatened by the police themselves saying that the mining was going on as per the state rules. The police registered the case as an accidental death (Action Aid, 2016). In some regions, sand mining has caused huge loss to agriculture due to flooding.

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Due to heavy traffic the air and noise pollution has increased tremendously in the villages where sand mining is done.

Sand mining governance and the economy

Sand mining in the state regulated under the Gujarat Minor Mineral Concession Rules 2016. Under these rules sand mining is under the department of Industries and Mines and Commissioner of Geology and Mining (CGM) of the state is responsible for the sand mining governance. Sand mining is under Part A, Schedule III.

The rules for the Minor Minerals Concession were amended in the state which stated that mining cannot be carried out without permission of State Pollution Control Board and environmental clearance. The new rules state that sand cannot be mined from below the water level in the river bed. The lease holders of the sand blocks have to submit environmental management plan at the time of the bidding process itself. Sand mining is allowed only up to 3 m deep in the river bed. Mining is strictly prohibited within a 500 m area of irrigation projects and bridges and in an area beyond 10 m from the bank of the river. According to the new rules, the natural course of the river cannot be disrupted and the mining as to be carried out between 6 a.m. and 6 p.m. 95% of the royalty has to be paid to the village Panchayat where the mining is being carried out. There is also a ban on the interstate movement sand. As mentioned in the rules the royalty for the sand is Rs. 40 per tonne. Dead rent per square meter is Rs. 5. The rules also say that the traditional communities like the Vanjara and the Odes will be given priority (Government of Gujarat, 2017). The minimum area that can be granted for lease is 1 ha and the maximum area is 50 ha. The maximum period for granting the lease is 5 years.

Since the new rules have been formulated the leases for the sand mining have been given based on auctioning or competitive bidding. The model used is “Tender cum auction model”. This is a two stage process in which the initial price is offered along with the technical bid. In this first stage about 50% of the bidders are then selected for the auctioning process where competitive bidding takes places and the highest bidder gets the lease. The process of tendering is online with forward auctioning. Here the bidder sends his quote in terms of percentage over and above the base premium. The value of the mineral of sand published by the State Government is Rs. 240 per tonne. The Lessee is responsible for preparing the mine plan and taking the EC from the relevant departments and the consent from the State pollution control board (Gol, 2018).

Violations and illegal mining

In the interview with Mr. Rohit Prajapati, There have been gross violations and illegal sand mining all across state especially in the Sabarmati, Orsang, Tapi, Auranga, Mahi, Dhatardi and Gama Rivers. Orsang River in the Chhota Udepur district is one of the most mined rivers where there have been too many violations. There have been repeated violations in the Orsang River and the government has not taken enough steps to curb these activities. In fact, the illegal sand mining in the Orsang River caused damage to the aqueduct of the

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Narmada canal in Bodeli taluka (SANDRP, 2018). Figure 19 below show the damages caused to the aqueduct.

Figure 19: Damages caused to the aqueduct of the Narmada main canal due to erosion



In the last five years, there were around some 38,000 odd cases filed in the state for illegal mining for this. FIRs were filed only in 2.16% of these cases. In 2014-2015 there were a total of 5,463 illegal cases recorded in the state which increased to 7,340 cases by 2019 which shows a 34% increase in the number illegal cases. The maximum cases have emerged from Chhota Udepur district and are around 3,101 reported cases. According to DM Shukla, Additional Director, CGM, the reason for low percentage of the FIRs is that after finding illegal mining a notice of penalty is issued if the accused are ready to pay the penalty then there are no FIRs lodged against them. He also said that the major reason for maximum number of illegal sand mining cases in Chhota Udepur is because of its proximity to Madhya Pradesh and Maharashtra (Nair, 2020).

“Sand mafia sometimes pay penalties in advance for 20 years and then get away with the violations. The penalty is peanuts compared to the profits they make” – Rohit Prajapati, Activist

In fact the government of Gujarat launched a ‘Trinetra’ drone surveillance system, first in the country to curb illegal sand mining in the state. However, the reports have shown that it has not achieved much success in trying to prevent illegal sand mining (SANDRP, 2019).

Incidences of violence

In 2018, Nayan Kalola, an RTI Activist and local farmer from Junagadh District was abducted and brutally beaten by the sand mafia. He had been trying to put a stop to the uncontrolled sand mining happening on the Ozat River which had caused destruction of their horticulture crops.

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Figure 20: Nayan Kalola, RTI activist and local farmer beaten up by the local mafia



Source: Times of India, 2018

In Chhota Udepur district a 45 year old man was shot dead over dispute between villagers from Motikanas and Khadakwada villages over the limits of the river bed of Orsang River cutting through both the villages. In another incident last year in November, 43 year man was beaten up by the sand mafia for informing the mines and minerals department about illegal sand mining in Narol. According to a couple of local journalist from the sand mafia are extremely powerful and they threaten anyone who opposes or tries to complain against them. They also threaten to implicate people in legal proceeding including SC/ST Atrocities Act. The nexus is huge which includes local police and the politicians (Mishra, 2019). In another tragic incident last year in September five people drowned in the Sabarmati River during Ganesh immersion in pits that were around 50 ft deep. The Chief Fire Officer accepted that these incidents had occurred due to illegal sand mining and he also added that around 10 people had died in a similar manner in 2018 (SANDRP, 2019).

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Maharashtra

River system in Maharashtra

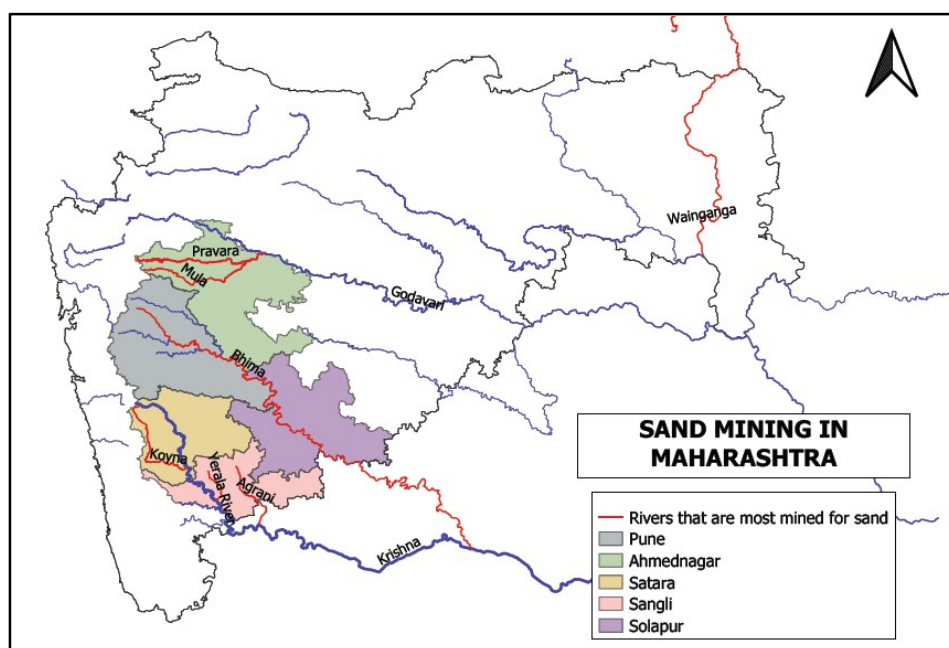
The state of Maharashtra is the 3rd largest state in the country with a geographical area of 307,710 sq. km. Physically the state can be broadly divided into three regions, namely, the Konkan Coast, Sahyadri and Satpuda Range and the Deccan plateau. The state is traversed through networks of rivers: Godavari, Krishna, Bhima, Tapi, Narmada, Painganga and Wainganga. In all these rivers sand mining takes place. However, sand mining is high in the western rivers of Bhima, Krishna and some of its tributaries, creeks in the Konkan region and the Wainganga River in the Vidarbha region. This is because the sand quality in these rivers is of superior quality, and the demand for sand is more.

Like other states, in Maharashtra too, it is legally permitted to mine sand during daytime, i.e. from 6 a.m. to 6 p.m. Sand mining is to be done within 2 m from the riverbed. Also, while transporting sand in trucks, it is mandatory to cover the trucks. However, there are cases where sand mining is done up to 50 m depth and illegal mining is prominent during night time (Divya Marathi, 2013).

Hotspots for sand mining

The rivers originating in the Western Ghats of Maharashtra carry a lot of sediments with them, due to which sand is available in larger quantities in the western rivers of the state. Also, the annual replenishment of sand is faster in these rivers. Godavari, Pravara, Mula, Kukadi, Bhima, Ghod, Nira, Koyna, Krishna, Warna, Panchganga, Tapi, Narmada, Manjara, Dudhana, Wainganga and Painganga are the major rivers in which sand mining is done on a larger scale. In Western Maharashtra, Pune, Ahmednagar, Solapur, Satara and Sangli are the hotspot areas in which sand mining is done.

Figure 21: Sand mining rivers in the state of Maharashtra



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Historical trend of sand mining in Maharashtra

Sand mining in Maharashtra started in the mid 70s to early 80s, when development was at its peak. Especially in the Western Maharashtra, after the construction of the Koyna dam on the Krishna River, sand extraction became a prominent activity. Krishna river and its tributaries were able to provide water mainly during the Kharif season. Therefore in most of these regions, only one crop was grown. The now drought prone areas (Sangli region) at least received water for crops. With the construction of dams, water was made available in the upstream region and villagers started taking two crops. Also ample sand was easily available for extraction. Within few years, villages located in the downstream areas started facing water shortage, and also groundwater depletion (As reported by activist, Dr. Bharat Patankar).

Estimates of sand extraction

The rivers basins in Maharashtra are rich in sand and minerals. Sand is categorized as a minor mineral and there is a large demand for it in the construction industry. Sand is auctioned by the Maharashtra Government on a large scale as it is a major source of revenue. **As per the estimates, every year the state of Maharashtra earns up to Rs. 3-4 thousand crores of revenue through sand auctioning.**

Impacts of river sand mining

Since sand mining is a profitable business, sand is mined illegally in many parts of Maharashtra. Bureaucratic pressure and corruption in the government further boosts the illegal mining of sand which has led to large amounts of sand being extracted from the river beds. This extraction has led to adverse effects on the lives and livelihoods of the adjoining villages. The groundwater levels in many villages have reduced, due to which there is shortage in the availability of water to fulfil basic needs like domestic and drinking. For example, in Valan, Pimpri, Khedle, Rahuri villages, located on the banks of the Mula River in Ahmednagar district, the water tables have reduced drastically. This is because due to excessive sand mining, the river has lost its capacity to retain water. In Valan village, the water level has reduced so much that people have to dig borewells more than 300 feet deep to access water, and by October – November, people start facing acute shortage of drinking water. This, due to excessive sand mining, the water tables are not replenished and the villages situated on the banks of the rivers start facing shortage of water from winter season only.

Impact of coastal sand mining

Maharashtra has a large coastal belt (Konkan region) and sand mining is prominent even in this part of the state. Sand is extracted from creeks located in between the rivers for commercial purpose. Large boats remove sand from the creek, both manually and mechanically. The labourers are migrants from other states. One boat extracts about 3-4 brass of sand daily and about 1000 boats operate in this area daily. Sand is extracted in large quantities illegally in the Terekhol River and no action is taken against them as the

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government officials are also involved in it. This has severely impacted the fishing communities. A few Gram Panchayats have also passed resolution to ban sand extraction but it not implemented yet. Following impacts are observed due to sand mining in the coastal areas:

- Due to sand mining, the depth of the rivers has increased causing salt intrusion from the sea. Therefore the salinity of the drinking water has increased.
- Sand dredging has made the banks of the rivers unstable. During heavy rainfall, these banks collapse and water enters the farms. This has led to destruction of coconut and *supari* plantations.
- Earlier the sea water used to flow into a certain area but now due to sand extraction, water reaches the interior areas of villages, and water is not available for agriculture. As a result in many areas, cultivation of Rabi crops has reduced.
- The fishing communities have been adversely affected. Earlier crabs, which were easily available in large quantities, are now caught with great difficulty. Turtles have disappeared and the number of crocodiles in the river has increased.
- In this area people are reluctant to use alternatives like stone crush sand and prefer sand from riverbed for construction purposes.

Legal provisions for sand mining in Maharashtra

In accordance to the section 15 of the Mines and Minerals (Development and Regulation) Act, 1957, the Government of Maharashtra has framed the rules for regulating the extraction of minor minerals in the state. The Maharashtra Minor Minerals Mining (Development and Regulation) Rules were formed and implemented since 24.10.2013. The mining department under the District Collectorate's office is responsible for permitting license, its renewal and regulating and monitoring the sand mining activities. As per Government Resolution (GR), dated 12.03.2013 (GR 10/ 512/प्र.क्र.300/ख), the Government of Maharashtra has revised the sand mining policy. In accordance to the policy following actions are implemented:

1. Stretches of rivers for sand mining are identified and information related its geographical area, availability of sand, its quantitative estimation, etc. is made available.
2. For excavating sand from these identified stretches, a no obligation certificate is acquired from the respective Gram Panchayats during the Gram Sabha meetings.
3. The Tehsildar surveys the identified sand mining stretches in the month of April and May through District Mining Officer and Groundwater Survey and Development Agency (GSDA). Similarly a final survey of these stretches is done in September every year.
4. Following the survey, the Environment department approves the auctioning of sand dunes which are approved and authorized by the GSDA. After that the offset price of

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the sand is fixed and the proposal is submitted to the Divisional Commissioner Officer for approval.

5. After the approval of price from the Divisional Commissioner Officer, the sand is auctioned through e-tender or e-auctioning system.
6. The highest bidder, who bids more than the offset price, is given the contract. An agreement is formed and executed only after the full payment is made by the bidder. The period to excavate sand from the stretches is permitted only till 30th September every year, even if the date of auctioning is different.
7. The SMATS system is used to provide information related to the sand excavators and their mining operations. Similarly, it is mandatory for the excavators to use and update information on the website, www.mahamining.com.

Government Resolution on Sand Mining policy dated 3 March, 2019

Although the Maharashtra Government revised the mining policy in 2013, there were some errors and omissions which needed rectification. Similarly as per the notification by the Central Government dated 15 January, 2016 district level committees are to be set to control and monitor the mining in the river stretches. Therefore to accommodate all the above stated changes and to adhere to the Sustainable Sand Mining Guidelines 2016 and Sand Mining Framework, 2018 Government of Maharashtra amended the policy on sand mining in Maharashtra. Following are some of the important points which are stated in the new GR dated 3 March, 2019

Institutional set up for sanctioning license for sand mining

Procedures for sand excavation and transportation: The District Sand Monitoring Committee has been constituted with the District Collector as its Chairman, Chief Executive Officer as Zilla Parishad and District Superintendent of Police as its members. This committee shall be responsible for issuing licenses to individuals and organisations for sand extraction. The committee shall also ensure that the sand extraction shall take place as per the guidelines mentioned by the Central and state government and the National Green Tribunal. The committee shall also prepare district survey report for environmental permits and other works.

Taluka level sand monitoring committee will be set up under the chairmanship of Tehsildar. This committee will determine the river stretches for sand excavation and will assist the district level committee in preparing the district survey report.

Recommendation of Gram Sabha for sand auction and funds to be given to Gram

Panchayat: After finalizing the river stretch for sand mining, permission from the Gram Sabha is required. If they do not give permission, the Gram Sabha needs to be persuaded to cooperate. The Gram Sabha which approves the auction is to be given compensation, ranging between 10- 25% of the auctioned money.

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Some stretches of the river are reserved for projects of various department of state government. Environmental clearance for sand mining is given only when sand mining plans are prepared as per the guidelines of the central government and the NGT. Sand cannot be extracted from the river bed until there is environmental clearance.

Regulation for sand mining

Procedures for sand auctioning: The river stretch meant for sand extraction should be up to 5 hectare. The license for the sand extraction is valid for a period of 5 years, however, during the monsoon period, i.e. from 10 June to 30 September, sand mining is completely banned. The duration of sand extraction period should be determined keeping in view the technical aspects. The advertisement for auction of the river stretches for sand mining should be published in the major newspapers with all the details.

Restricted conditions for sand mining:

- As per the directions given by the SC, sand can be excavated up to a maximum depth of 3 meter or up to the water level, whichever is less or to a depth which is recommended in the environmental clearance in order to keep the water in the river clean and pure.
- Sand mining to be done during daytime, i.e. from 6 am till 6 pm only.
- The lease holder is allowed to excavate sand only within the quantity approved during the auction.
- No sand excavation to be done within 100 meters of public water supply
- CCTV to be installed in places of sand excavation
- Sand excavation to be done mechanically.

Plans for Preventive Measures

- For each sand excavation area, only one road should be kept
- CCTV to be installed at every sand excavation area
- Gramsevak Tehsildar or Sub Divisional Officer should visit the sand excavation area from time to time to ensure that sand is being extracted as per the guidelines.

People's movements

Story of the impact of sand excavation on Yerala River in the mid 80s

Large amount of sand was being extracted from the Yerala River located in Sangli District of Maharashtra. This led to decrease in the water tables. The water levels in the jack wells along the river reduced which affected the water availability for irrigation and drinking. People of the adjoining villages complaint the District Collector of Sangli about this issue. Under the chairmanship of the Collector, the government constituted a 10-member committee to study the matter in detail. Bharat Patankar, an activist from the Shramik Mukti Dal was also part of this committee. The Chairman of this committee constituted five sub-committees, one for each of the following issues.

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1. Rate of sand deposition and flood characters in the river Yerala.
2. Groundwater aspect in and around Yerala river bed and probable effect due to excavation of river sand.
3. Change in the course of stream / soil erosion.
4. Adverse effect on irrigation from Jack wells.
5. Adverse effect on drinking water from Jack wells.

Based on their study the committee made the following recommendations.

1. Minimise exploitation of sand from Yerala River.
2. Identification of suitable sites for sand excavation and unexploited sites.
3. Following rules were framed by committee for exploitation of sand to avoid environmental effects of Yerala River.
 - No sand should be excavated within 2 metres from the river bank
 - Depth of sand to be excavated should not be more than 1 metre.
 - Safe distance of 50 metres should be left while excavating sand in the periphery of existing structures like dam bridge road jackwell and any other public structures.
 - Excavation of sand permitted to cater the local need of constructions of houses, wells etc up to 20 brass. Sand may be given by Tehsildar to the people from the villages up to a distance of 8 kilometres on either side of Yerala river with proper verification
 - Requirement of sand about 20 brass and upto 200 brass for house building etc. for private purposes may also be given by Tehsildar but with a certificate from the civil engineer
 - Permits for small requirements of 200 brass should be given to the individual only once for single purpose
 - Selection of place of sand required for excavation its priority quality for the requirement for government works will be decided by a team.

Mukti Sangharsh Chalwal also filed PIL in Supreme Court (568/1988) for complete ban on commercial sand mining. Supreme Court judge accepted the committee's recommendations.

Long struggle of Panegaon villagers to keep sand mafia away

Panegaon village in Nevasa taluka of Ahmednagar district is located on the banks of the Mula River. In this village, sand was excavated at a stretch spread over length of 20-21 km, 100 meter breadth and 80-100 feet depth. Most of the villagers of Panegaon are dependent on agriculture for their source of livelihood, and source water for irrigation from the Mula River. Sugarcane is the major crop cultivated grown in this area. Due to sand excavation the water holding capacity of the river decreases and this indirectly impacts the productivity of crops. The villagers of Panegaon realized this and hence they came together and

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successfully stopped the sand mafia from extracting sand. Of course this was possible only after a long struggle.

In 1997, the Circle officials announced about the sand auction in the village. One contractor got a license for extracting sand for Rs. 10 lakh. The villagers were aware of the impacts of sand mining on the availability of water from experiences in the neighbouring villages and hence decided to pass a resolution in the Gram Sabha to stop sand mining. The villagers then unanimously filed a petition in the Aurangabad Bench of the Mumbai High Court, and through this petition, they were able to ban the sand mining in the village. Today groundwater is available in Panegaon village at a depth of 50-60 feet, whereas in neighbouring villages, borewells are dug at 300 feet deep. They are also able to cultivate sugarcane crops.

After 19 years of struggle the villagers till today are unanimous on their decision of not allowing sand mining in this area. If there is any opposition, they try to resolve the issue peacefully. Villagers are also aware about the climate change effects on precipitation patterns and hence are taking efforts to conserve water.

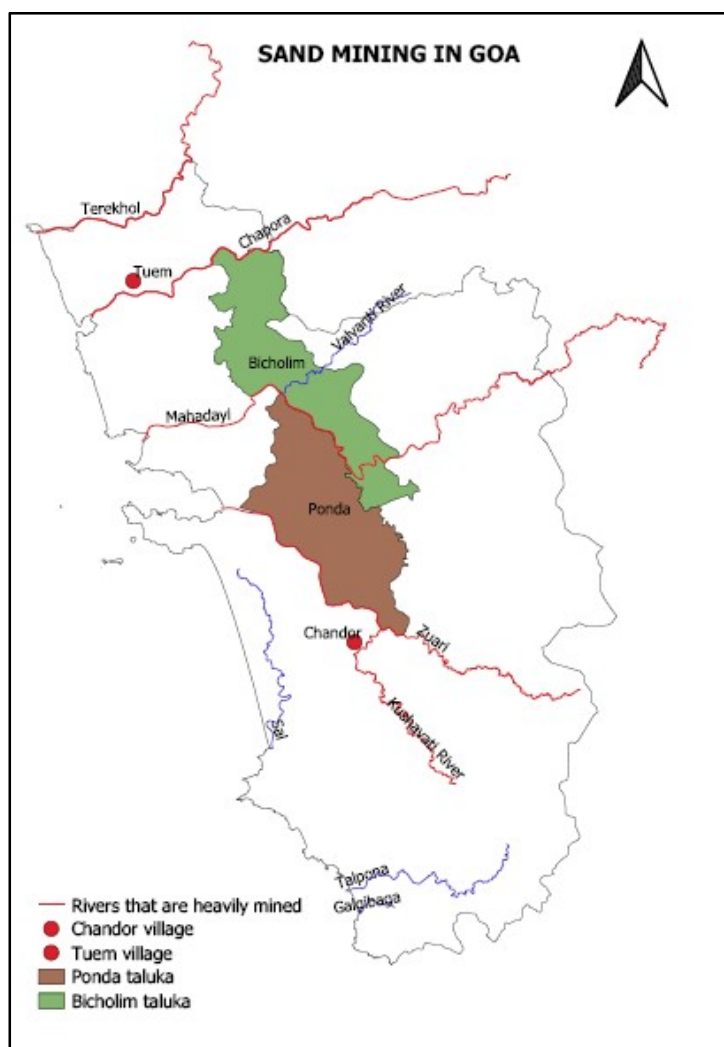
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Goa

River systems in Goa

Sand mining from the rivers is a common activity in the country and the state of Goa is no exception. Located on the West Coast of the Arabian Sea, the state of Goa is rich in forests and rivers and hence minerals are present abundantly in this small state. Sand is extracted traditionally from the month of October till March from the coastal beaches and sand dunes. However, extraction of sand from the coastal beaches is not preferred due to salinity issues¹⁰, cost of operation and the laws of the coastal regulation zone (CRZ). Goa has 11 major rivers, of which Chapora, Mandovi (Mahadevi river), Zuari and Terekhol rivers and their tributaries are the major hotspot areas for sand mining. There are stretches on these rivers which are overexploited.

Figure 22: Sand mining rivers in the state of Goa



¹⁰ Though sand from the beach is of good quality, the salinity in the sand induces corrosion of metals in the construction and hence river sand is generally preferred (Sonak et al., 2006).

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Extent of sand excavation

Although there are no clear estimates on the amount of sand extracted, global estimates show that annually about 200 kg per person of sand is extracted (Sonak et.al, 2006). The Directorate of Mines and Geology (DMG), Government of Goa gives lease to about 68-70 persons per year. Every license holder is allowed to extract about 1400 m³ of sand (The Economics Time, 2015). Therefore on an average one can estimate that annually about 98000 m³ of sand is extracted. Of course, the number of lease permissions varies every year and the illegal mining of sand is not accounted.

Process of sand extraction and institutional set-up

Sand is extracted manually from the rivers by using traditional method, i.e. canoe and bamboo-bucket method. Sand is usually extracted during low tide. One canoe takes about 2-3 hours to fill completely. About 8-10 labourers are employed by per license holder to extract sand. These labours are generally migrants from neighbouring states. During the past few years, the sand mining has resulted in the loss of ecology and important species. Following the NGT order, the DMG has put restrictions on sand mining. Sand is to be extracted only during daytime by the license holder in 30 identified sites and the extraction limit is capped at 6m³ per person per day. This has to some extent curbed sand extraction but the illegal mining and corruption still continues. Shailesh Shetye from Betki reports that the government rules are easily violated and the amount of sand extracted per license holder varies from 10 to 30 m³ of sand per day. If at least 20 canoes are used to even extract 20m³ of sand per day, sand extractors earn upto Rs. 6 lakhs in one night (Cost of one cubic meter of sand is Rs. 1500/-).

Figure 23: Traditional method for extracting sand in Goa

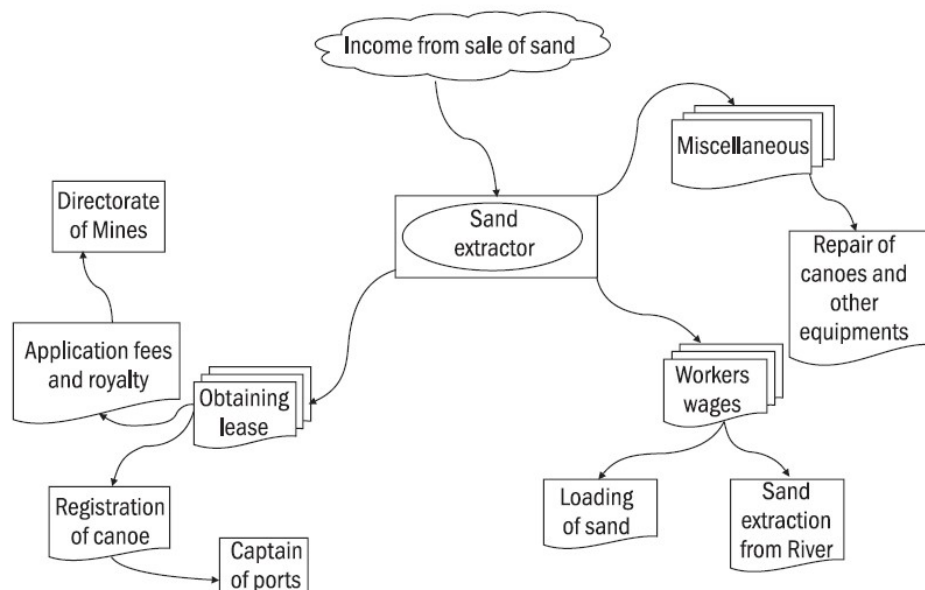


Source: Shailesh Shetye, Activist

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Revenue flow for sand mining extraction

Figure 24: Revenue flow chart for sand mining in Goa



Source: Extracted from, Sonak et al, 2006

Sand extraction is a lucrative business and many people benefit from these. The process of sand for extracting sand includes:

a) Obtaining Lease:

- Application form to be filled every year by the License holder, new application Rs. 500/- and renewal Rs. 300/-
- Applicant should also register the canoe, which will be used for the sand extraction, with the captain of ports and the receipt of it should be submitted in the office of Directorate of Mines.
- Annual payment of royalty to the DMG as per revised rates.

b) Extraction of sand

- Payment of daily wages to the workers depending on their performance
- Miscellaneous cost like repair of canoe and boats.

c) Money received by sand extractors. The rate of sand per cubic meter varies as per quality of sand and season. Sand is sold currently at a rate of Rs. 1500 per m³.

The DMG has set up a few guidelines to extract and transport sand, like issuing of pass to trucks carrying sand, registration number of canoes to be updated with the Captain of ports, truck permits, observing extracting protocols to avoid damage to the environment and so on. However, despite such guidelines, the government and the bureaucracy fails to control the illegal sand mining in the state and corruption at various levels is quite prominent.

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Impact of sand mining on environment

Sand extraction from rivers is a profitable business and it helps to sustain the livelihoods of the local people. However, excessive extraction of sand mining in Goa in the last two decades has deteriorated and altered the natural course of rivers. According to National Institute of Oceanography (NIO), sand mining has led to increase in salinity levels in the Chapora, Mandovi and Terekhol rivers (Herald, 2011). The sidewalls of the river bank collapse, which is a common occurrence and the extractors do not following the guidelines and norms for extraction. Experts also inform that deep excavation of sand (up to 10 m deep) can affect the local ecology physically, chemically and biologically and have the potential to cause severe sea erosion.

Terekhol River has a large stretch of mangroves and this acts as natural barrier against floods. Excessive sand mining in these river stretches has threatened the existence of the mangroves and the nearby villages live under constant fear. Reports mention that in a period of one and half years, at least six stretches on river Terekhol have completely destroyed the mangroves (Times of India, 2011). The water table in the upper stretches of the rivers have decreased and people face acute shortage of drinking water on the onset of summer.

Figure 25: Canoes parked on the mangrove bed in Terekhol River



Source: Shailesh Shetye, Activist

Impact of sand mining on livelihood of local people

The most affected people due to sand extraction are the fishing communities. People have reported of loss of local species, like *khube* (shell fish), clamps, etc. Coconut and *supari* plantations along the coastline have been destroyed. This is not only due to canoes, but also due to reduction in the water table levels. Continuous sand extraction has also resulted in

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developing cracks in some houses, which are near the river bank in Kiranpani village on the Terekhol River. Criminal activities have also been reported in Bhalkajan village in Pernem due to sand mining (The Gaon, 2012).

Legal Provisions

As sand is considered as a minor mineral, the state of Goa follows the Goa, Daman and Diu Minor Mineral Concession Rules 1985 and its subsequent amendment in 2004. As per this rule, an applicant has to apply for a lease for extracting any minor mineral. While applying the applicant needs to indicate clearly the area for extracting the minor minerals, purpose for extraction and leasing period. The competent authority from the Directorate of Mining and Geology department, then decides to how many extractors the lease is to be provided. While providing the lease, all the leasing conditions are to be clearly specified. One of the important conditions mentioned is to avoid harm to the environment and maintain the ecological conditions. Also, a transit pass is required for moving the minor minerals, which is made available after the lessee pays advance royalty fees as per the prescribed rates.

The draft notification of 2012 of the above rule further mentions that the Government from time to time shall mention about the river stretches in which sand mining activities can be done. The depth of mining in these stretches may be restricted to 3m/ water level or even less. For carrying out sand mining operations in proximity to bridge/ embankments, safety zones shall be specified, and sand mining in these safety zones and eco-fragile zones is to be completely banned.

Court cases

The NGT order dated 14th August, 2013, which banned sand extraction from river bed across the country, affected the sand mining industry in Goa too. Although sand mining was banned in the major river, illegal sand mining continued in some pockets of the river. Following are the summary of the some of the recent court cases and verdict by the NGT

NGT order regarding illegal mining in the Chapora River

Saidas Khorjuvekar Vs DGM, dated 26 February, 2019, regarding illegal mining in Chapora River. Records show that since 2015, the state has been taking several measures to curb sand mining, which includes constitution of District committee for North Goa to deal with extraction and monitoring of sand mining. NGT has ordered to install CCTV cameras at 'Zuvom de Tuyem' island in the river Chapora situated between Camurlim, Bardez Goa. To ensure compliance, the NGT has also directed DGM to deposit a Performance Guarantee of Rs. 20 Lakhs with the Central Pollution Control Board (CPCB) within a period of 10 days.

NGT Order regarding threat to mangroves along Chapora river, Bardez

Sagardeep Sirsaikar Vs Goa Coastal Zone Management Authority (GCZMA) and Others, dated 23.07.2019. The applicant filed an appeal seeking for an order protection of mangroves of Chapora River along its stretch, more specifically Camurlim village which has

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the highest density of mangroves. The mangroves are being threatened due to land filling of creeks and illegal constructions. It is stated that the area where the construction is being undertaken falls under the No Development Zone (NDZ) as per Coastal Regulation Zone (CRZ) Notification, 2011. NGT directed the GCZMA, to inspect the area in question and submit a detailed report after verifying the facts and circumstances set out in the application.

Federation of Rainbow Warriors Goa Vs DGM

The petition was filed in the Bombay High Court. In this the petitioner seeks relief for two aspects, a) remedial measures to be sought by the state to prevent and control sand mining in the state and b) directions to the Goa State Environment Impact Assessment Authority (GSEIAA) to withdraw environmental clearance for undertaking sand mining in specified areas. The following were the key points:

- State has to do a proper survey of the leased areas and the extraction of sand should be done on scientific estimates only.
- Constitution of flying squad in every taluka to monitor the illegal mining activities, during day and night time.
- The state to set up a dedicated helpline number for effective redressal of the complaint and will adequate wide publicity.
- Canoes and boats used for illegal mining shall be seized by the flying squads and thereafter confiscated. Registration of such boats/ canoes to be cancelled.
- In case of illegal mining, the confiscated sand to be replenished.
- The state to publish information in local newspapers to create awareness and prompt action is taken

Illegal sand mining continues

At 2:30 am, Sarang Jambhale, an activist calls up the flying squad to report about the illegal mining taking place in the Betki to Volvoi stretch on the Mandovi River, in Ponda taluka. The flying squad was set up to patrol the illegal mining at night. The flying squad does not have its own boat to carry out a raid and are dependent on the police. They called back Mr. Jambhale if that they have reported the matter to the police. By the time the police could react and take action it was already 6 am and the mining activity was over. The activist mentions that such incidents have become a common occurrence and they do not have faith in the system. The Herald (2019) reported of a raid been conducted at Carmurlim in Chapora Lake where three trucks which were about to transport sand were seized. It was also reported that in the month of April-May, 2019, the Captain of Ports have seized another 30 canoes (Times of India, 2019). The activists informed that despite the decisions by the Bombay High Court and many such petitions files, no strict action is taken. Trucks and canoes are often returned after the sand extractors pay fine, which is not very high. Simply capturing the vessels is not going to stop the illegal mining, as the building lobby is very strong.

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Social movements

In the recent years, there is a rising awareness among the local groups in Goa, regarding the environmental, social and livelihood impacts due to riverbed sand mining. Despite several judicial interventions, illegal mining still continues. Many civil society organisations, like the Rainbow Warriors have come forward to form the Goa River Sand Protectors Network to monitor the illegal sand mining activities. The members of this network have been actively writing, reporting in newspapers and video blogging the illegal activities in the state. They make sure that the state government follows and adheres to the set protocols and guidelines. There is still a long way to curb illegal sand mining, but the civil society is determined to bring down the sand mafia.

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