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Preface

Once a free and low value material, sand has become increasingly valuable. Its utility has expanded worldwide with growing infrastructure and construction activities. Sand has become inalienable to the emerging economies with free market and global investment. In a growing country like India, excavation and use of sand pose challenge of balancing environment with socio economic prosperity. The practice of sand mining has become a major environmental issue apart from just being used as a material for infrastructure. Of course there are other uses of sand having special quality. Sand mining has expanded rapidly with commercial input and using mechanised equipments. Over extraction of sand by mafias has increased during last decades and there are instances of honest officials targeted who fought against illegal sand mining in different states.

Still this is a neglected area and there is not much debate on this in the country. There is no nationwide study and research on impact of sand mining on river ecology. On the other hand legal fight against illegal mining is continuing by different environmental and social groups and individuals. Judicial bodies including NGT have passed very progressive judgments and orders to protect and regulate illegal sand mining from time to time. But those are not being followed up by appropriate authorities. As a commons, sand is supposed to be owned collectively but is forcefully being controlled by private players for profit. The system to regulate river banks and habitations from sand mining is not properly functioning. Although sand as a minor mineral and comes under state regulatory preview, there is a need for national level policy on sand mining.

It is my pleasure that colleagues of NR Hub have completed a study on this critical emerging issue covering five states and come out with this report. The report is useful for environmentalists, policy makers and intellectuals to focus on issues of sand mining in the country. I express my thanks to my colleagues and people who have contributed to complete this report. Our efforts will be realised if this small but significant step will contribute to bring pro people policy on sand in the country and in various states.

Sandeep Chachra
Executive Director
Actionaid India

Acknowledgement

The glaring problem of sand mining was observed during a foot march on 'Natural Resource Rights' in 2012. People in Gujarat, Madhya Pradesh and Andhra Pradesh shared with us their bitter experience with massive illegal sand mining although some people believed that sand is formed every year and available in plenty. However, unbridled pillage of this natural resource poses a big threat to the very existence of rivers. Remember how difficult it was to convince our own colleagues about this issue three years back. Today I am really happy to bring facts on sand mining through this report and take this opportunity to acknowledge my sincere thanks to all those who have encouraged and contributed to complete this study.

The study would not have been possible without the support of community members who have suffered the consequence of sand mining and provided us their personal narratives. Sincere regards and thanks to all of them.

I thank Ashwin Bhai Narsinghbhai Rathva from Gujarat, Raim Singh Bamniya from Madhya Pradesh, A. V Nagalaxmi, Y. Durga Rao, B. Rajyalaxmi, M. Saraswati and J. Archana from Andhra Pradesh, Padmavathi from Karnataka and Avinash Das from Odisha who helped in collecting data on which this study is based. Mr. Shankar Singh Tadwal from Khedut Mazdur Chetna Sangathan, Alirajpur MP, Mr. Ashok Kumar Shetty from Samagra Grameena Ashram, Dakshina Kannada, Karnataka and Mr. Sanyasi Rao from Action in Rural Technology and Service, Srikakulam, AP: thank you all for making the study possible in the respective states.

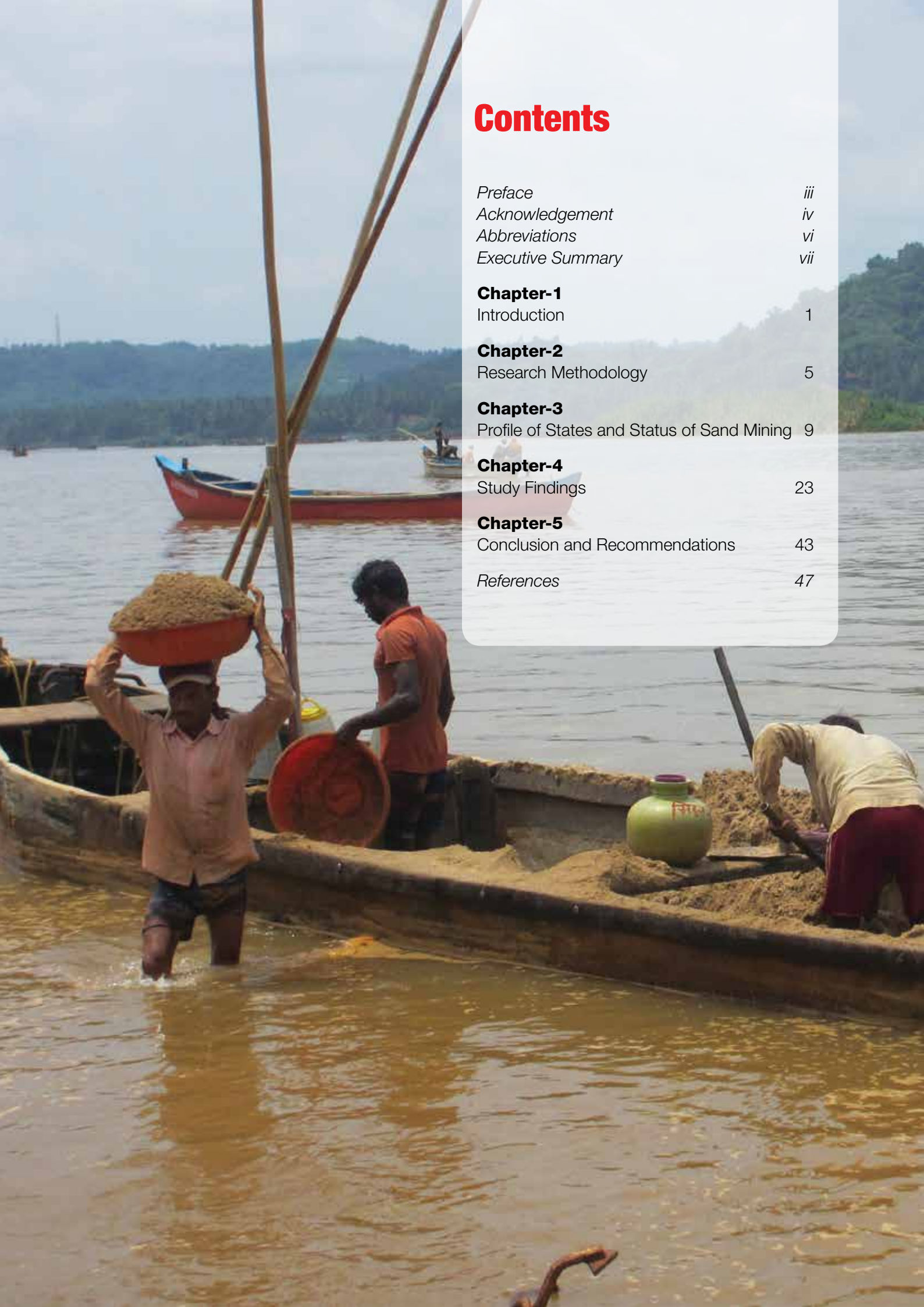
I am pleased to express my thanks to our Actionaid colleagues Sarika Sinha, Narendra Sharma, Jayant Lakra, Kevin Noronha and Kshithij Urs for their support to this study from time to time.

Appreciation and thanks to my colleagues, Biren Nayak, Dr. Sricharan Behera, Priyabrata Satapathy, Ratikanta Rana, Malaya Ranjan Samantaray and Supriya Patra for ensuring completion of this study report without major glitches. We thank Dr. Ranjan Kumar Sahoo, Department of Statistics, Vani Vihar for his guidance and help in analysing all primary data.

I deeply express my thanks to Sandeep Chachra, Executive Director, Actionaid for his continuous guidance and encouragement till the completion of this study.

Last but not least, I am thankful to New Concept Information Systems Pvt. Ltd., for designing and printing the report.

Bratindi Jena
Head, Natural Resource Knowledge Activist Hub
Actionaid India



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Abbreviations

AP	Andhra Pradesh
AREDS	Association of Rural Education and Development Service
COP	Conference of the Parties
DEAC	District Level Expert Appraisal Committee
DEIAA	District Level Environmental Impact Assessment Authority
EC	Environmental Clearance
EIA	Environment Impact Assessment
ENVIS	Environmental Information System
GMMR	Gujarat Minor Mineral Rules
GSI	Geological Survey of India
HHs	House Holds
IAS	Indian Administrative Service
IBM	Indian Bureau of Mines
KM	Kilo Metre
KMMCR	Karnataka Minor Mineral Concession Rules
MCDR	Mineral Conservation & Development Rules
MCR	Mineral Concession Rules
MMDR	Mines and Minerals Development and Regulation
MM	Millimetre
MoEFCC	Ministry of Environment, Forest and Climate Change
MoM	Ministry of Mines
MP	Madhya Pradesh
NGT	National Green Tribunal
NMP	National Mineral Policy
NRKA Hub	Natural Resources Knowledge Activist Hub
PESA	Panchayat Extension to Scheduled Area
PWD	Public Works Department
RBC	Red Blood Cell
RELA	Readiness for Empowerment through Legitimate Action
RS	Rupees
SEIAA	State level Environment Impact Assessment Authority
SHG	Self Help Group
SLP	Special Leave Petition
SPSS	Statistical Package for Social Science
SQKM	Square Kilometre
Wef	With effect from

Executive Summary

Sand is critical to maintain the ecology of a river system. Alarming increase in indiscriminate sand mining has caused serious damage to the river system in India. The quantum of sand mined every year is several fold more than what flows down and accumulates in the riverbeds. This situation creates a serious environmental threat to the riverine system. Sand mining puts a threat to water availability in river and to groundwater. Extensive sand mining in rivers are not just affecting the natural course of these rivers, but also depleting agricultural produce at large. The fisherman communities are also not able to get proper fish catch and are losing their livelihood. Sand mining is causing irreparable loss to biodiversity, river ecology and life and livelihood of people.

Now it has been observed that policies and their implementation are taking place mostly in an ad hoc manner. There is a need for proper implementation of rules and regulations conferred by law and judicial verdict through participatory planning, knowledge management and capacity building. In spite of illegal mining and trade of sand there is no proper check on extraction of sand or any other aspect of sand mining including loss of biodiversity, threat to water security and land security.

In spite of the verdict from the Apex Court and ongoing directions of National Green Tribunal, repeated assurances from State governments and continuing enforcement lapses in the matter of regulating riverbed sand mining in the country, the river and riverine communities are under threat due to sand mining. Supreme Court has given clear verdict and direction and NGT has been repeatedly hearing this issue and giving its direction.

Chapter one of this study report deals with understanding the concept of sand in rivers as a natural resource and as part of larger commons, analyses its importance. Chapter two deals with the methodology adopted for the study with short and long term objectives. The study covers five states – Gujarat, Madhya Pradesh, Odisha, Andhra Pradesh and Karnataka with five rivers, five districts, seven blocks, 20 Gram Panchayats, 25 villages and 500 HHs. Primary information was collected through HH surveys and case studies. Chapter three focuses on the profiles of sample states by analysing the information on minor mineral status and examines the existing legal and policy space for governance of sand mining. The Apex Court verdict on sand mining and verdict of National Green Tribunal also form part of this chapter. Chapter four focuses on the analysis of village level information on location of sand mining, impact of mining on health, life and livelihood of people. Impact on biodiversity and ecology is also analysed in this chapter. Analysis in relation to peoples' participation on mining governance and their struggle against illegalities form part of this chapter. Chapter five deals with conclusion and recommendations emerged from the study.

Recommendations

Local people are the key players in governance of natural resources including sand. However plenty or scarce sand may be, local people should be made aware of any planning for sand mining. This includes giving detailed information about social and environmental impact of mining on human beings, river ecology, vegetation and dependent animals and other aquatic species.

Despite legal provisions and clear guidelines for public hearing to get people's consent before any mining activities, no where is this process followed. The study recommends in favour of public hearing for any kind of sand mining anywhere in the country.

Gram Sabha is considered as the lowest constitutional body where people directly participate in democratic process. Gram Sabha has the power to decide if any mining activity is to be undertaken in its respective areas. This has been proved in case of Niyamgiri of Odisha, where twelve Gram Sabhas rejected proposals for bauxite mines. The study clearly recommends free, prior and informed consent from Gram Sabha before starting of sand mines at any place.

The study found that many states have come out with a progressive policy related to sand mining. Andhra Pradesh, for instance allows only manual labour and bullocks to mine sand in riverbeds. 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.

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.

The study identified more than 70 percent of sand mines are located within 1 km distance from human habitation causing difficulties for men, women and children in particular, and for livestock in general. Local people's difficulties are not addressed either by mining lease holders or by local lease approving authority. The study clearly recommends that sand mining should be located outside human habitation and outside the active flood plain.

As far as sand mining location is concerned, it is found that people extract sand both from middle of the river as well as river beds. Sand mining from middle of the river affects water level and water flow. The study recommends that large rivers and streams should be used preferentially for sand mining keeping flow of water intact. Pit excavations located on adjacent flood plain or terraces should be separated from the active channels. Excavation should not take place from below the water level.

Sand mines and related activities cause water pollution and affect lower riparian community. There is no system existing anywhere to monitor and regulate water pollution in the river. The study recommends pollution level should be monitored and checked by appropriate authority and with active participation of local people. Operation of heavy equipment within riparian habitat must be restricted. Alternative diverted road may be used if at all it is necessary for any specific work.

The impact of sand mining varies from social, environmental to economic aspects. But there is no effort to assess these impacts or manage the same. The present study recommends doing social, environmental and economic impact assessment and proper management plan for sand mining activities. This should also include plan for post mining restoration which must be done immediately after the mining or before onset of rain. Wherever necessary proper compensation and restoration process should be taken up by local authority to maintain river ecology.

As far as feasible, manual excavation of sand should be encouraged. Mechanical tools and equipments must be discouraged in sand mining. This will provide employment opportunity to local people and ensure their involvement in sand mines.

Sand mining is happening throughout the year without taking care of the river. The study recommends that timing of sand mines must be restricted to winter and summer days. No mining of sand should be done during rainy days from river.

On the whole if one calculates loss and profit of sand mining, local people do not gain anything out of sand mining activities but bear the burden of loss and damage. If sand mining is taken as a profitable work, local people need to be given due share of the profit.

Introduction

Of all natural resources including land, air and water, sand is considered to be an important element for current civilisation. Sand plays different roles in rivers to retain and recharge water tables and river basin management. It acts as a link between river basins and flow of water and is a part of aquifer. Sand is a part of our culture used for religious activities on river beds. People make small sand structures on river beds to perform religious and cultural actions. Children enjoy most while playing with sand and construct imaginary houses to play. It is used by sand artists globally to express their creative arts. Sand of various kinds is used as essential elements in detergents, cosmetics, tooth paste, solar panels, glass, silicon chips and for infrastructure building. Rivers carry countless amount of sand of different sizes and varieties from far and wide and deposit them on their beds and plains before they meet sea. Although it seems the supply is recurrent and endless, sand is finite like any other natural resource.

With growing demand for its use, sand is now being considered as an expensive commodity, a source of revenue and big business for profit without much investment. This leads to massive illegal sand mining without taking care of river ecosystem and interest of people who depend on river beds for their livelihood. The deadly war over sand has virtually started everywhere killing hundreds of people who raised their voice against illegal sand mining. Although there are debates and discussions at various locations, sand mining still remains a neglected topic among policy makers and intellectuals. There has not been much study on impact of sand mines and rules and regulations to manage this resource.

What is Sand?

The composition of sand is highly variable, depending on the local rock sources and conditions, but the most common constituent of sand is silica. Sand is naturally occurring granular

material composed of finely divided rock and mineral particles between 0.06 mm to 2 mm in diameter.

Sand is formed due to weathering of rocks and mechanical forces. In the process the weathered rocks form gravel and then sand. The mining of sand has been continuing for many years. Now it has reached a level threatening the environment and ecosystem besides reaching a level of scarcity that would threaten the economy.[1] Sand is specified as minor mineral in the Schedule appended in Minor Mineral Concession Rules of States and extraction of this mineral is governed by States through different policies, rules and regulations.

The term 'minor mineral' is defined in Clause (e) of Section 3 of MMDR Act, 1957: '3 (e) "minor minerals" means building stones, gravel, ordinary clay, ordinary sand other than sand used for prescribed purposes and any other material which the Central Government may, by Notification in the Gazette of India declare to be a minor mineral;

The term 'ordinary sand' used in Clause (e) of Section 3 of the MMDR Act, 1957 has been further clarified in Rule 70 of the MCR, 1960 as:

Sand shall not be treated as a minor mineral, when used for any of the following purposes:

- Purposes of refractory and manufacture of ceramic,
- Metallurgical purposes,
- Optical purposes,
- Purposes of stowing in coal mines,
- For manufacture of silvicrete cement,
- Manufacture of sodium silicate and for
- Manufacture of pottery and glass.

The value of production of minor minerals was Rs. 52,490 crore last year. Andhra Pradesh with share of 23.5 percent in the value of minor minerals produced in the country occupied the top position. Gujarat was at second place with a share of 23.0 percent in the value of minor minerals. Item-wise analysis revealed that road metals had the largest share of 38.7 percent to the value of minor minerals followed by building stone 21.9 percent and ordinary sand 16.5 percent.[2]

Sand is mostly required by the construction industry for its projects and the industry gets most of the sand by dredging rivers' earthen materials beyond a safe capacity. In almost every river where it is viable, the 'sand mafia' flush out the depths for profitable sand, amounting to an illegal yearly turnover of Rs. 1,000 crore. Some states have banned mechanised mining, but the mafia is not ready to obey. Illegal mining is hollowing the riverbed putting at risk the stability and ecology of rivers.[3]

Methods of Sand Mining

River sand and gravel are mined generally from alluvial deposits both from active channels and floodplains and overbank areas. Mining of sand and gravel from active channels is referred to as in stream mining and mining from overbank areas in the lowlands as floodplain mining. Mining of sand is also reported from abandoned river channels of the rivers as well.

In streams sand deposits are easily accessible, well-sorted, and generally free from fine particulates such as silt and clay. Hence, it is extensively used in construction industry for concrete preparation and plastering. Different methods are adopted to extract sand from the active channels of river systems. The commonly adopted practices are pit excavation and bar skimming. Pit excavation can be classified further into dry pit and wet pit mining. Dry pit mining refers to mining of sand from dry temporary stream beds using machines/ bulldozers, scrapers and loaders or manual methods. Wet pit mining requires the use of a dragline or hydraulic excavator to extract sand and gravel below the water table or within a perennial stream. If the water is shallow, mining will be carried out manually. In some cases, high power jet pumps are used for the extraction of sand from

[1] ENVIS Centre on Environmental Problems of Mining, Indian School of Mines, Dhanbad, Jharkhand, http://ismenvis.nic.in/Database/Sand_Mining_3817.aspx

[2] Annual Report 2014-2015, Ministry of Mines, Government of India, http://mines.nic.in/writereaddata/UploadFile/Annual%20Report%202014-15635699605386348293.pdf

[3] Grains of Despair: Sand mining in India, Centre for Science and Environment, 2012, http://www.Cseindia.org/node/3878

wet pits and river channel. Bar skimming involves scraping off the top layer of variable thickness. Bars are temporary storage features in which sand and gravel pass through. Controlled bar skimming is a recommended sand extraction method in most of the developing countries as a means for achieving stream resource conservation while sustaining the extraction industry.[4]

Illegal Sand Mining

Illegal sand miners over-exploit sand without looking into environment law. The government officials, politicians even ministers and police administrations help the miners escape and get away from all possible clutches of legal system. We always see blood stains of sincere government officials and social workers, who ventured to check the illegal sand mining.[5]

In earlier days sand mining was carried out manually using donkeys and bullocks for transportation. Today, sand miners engage modern machineries for mining sand, which is against the principles of mining, and destroy the resources at an alarming speed. Although, there are environmental laws to check the adverse impact of sand mining, but those are not followed and Illegal mining is ramified in all places in India.

The Issue Needs Urgent Attention

Sand mining is a largely unacknowledged but major threat to biodiversity in many parts of the world. Numerous scientific studies have been conducted of adverse effects to flora, fauna and ecosystems through other types of human interventions. Effects of sand mining on biodiversity have not been studied properly by the governments of most countries or even by independent scientific researchers.

Sand is a necessary component to fuel the construction boom driving the rapid pace of urbanisation and the rapid economic growth patterns of developing countries like India, Brazil etc. Rapid growth necessarily requires rapid construction of industrial, commercial and residential spaces. In India, the construction industry has accounted for around 40 percent of the development investment during the past 50 years.[6] India has the world's third-largest construction business, after China and the United

[4] Environmental Impact of Sand Mining: Environmental impact of sand mining: a case study in the river catchments of Vembanad Lake, Southwest India Effects of sand mining, Sreebha S, 2008, http://hdl.handle.net/10603/8987

[5] Why Illegal Sand Mining Prolongs, Renganathapuram Experience, Association of Rural Education and Development Service (AREDS), http://www.aredsindia.org/reports/feb09/06%20-% 20 Why %20 movements %20against%20 illegal %20sand%20mining%20prolong.pdf

[6] Proposals from Awaz Foundation and Bombay Natural History Society, consideration as new and emerging issues at COP 12, 2014 www.cbd.int/doc/emerging-issues/emergingissue-2013-10-Awaaz-Foundation-Bombay-NHS-en.

States, accounting for 9 percent of its $2 trillion economy. Over the next five years, India plans to invest $500 billion in its woefully inadequate infrastructure, of which $500 million is earmarked for the construction industry alone.[7]

Yet, sand is classified as a 'minor mineral' in India and its excavation is regulated by State Governments, while the Ministry of Environment and Forests does not have any effective regulatory framework to control it. The Supreme Court of India and the National Green Tribunal passed orders banning sand mining in river beds. In 2012 the Supreme Court of India ruled that sand miners must seek permission from the Environment Ministry. But many felt that the ruling would not stop illegal mining. They felt that it will only add one more layer of bribe-giving.

Rivers are lifelines of our society and they flow and provide us with abundant resources and means of life and livelihood. Sand mining can lead to river erosion and loss of entire river habits including villages and cities, because many human habits are situated along rivers. Yet the problem remains marginalised in public consciousness and in the policy making of State and Central Governments.

[7] India's illegal sand mining fuels boom, ravages rivers, Rama Lakshmi, The Washington Post, May 19 2012, https://www.washingtonpost.com/world/asia_pacific/indias-illegal-sand-mining-fuels-boom-ravages-rivers/2012/05/19/gIQA3HzdaU_story.html

Research Methodology

Objectives of the Study

Broad objective

The proposed study aims to investigate both the positive and negative impacts of sand mining. Positive in terms of financial gain and negative in terms of environmental impacts associated with potential sand mining operations and to outline the best management practices in order to minimise the adverse impacts.

Specific objective

- To discover the different types of sand mines that exist in different river beds, volume of sand mined and seasonality of sand mining
- To study the impact of sand mining on local people, river beds, agriculture practices and other related fields
- To study the impact of sand mining on women and children
- To discover practices involved in awarding sand mining lease and role of people in the lease process
- To consolidate people's voice and opinion on sand mining governance and management process

Study hypothesis

- Sand mining affects river ecology and river bed agriculture more than its economic value and use in construction activities
- Local people have to participate in sand mining management in order to maintain an ecological balance
- River water and ground water get affected due to large scale sand mining from river beds. This ultimately affects people in general, those who depend on river water for bathing and household consumption and women in particular, due to increase in distance to fetch water
- River bed agriculture is directly linked to sand mining and soil erosion

Sample Design of the Study

The idea to take up a study on sand mining was emerged during *Padayatra* conducted by NRKA Hub in the year 2012 with proper consultation with affected people in few areas. The study has used stratified purposive sampling for collection of primary data. After a lot of debate and discussion, the following criteria were adopted for the selection of the samples.

- Heavily sand mined rivers where there is regular conflict among people and administration on this issue
- Villages near the sand mining lease area and near the river banks
- Villages affected by natural hazards like flood, river bank erosion and water scarcity
- Villages affected by loss of livelihood, ground water depletion, accident due to sand mining etc.

A total of 25 villages were selected on the basis of the above criteria. The list includes five villages each from states of Gujarat, Madhya Pradesh, Odisha, Andhra Pradesh and Karnataka. Selection of 500 HHs was done randomly by taking gender, caste, class and other vulnerabilities into consideration.

Study Universe

The study universe is based on five rivers - Orsang (Gujarat), Sukkad (Madhya Pradesh), Brahmani (Odisha), Nagavali (Andhra Pradesh) and Netravathi (Karnataka). During *Padayatra* organised by Actionaid in 2012, communities in Gujarat and Madhya Pradesh shared their views on rampant sand mining in river Orsang and Sukkad. On the basis of media report and suggestions from Regional Offices of Actionaid and partners, rivers in Andhra Pradesh, Karnataka and Odisha were identified.

State	District	Block	Gram Panchayat	Name of Village	River	No. of House Holds
Gujarat	Chhota Udepur	Jaitpur Pawi	Suskal, Hirpari, Sihod, Moterasli, Jabugam	Suskal, Hirpari, Sihod, Moterasli, Jabugam	Orsang	100
Madhya Pradesh	Alirajpur	Alirajpur	Bada Undva, Mayala, Kharkuan, Titi	Bada Undva, Mayala, Kodla, Kharkuan, Titi	Sukkad	100
Odisha	Jajpur	Dharmasala	Chhoramuha, Bhawanipur, Badakaima	Chahata, Bhalukhai, Bhubana, Balabhadrapur, Arakhapada	Brahmani	100
Andhra Pradesh	Srikakulam	Burja	Allena, Labam, Kandhyam	Allena, Labam, Narayanapuram, Mamidivalasa	Nagavali	100
		Palakonda	Annavaram	Annavaram		
Karnataka	Dakshina Kannada	Bantwala	Kariyangala	Ammunje (Pelali, Aduru)	Netravathi	100
			Tumbe	Tumbe (Sudebari, Bramanahuttlu)		
			Pudu	Pudu (Sujeer Kallaje, Parangipete, Kuttinja)		
		Mangalore	Adyar	Adyarkatte (Adyarpadavu) Kannru		
5 States	**5 Districts**	**7 Blocks**	**20 Gram Panchayats**	**25 Villages**	**5 Rivers**	**500 HH**

The study covers five rivers, five states, five districts, seven blocks, 20 Gram Panchayats, 25 villages and 500 HHs.

Tools and Techniques used for Data Collection

Both qualitative and quantitative data collection methods were used for collection of primary and secondary data. Questionnaires for HH data were finalised through a consultative process and field testing to verify its reliability and acceptability. The structured questionnaires covered questions related to methods and volumes of sand mining, impact of sand mining on local people, impact of sand mining on ecology, people's involvement and participation on decision making processes and people's opinion on sand mining governance. Individual case studies were also collected. Face to face interviews to gather overall community perception and knowledge about the situations in villages was adopted. Information collection was done by field investigators from each State with monitoring by programme coordinator. The field investigators were trained through orientation on study design, objective, methodology, data collection process and study activities.

Data Analysis

The information used in the study has been collected both from primary and secondary sources. The data collected from primary sources was processed through MS Excel and analysed through an advanced version of statistical package SPSS. The secondary information was collected from reports and records of the central as well as the State Governments, relevant statistics, previous research, books and relevant papers and policy documents.

Study Limitations

- It was very difficult to reach openly to the respondents due to threat of mafias and their goons as they did not want any interference in mining activities
- The respondents were also under threat and felt the nexus between the miner, police administration and local leaders
- People were not much aware about the system of mining allocation and other legal requirements
- Due to paucity of time, this study has not been able to cover all seasons specially peak summer

Profile of States and Status of Sand Mining

Sand is classified as a minor mineral by the Union Mines Ministry along with clay, marble and other minerals. Together these minerals account for over 12 percent of the total mineral production in the country. Sand is used for making glass, and for all grades of construction ranging from buildings to roads. So, as economic activity expanded, its demand correspondingly rose.[8]

River sand is vital for human well being and for sustenance of rivers. As a resource, sand by definition is 'a loose, incoherent mass of mineral materials and is a product of natural processes.' These processes are the disintegration of rocks and corals under the influence of weathering and abrasion. When sand is freshly formed the particles are usually angular and sharply pointed but they grow gradually smaller and more rounded as they become constantly worn down by the wind or water.[9]

Indian rivers are continuously in threat by sand mining and other developmental activities. The malaise is pretty widespread in many states, like Gujarat, Karnataka, Madhya Pradesh, Odisha and Andhra Pradesh. They are also victims of unchecked illegal sand-mining, the consequences of which are very serious. Rivers of India are polluted by industrial and urban effluents; they are also victims of deforestation in their catchments, sequential damming and degradation because of unchecked sand-mining on their banks and beds. Besides, erratic monsoons induced by changing climate are taking their toll, adversely impacting their capacity to sustain the current levels of economic activities, especially agricultural productivity.

[8] http://indianexpress.com/article/india/india-others/sand-mining-menace-states-sharpen arsenal/#sthash.eEHeh 6tK.dpuf

[9] ENVIS Centre on Environmental Problems of Mining, Indian School of Mines, Dhanbad, Jharkhand, http://ismenvis.nic.in/Database/Sand_Mining_3817.aspx

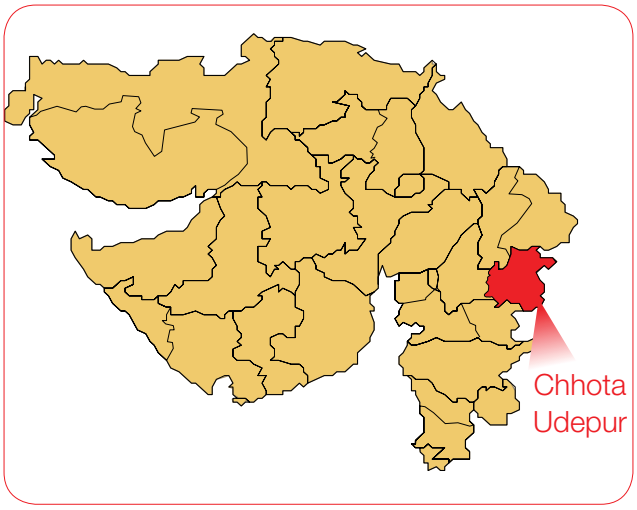
Gujarat

Gujarat is located in western India having a geographic area of 1,96,024 sq. kms with a huge 1,600 km of coast line. Geologically, Gujarat is a treasure trove of various mineral-bearing rocks ranging from Pre-Cambrian, Jurassic, Cretaceous, Tertiary and Quaternary Formations. Gujarat is endowed with rich minerals like petroleum and natural gas, lignite, bauxite, limestone, bentonite, fire-clay, china-clay, fluorspar, marble, agate, chalk, gypsum and decorative and dimension stones with which, the state possesses a prominent place in mineral production in India.[10]

Mining is an important revenue generating activity of the State Government. Sand mining alone earned the State Government Rs 81.13 crore in 2013-14.[11] A lease owner earns 10 times a higher amount from sand mining compared to the cost incurred by him. Mineral extraction is being carried out in Gujarat under the Mines & Mineral (Regulation & Development) Act 1957. Grants of mining lease, prospecting license and reconnaissance permit are being regulated under Mineral Concession Rules-1960. The State has prepared mineral policy in 2003.[12]

The GMMR 1966 has been repealed and replaced with Gujarat Minor Mineral Concession Rules 2010. Again the State Government has amended the Rule in February 2015. The power conferred under the MMDR Act the State has construed Rules for illegal transportation of minor minerals called Gujarat Mineral (Prevention of Illegal Mining Transportation and Storage) Rules, 2005 which is again amended in 2015.

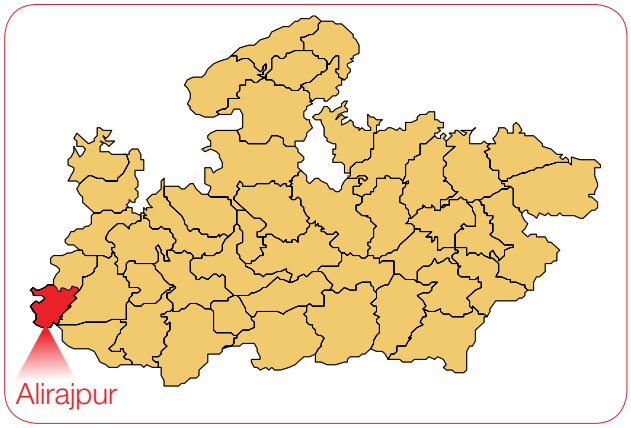
Chhota Udaipur district (also Chhota Udepur district) was carved out of the Vadodara district on 26th January 2013 with its headquarters at Chhota Udaipur town. The district consists of six *talukas* - Chhota Udepur, Pavi Jetpur, Kawant, Naswadi, Sankheda and the newly created Bodeli *taluka*. Chhota Udepur is dominated by Rathwa tribes. The river Orsang originates at



Ratanmahal hills in Ratanmahal forest of Chhota Udepur district at an elevation of 370m above msl (mean sea level) and flows towards South-West direction till its confluence with Narmada River at Chandod-Karnali in Dabhoi Taluka in Vadodara District of Gujarat. The Orsang drains more than 70 percent in Chhota Udepur district. The total length of the river from its origin to the confluence with Narmada River is 104 km. This river is heavily mined and now there is a threat to the existence of river and the inhabitants alongside. Rampant mining in Orsang River is happening round the year, using machines for last ten years. The other rivers like Ambika, Tapi, Khapra and Narmada are also heavily mined.

Madhya Pradesh

Madhya Pradesh occupies about 9.3 percent of the total geographical area of the country and is



[10] http://cgm.ncode.in/SitePages/Why_Gujarat.aspx

[11] Gujarat State ranks fifth in illegal mining cases in the country, state capital Gandhinagar tops in Gujarat, Hitesh Chavda, Counterview.org, 2014, http://counterview.org/2014/09/16/gujarat-state-ranks-fifth-in-illegal-mining-cases-in-the-country-state-capital-gandhinagar-tops-in-gujarat/

[12] Gujarat State Mineral Policy 2003, Industries and Mines Department, Government of Gujarat

the 2nd largest state by area in the country with natural beauty and abundant natural resources and economically useful minerals in large quantities namely, diamond (sole producer in the country), copper mining (80 percent in the country), magnesium ore, limestone, and coal. The State straddles the Narmada River, which runs east and west between the Vindhya and Satpura ranges. In fact these ranges and the Narmada River mark the traditional boundary between the North and South of India. Madhya Pradesh is endowed with rich and diverse forest resources.[13]

The minor minerals have been divided into two categories under MP Minor Mineral Rules, 1996. Schedule I minor minerals are used in construction activity after processing while Schedule II minor minerals are directly in construction activity. The State Government under the "Panchayat Raj" has delegated the powers of regulation of the Schedule II minor minerals to the Panchayats and the quarries of such minerals are now allotted by auction. Since the revenue received from Schedule I minor minerals are also distributed to Panchayats, therefore, in order to enhance the revenue of Panchayats, the stone quarries for installation of crusher and the flagstone quarries shall be allotted by way of auction instead of lease. It is planned that quarries of minor minerals shall be allotted to the Co-operative Societies of Scheduled Castes, Scheduled Tribes and traditional miners without auction, but not followed till now.[14] The Sand Mining Policy-2015 has been prepared in the State to make sand available to people on rational rates.

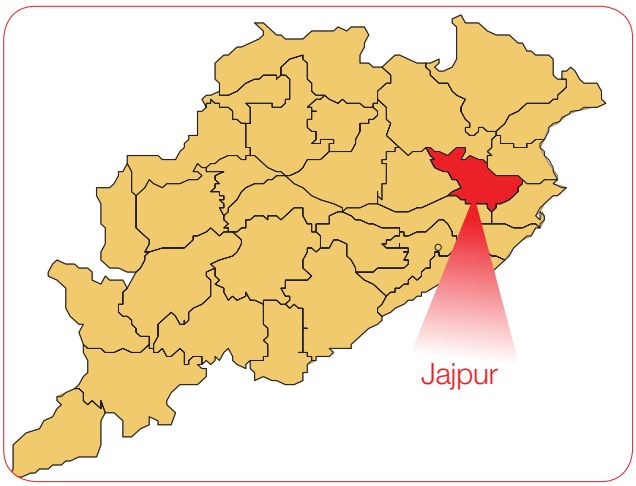
In March 2015, the State Government launched its first sand mining policy to make the key building material ingredients easier and cheaper. The new policy has abrogated mandatory provisions of furnishing mining plans and environment clearances. The State has also removed limitations that any miner should not have another mine within a radius of 10 kms.[15] Madhya Pradesh is the first state to launch its minor mineral policy, particularly for sand mining. The State has sand mines and is operated by district collectors and State mineral development corporates. Under new provisions 18 districts will be fully controlled and operated by the corporation while the collectors will operate in 31 districts.

Alirajpur is one among the district of Madhya Pradesh almost entirely hilly in character with several ranges of low hills covered with forest. There are small rivulets which are dry during the summer flowing through this district. The Narmada which forms the southern boundary of this district is the major river. Hatini River is flowing from north to south eventually join Narmada and the Sukkad River discharge itself into the Hatini River. Sukkad River is heavily mined for last few years. Narmada, Betwa, Son, Chamba and Nevaj are other rivers in Madhya Pradesh where illegal sand mining is done in a massive way.

Odisha

The State covers an area of 1, 55,707 sq. kms, which accounts 4.74 percent of the total land area of the country and geographically ranks 9th position among the Indian States. Odisha, situated in the heart of the Eastern Ghats, carries major rivers like the Mahanadi, Brahmani, Baitarani, Subarnarekha, Bamsadhara, Nagavali and Rusikulya. Almost 44.21 percent of the total land area in Odisha has been declared as Scheduled area.[16]

The Orissa Minor Mineral Concession Rules, 2004 has been regulating and controling the mining of



[13] http://phdcci.in/file/state%20profie_pdf/MadhyaPradesh-state%20profile%20Aug%202012.pdf

[14] http://mpnricentre.nic.in/minarals.htm

[15] Department of Public Affairs, Madhya Pradesh, Sand mining Policy 2015 approved, March 2015, http://m.mpinfo.org/MobApp/mobStory.aspx?StoryID=150303S1&CatId=2

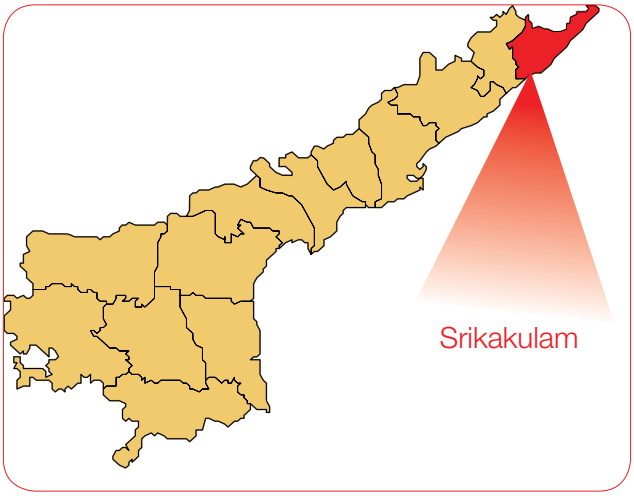
[16] Land alienation and its dimensions, Karunakar patnaik and Pramila Prava Patnaik, Institute of Social Science, Eastern Regional Branch, Bhubaneswar 2011

minor minerals. The *Tehsildars* are the competent authorities for the governance of mining of minerals like ordinary sand and other construction materials. In September 2014 the Odisha Minor Mineral Concession (Amendment) Rules 2014 came where the details about the lease of minor mineral were spelled out. In July 2015 the Rules again amended. The Odisha Government has also made rules to prevent illegal mining, called Orissa Minerals (Prevention of theft, smuggling and Illegal Mining and Regulation of Possession, Storage, Trading and Transportation) Rules 2007.

As per administration Jajpur district has got one sub division namely Jajpur. There are 10 *tehsils*, 10 blocks, 280 GPs, and 1,781 villages in the district. The Brahmani is a major seasonal river in Odisha state. The Brahmani is formed by the confluence of the Sankh and Koel Rivers, and flows through the districts of Sundargarh, Keonjhar, Dhenkanal, Cuttack and Jajpur. Together with the Rivers Mahanadi and Baitarani, it forms a large delta before emptying into the Bay of Bengal. Sand mining continues in many parts of Jajpur district despite the National Green Tribunal order in 2013 to curb such practices without proper environment clearance. Illegal sand mining is continuing on Bramhani River with the involvement of powerful local mafias.

Andhra Pradesh

Andhra Pradesh has an area of 1, 60, 00 sq km. The Eastern Ghats Mountains run the length of the state. East of the mountains lies the coastal plain; to the west of the mountains is the upland Telangana Plateau. Minerals form a major resource and contribute considerably to the economic growth of the State. Andhra Pradesh is renowned as the mineral store house of the south and established as a prime mineral producer in the country.[17]



The State Mineral Policy has been formed in 2013 and is an integration of National Mineral policy. The main aim of the State Mineral Policy is to serve as a guiding force to translate the State's mineral potential into reality with the objectives of eco-friendly and sustainable mining. The policy puts emphasis to frame a scheme for proper extraction of minor minerals addressing environmental concerns. The indiscriminate sand quarrying and soil for making earthen bricks are the prime concern in respect of environmental degradation, depletion of ground water and loss of biologically rich top soils. The policy again state that sand bearing areas of Godavari, Krishna, Penna and their immediate lower order streams are the main source of quarrying of sand in the State. In delta regions, the ground water exists in unconfined aquifer state; removal of sand has direct and immediate effect on ground water recharge regime.[18] The State introduced the Sand Policy -2012 to regulate the sand quarrying activity. Minor mineral resources are governed through Andhra Pradesh Minor Mineral Concession Rules, 1966 amended further in 1977.

Srikakulam district is one of the 13 districts of Andhra Pradesh. The headquarters of the district are located at Srikakulam. Srikakulam district has the longest coast line about 193 km in the State of Andhra Pradesh.

Major Rivers flowing through the district are Nagavali, Vamsadhara, Mahendratanaya, Champavati, Bahuda, Kumbhikota Gedda, Suvarnamukhi, Vegavati, Gomukhi. The Nagavali and Vamsadhara are two major rivers in Srikakulam district. Nagavali River rises in the eastern slopes of the Eastern Ghats near Lakhbahal in Niyamgiri Mountain, Kalahandi district of Odisha. Total length of the river is about 256 km, of which 161 km are in Odisha and the rest in Andhra Pradesh.

[17] http://nidm.gov.in/pdf/dp/Andhra.pdf

[18] Andhra Pradesh State Mineral Policy 2013

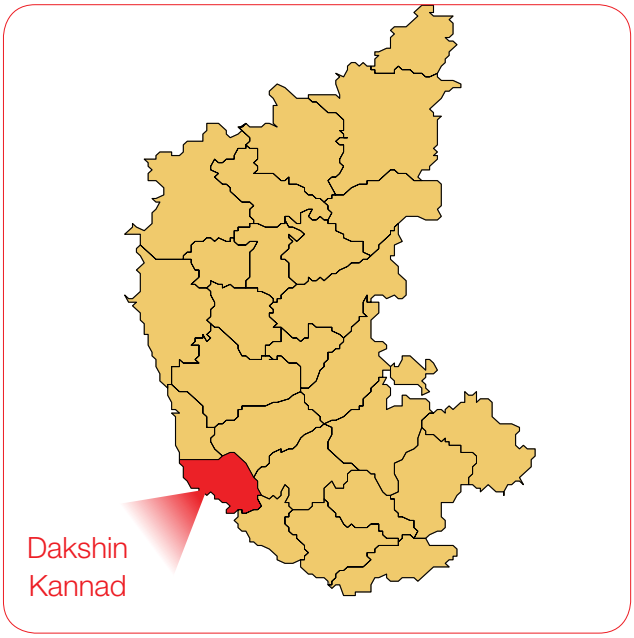
Illegal sand mining is rampant along the banks of Nagavali River despite claims of the authorities that they are taking all measures to stop this.

Karnataka

The State has a total land area of 1,91,791 sq.km, accounting for 5.83 percent of the total area of the country (32.88 lakh sq. km) and ranks 8th among major States in terms of size. Karnataka State has been divided into four Revenue divisions, 49 sub-divisions, 30 districts, 177 *talukas* for administrative purposes.[19]

Karnataka Mineral Policy 2008 has the major objectives like adoption of modern techniques in mining, transparency in granting mineral licenses and emphasis on value addition. Karnataka Minor Mineral Concession Rules (KMMCR), 1994 have been framed for preventing illegal mining, transportation and storage of minerals. In June 2014, the State prepared the Sand Policy.

Dakshina Kannada is a coastal district in the state of Karnataka, sheltered by the Western Ghats on the east and surrounded by the Arabian Sea on the west. It is bordered by Udupi District to the north, Chikkamagaluru district to the northeast, Hassan District to the east, Kodagu to the southeast, and Kasaragod district of Kerala to the south. Mangalore city is the district headquarters of Dakshina Kannada. There are seven river systems like Godavari, Krishna, Cauvery, North Pennar, South Pennar, Pallar, West flowing river systems in Karnataka which with their tributaries, drains the state. Netravathi is a part of west flowing river system, originating from Bellarayana Durga in the Dakshina Kannada and flow 300 kms in the State. This has its origins at Bangrabalige valley, Yelaneeru Ghat in Kudremukh in Chikkamagaluru district of Karnataka, India.



The Legislative Framework for Minerals

In the federal structure of India, the State Governments are the owners of minerals located within their respective boundaries. The Central Government is the owner of the minerals underlying the ocean within the territorial waters or the Exclusive Economic Zone of India.[20]

In this context, the entry at serial No. 23 of List II (State list) to the Constitution of India states, 'Regulation of mines and mineral development subject to the provisions of List I with respect to regulation and development under the control of the Union.'

The entry at serial No. 54 of List I (Central list) to the Constitution of India states, 'Regulation of mines and mineral development to the extent to which such regulation and development under the control of the Union is declared by Parliament by law to be expedient in the public interest.'

In pursuance to the entry at serial No. 54 of List I, the Central Government have framed legislation titled Mines & Minerals (Development and Regulation) (MMDR) Act, 1957 as Central Act No. 67 of 1957.

The Mines & Mineral (Development and Regulation) Act, (MMDR Act), 1957 is the law governing Mineral Sector (other than Petroleum and Natural Gas) of the Country. The Mineral Concession Rules, 1960 and the Mineral Conservation and Development Rules, 1988 are the Rules covering the sector.

The scheme of MMDR Act, 1957 recognises a substantial role for the State Governments. As

[19] http://nidm.gov.in/pdf/dp/Karnataka.pdf

[20] Annual Report 2014-2015 Ministry of mines Government of India, http://mines.nic.in/writereaddata/UploadFile/Annual%20Report%202014-15635699605386348293.pdf

per Section 15 of the MMDR Act, 1957 State Governments have complete powers for making rules for grant of concessions in respect of minor minerals; and levy and collection of royalty on minor minerals. Further, as per section 23C of MMDR Act, 1957, State Governments have complete powers to make rules for prevention of illegal mining and for purposes connected therewith. Therefore, matters relating to regulation of mining and control of illegal mining of minor minerals are all matters which lie in the domain of State Governments.

In exercise of powers under section 3 (e) of the MMDR Act, 1957, the Ministry notifies 'minor minerals'. The Ministry of Mines on 10 February 2015 notified 31 minerals as 'minor minerals'. The notification has been published in the Gazette of India vide S.O. 423(E) dated 10.2.2015. The total number of minerals notified as 'minor minerals' so far is 55.[21]

India, being the 7th largest country in the world, is well endowed with various mineral resources. Government of India has enacted amendments to Mines and Minerals (Development & Regulation) Act, 1957 (MMDR) in year 2015 and notified rules that would help in overcoming many challenges associated with the minerals and mining sector such as low level mineral exploration and exploitation, low technology deployment, fragmented and small concession areas. India is poised to witness great leaps of growth in minerals and mining sector with the adoption of transparent and non-discretionary grant of mineral concessions through an auction process.

National Mineral Policy, 2008

The National Mineral Policy (NMP) was notified in 2008. It recommends measures like assured right to next stage mineral concession, transferability of mineral concessions and transparency in allotment of concessions, in order to reduce delays which are seen as impediments to investment and technology flows in the mining sector in India. The Mineral Policy also seeks to develop a sustainable development framework for optimum utilisation of the country's natural mineral resources for the industrial growth in the country and at the same time improving the life of people living in the mining areas, which are generally located in the backward and tribal regions of the country. The Policy recognises that minerals are valuable natural resources being the vital raw material for infrastructure, capital goods and basic industries, and therefore development of the extraction and management of minerals has to be integrated into the overall strategy of the country's economic development.

Structure of Minerals and Mining Sector

The Ministry of Mines (MoM), Government of India is responsible for the entire minerals and mining sector in the country. This includes legislation, administration and policy formulation in respect of all mines and minerals other than coal and lignite, natural gas and petroleum, including offshore minerals. In India, the minerals are classified as minor minerals and major minerals. The power to frame policy and legislation relating to minor minerals is entirely delegated to the State Governments while policy and legislation relating to the major minerals is dealt by the MoM. All the mineral legislations in the country conform to the provisions of the MMDR Act, 1957. MoM through its attached office, Geological Survey of India (GSI) facilitates exploration, geological mapping and mineral resource assessment in the country. Indian Bureau of Mines (IBM), a subordinate office of the MoM is mainly responsible for regulation of mining in the country. Mineral concessions in India are granted to Indian nationals or entities incorporated in India only.

Mineral Related Legislations in India

India has written legal and constitutional framework to manage the mineral sector. National Mineral Policy provides the direction for mineral sector. Management of mining sector is the responsibility of the Central Government and the State Governments. The State Governments are the owners of minerals occurring onshore. The Constitution bestows power to the Parliament to enact legislation relating to the mining and the States are bound by the Central legislation. The Mines and Mineral (Development and Regulation) Act 1957 is the central legislation in force for regulation of mining operations. The MMDR Act enables all the State Governments to exercise their powers within a uniform national framework.

[21] Ibid 20

The State Governments, as owners of onshore minerals, grant mineral concessions and collect royalty, dead rent and fees.

Mineral Concession Rules (MCR), 1960

The MCR, 1960 defines the process of grant of mineral concessions as per the provisions of Section 13 of the MMDR Act, 1957. The rules lay down the process and timelines for grant of concessions, disposal and refusal of applications and the basic conduct of accounts, registers and information reports.

Mineral Conservation & Development Rules (MCDR), 1988

The MCDR, 1988 prescribes guidelines for the conservation and development of minerals as per the provisions of Section 18 of the MMDR Act, 1957. The rules prescribe procedures for carrying out prospecting and mining operations and the general requirements relating to preparation of mining and prospecting plans and filing of notices and returns. The rules also cover guidelines for protection of the environment.

Mineral Administration and Regulation

Each State Government takes care of all the mineral administration related matters (such as grant of concessions, collection of royalties and payments) within the state offices distributed over entire state.

Indian Bureau of Mines (IBM)

Indian Bureau of Mines, a subordinate office of the Ministry of Mines is mainly responsible for regulation of mining in the country. It carries out inspection of mines, approves mining plans and mine closure plans and conducts environmental studies to minimise environmental impact due to mining. Besides being a regulator, it also maintains a repository of information related to minerals and mining activity in the country and all the mines are required to file mandatory returns with IBM. It also prepares mineral maps, mineral resource and reserve inventory and publishes technical and statistical information relating to the minerals and mining activity in the country.

Directorate of Geology and Mining

The Directorate of Geology & Mining is based in every state a multi-disciplinary organisation under the State Government to explore the mineral resources by geological mapping, drilling and sampling for the estimation of reserves in assessing minor minerals. They are engaged in promotion of conservation and scientific development of mineral resources and mineral based industries in the state.

Environment Clearance System

The protection of natural environment is one of the fundamental duties of every citizen under Article 51-A of the Constitution of India. Article 48-A of the Constitution, obliged the State to endeavour to protect and improve the environment and to safeguard the forests and wild life of the country. The Environment (Protection) Act and Rules, 1986 were enacted and came into force on 19th November, 1986. The object of this Act is to provide protection and improvement of environment and for matters connected therewith. Under provisions of the Act and Rules of 1986, MoEFCC has issued various Notifications regulating the mining of minor minerals, specifically stating the procedures that were required to comply by persons intending to carry on such mining activity and for the authorities to regulate the same.

Prior to 1994, there was no specific regime in place in relation to mining activity being carried out. The Notification issued by MoEF on 27th January, 1994, in exercise of the powers vested in it under Sub-Rule 3 of Rule 5 of the Rules of 1986 and Sub Section (1) and Clause (v) of Sub-Section (2) of Section 3 of the Act of 1986, prescribed the requirement and procedure for seeking Environmental Clearance for the projects listed in Schedule I. Schedule I of this Notification did not list mining projects of minor minerals. On the contrary, the projects covered under S. No. 20 of Schedule I of this Notification were only “mining projects (major mineral) with leases more than 5 hectares”. The mining of minerals (both major and minor) were brought under the ambit of EIA Notification, 2006. The mine lease area of more than equal to 50 ha was Category ‘A’ and mine lease area less than 50 ha and more than equal to 5 ha was category ‘B’ project. Mine lease area of less than 5 ha (both major and minor) was kept out of EIA Notification purview.

Report of the Committee on Sand Mining

A Committee headed by the Secretary MoEF was set up in 2010[22] to observe the impact of sand mining and prepare a report. The Committee observed that in many States the area of sand mining permit is not specified in the Rules. The Committee recommended that the minimum size of mine lease should be 5 ha. Further, preparation of comprehensive mine plan for contiguous stretches of mineral deposits by the respective State Governments may also be encouraged. The Committee felt the need to bring uniformity in the period of lease. It was recommended that a minimum period of mine lease should be five years, so that eco-friendly scientific and sustainable mining practices are adopted. Most of the State Governments have not made it mandatory for preparation of mining plan in respect of minor minerals and it is essential to prepare and approve the mining plan. There is a need to create a separate corpus, which may be utilised for reclamation and rehabilitation of mined out areas. The Committee again felt that an ideal situation would require that quarrying should be restricted to unsaturated zone only above the phreatic[23] water table and should not intersect the groundwater table at any point of time. In relation to the river-bed sand mining the Committee recommended that in the case of mining leases, specific river stretches should be identified and mining permits/lease should be granted stretch wise, so that the requisite safeguard measures are duly implemented and are effectively monitored by the respective Regulatory Authorities. The depth of mining may be restricted to 3m/water level, whichever is less. For carrying out mining in proximity to any bridge and/or embankment, appropriate safety zone should be worked out on case to case basis, taking into account the structural parameters, location aspects and flow rate. No mining should be carried out in the safety zone.

Sustainable Sand Mining Guideline by MoEF

In recent years, rapid development has led to an increased demand for sand as a source of construction material. This has resulted in mushrooming of river sand mining activities, which have given rise to various problems like river bank erosion, river bed degradation, deterioration of river water quality and drying up of rivers. Over-mining is jeopardising the health of rivers and the environment. The Ministry of Environment Forest & Climate Change Government of India has prepared a guideline[24] for sustainable sand mining from river beds in September 2015. Recommendations for management of sustainable sand extraction are the key objective of the guidelines. The guidelines provides criteria for sustainable sand mining in-stream and off-channel extraction. Also, sediment transport in rivers as an important factor determining sand replenishment rate and impacts of river sand mining.

The guidelines have been prepared as it had been observed that uncontrolled sand mining is not sustainable and there is a need to protect the environment and the right to life of people. Compliance of laws, rules and regulations are mandatory and not voluntary so everybody should follow the laws relating to sand mining. Self regulative system by miners is essential but when it is not possible, then monitoring majors with penal provisions should be implemented. The main objective of this guideline is to ensure sand mining is done in environmentally sustainable and socially responsible manner. It attempts to ensure conservation of river equilibrium and protection of bed and bank erosion. It also mandates no obstruction to the river flow, riparian rights and in-stream habitats. Again it planned to streamline the process of grant of EC for sustainable mining. The guideline precisely dealt with the effect of sand mining and the approach towards sustainable sand mining. The guiding principle of this guideline is that the river/natural resources must be utilised for the benefit of the present and future generation, so river resources should prudently managed and developed. This guideline set the process to identify the area for prohibition of sand mining, scientific and systematic way of mining, measures to protect the river bank, protection of environment and ecology, conservation of minerals and to implement safeguards to check illegal mining. The guidelines

[22] D.O. No Z-I1012/3/2oo9-IA.II (M) dated June 1st, 2010, http://www. moef. nic. in/sites/default/files/Sand% 20Mining%20Guideline%20 28.08.2015.pdf

[23] Under ground water in the zone of saturation

[24] Sustainable sand mining management guideline, Ministry of Environment Forest & Climate Change Government of India, September 2015

stated about survey of mining at district level and formation of a Sub-Divisional Committee to visit all areas to make recommendations. The preparation of management plan and measures to reduce consumption of sand also formed part of this guideline. The guidelines also stated about the customary right of native people to take silt, sand, soil and those customary rights need to be protected and respected. Finally the guidelines put some standard condition for sand mining which talked about stakeholder engagement, sustainable mining practice, pollution management, protection of infrastructures, management of erosion, health and safety, post mining reclamation, mineral conservation and monitoring impact of mining.

Supreme Court on Sand Mining

The Supreme Court, vide its order dated 27.2.2012 in I.A. No.12-13 of 2011 in SLP (C) No.19628-19629 of 2009 titled Deepak Kumar etc V/s State of Haryana & Ors has inter alia ordered "We, in the meanwhile, order that leases of minor mineral including their renewal for an area of less than five hectares be granted by the States/Union Territories only after getting environmental clearance from the MoEF."

Hon'ble Apex Court in Deepak Kumar's case extensively examined the environmental concerns, in the context of mining of minor minerals, considering its impact on the environment. The Apex Court observed that Extraction of alluvial material from within or near a streambed has a direct impact on the stream's physical habitat characteristics. These characteristics include bed elevation, substrate composition and stability, in-stream roughness elements, depth, velocity, turbidity, sediment transport, stream discharge and temperature. Altering these habitat characteristics can have deleterious impacts on both in-stream biota and the associated riparian habitat. The demand for sand continues to increase day by day as building and construction of new infrastructures and expansion of existing ones is continuous thereby placing immense pressure on the supply of the sand resource and hence mining activities are going on legally and illegally without any restrictions. Lack of proper planning and sand management cause disturbance of marine ecosystem and also upset the ability of natural marine processes to replenish the sand. Quarrying, mining and removal of sand from in-stream and upstream of several rivers, which may have serious environmental impact on ephemeral, seasonal and perennial rivers and river beds and sand extraction may have an adverse effect on bio-diversity as well. Further it may also lead to bed degradation and sedimentation having a negative effect on aquatic life.

The Court observed that without conducting any study on the possible environmental impact on/in the river beds and else- where the auction notices have been issued. Again it observed that "We are of the considered view that when we are faced with a situation where extraction of alluvial material within or near a river bed has an impact on the rivers physical habitat characteristics, like river stability, flood risk, environmental degradation, loss of habitat, decline in biodiversity, it is not an answer to say that the extraction is in blocks of less than 5 hectares, separated by 1 kilo metre, because their collective impact may be significant, hence the necessity of a proper environmental assessment plan".

National Green Tribunal on Sand Mining

NGT has been taking serious view of the menace of illegal river sand mining in different parts of the country. It may be noted that a large number of small river sand mine leases of area less than 5 ha are difficult to monitor and difficult to plan for sustainable mining and typically have serious cumulative environmental impact.

National Green Tribunal on August 5, 2013 issued direction[25] to 'restrain any person, company, authority to carry out any mining activity or removal of sand, from river beds anywhere in the country without obtaining environmental Clearance from MoEF/SEIAA and license from the competent authorities.' 'All the Deputy Commissioners, Superintendent of Police and Mining Authorities of all the respective States are directed to ensure compliance of these directions.'

The Tribunal heard in depth the Application filed by the National Green Tribunal Bar Association in case of National Green Tribunal Bar Association

[25] http://www.ercindia.org/files/ngt/Sand%20Mining%20Order%20171-2013(OA)_5Aug2013.pdf

Vs. Ministry of Environment & Forests & Ors (OA No. 171 of 2013). The Association raised the issue of 'large scale illegal and impermissible mining activity is continuing on the bank of Yamuna, Ganga, Chambal, Gaumti and Revati amongst others. This removal of minerals from the river beds is causing serious threat to the flow of the river, forests upon river bank and most seriously to the environment of these areas.'

It was highlighted that majority of persons carrying out the mining activity of removing mineral from the river bed had no license to extract sand, they also had not obtained clearance from MoEF/SEIAA at any stage in terms of the Environment (Protection) Act, 1986 as well as Air (Prevention and Control of Pollution) Act, 1981 and Water (Prevention and Control of Pollution) Act, 1974.

The Tribunal reiterated the Order passed by the Supreme Court of India in the case of Deepak Kumar Vs. State of Haryana which clearly stated that sand mining on either side of the rivers, upstream and in-stream, is one of the causes for environmental degradation and also a threat to the biodiversity. It had also ordered that mining activity even in less than 5 ha is to obtain Environment Clearance for MoEF/SEIAA.

Decentralisation of EC for Sustainable Sand Mining

The Ministry of Environment and Forests and Climate Change in January 2016[26] had announced that the process of granting Environmental Clearance for sustainable sand mining and mining of minor minerals has been decentralised. The Ministry has created District Environment Impact Assessment Authority (DEIAA) for proper monitoring of sand mining. The Central Government has notified amendment to EIA Notification 2006 on 15th January 2016 where the Environment Clearance (EC) power is being delegated to District Level Committee headed by District Collector. The EC should be granted by the District Level Environment Impact Assessment Authority (DEIAA). There is also plan to form a District Level Expert Appraisal Committee (DEAC) to support in the clearance process and to prepare District Survey Report. Some customary use of sand has been exempted from environment clearance process.

Sand Mine Governance in Gujarat

The Minor Minerals Concession Rules have been amended in the State, however without any proper regulations for sand mining. As per the amended rule the mining cannot take place without permission from State Pollution Control Board and without prior environment clearance. The new rules prohibit sand mining below the water level in a river bed or in other water bodies. The Government has also fixed the timings and as per the new rules, mining activities can be carried out between 6 am to 6 pm. The lease holder is now required to place an environment management plan while bidding for the mining lease. The natural course of water cannot be interrupted. Under the new guidelines, it is also made clear that mining in the river bed could go up to 3 metres deep in the river bed and lease holders will not be able to mine sand in 500 metre area of the irrigation projects and bridges. Lease holders will not be able to mine sand in 10 metres area from the bank of the river and will be punished if they are found to be mining more quantity of sand than specified. During the last two years, allotment was being made through auctions which were largely on-line. Mechanism to grant Environmental Clearance (EC) has now been set up. There is ban on inter-state movement of sand and permission is needed in the State even for stocking sand. It was planned that 95 percent of sand royalty would go to village Panchayat.

Sand Mine Governance in Madhya Pradesh

The Sand Mining Policy[27] of Madhya Pradesh focuses on identifying "more sand mining areas" to ensure it is available at reasonable rates even as illegal sand mining has become hot potato in the state after the death of a constable last week. The authorities in the state are at present working on the modalities for the implementation of the new policy. Under the new policy, sand will become the first mineral to be e-auctioned. Under the new policy, the provision that no other sand mine to be sanctioned within 10 km of the mines to the Madhya Pradesh Mining Corporation

[26] Press Information Bureau, Government of India, Ministry of Environment and Forests, Decentralization of Environment clearance for sustainable sand mining and mining of minor minerals introduces, Javadekar, 21-01-2016.

[27] http://www.hindustantimes.com/bhopal/new-policy-to-identify-more-sand-mining-areas-in-madhya-pradesh/story-6g3mqcbbSOl4S0NbgFBQmJ.html

has been abolished. Besides, rural people will be able to obtain sand from mines for free. The Mining Policy envisages that Madhya Pradesh State Mining Corporation will undertake sand mining in all the *tehsils* of 18 districts where it is undertaking mining in 53 *tehsils* at present. In remaining 33 districts, collectors will auction sand mines through e-auction. Similarly, the corporation will give contracts through e-auction from mining *patta* sanctioned to it for sand mining. The policy is meant for declaring maximum areas as sand mines while making environmental clearance mandatory for environmental balance so that maximum quantity of sand can be mined. This will make more sand available at affordable rates in open market and the Government will also get more revenue.[28] Minor Mineral Concession Rules have been amended by the State Government in the light of the judgment of the Supreme Court in Deepak Kumar case. State Government has filed SLP in the Supreme Court against NGT orders which banned mining in the State. It has been planned that 100 percent royalty from minor minerals would go to Panchayat.

Sand Mine Governance in Karnataka

In June 2014 the State prepared the Sand Policy that provides for levying of Rs. 10 on cubic metre sand sold to revive the environment damaged by it. It also allows levying Rs. 20 as an administrative fee at district levels. This corpus is planned to be used for reviving the environment in the sand mining areas as per Supreme Court order, National Green Tribunal and guidelines of the central government on Mineral Rules of 1994. The policy envisaged setting up sand monitoring committees at district and *taluk* levels to monitor illegal sand mining which is rampant in parts of the state. PWD has been authorised to carry out sand mining. District and *taluk* Sand Mining Committees are being constituted. It is planned to sell sand at the rates fixed by District Committee. Mining leases are generally granted for five years. However, if lessee establishes plant for manufacturing sand, the lease is granted for a period of 20 years. 25 percent of royally collected will be shared with the concerned Gram Panchayat.

Sand Mine Governance in Odisha

In exercise of the powers conferred by sub-section (1) of Section 15 of the Mines and Minerals (Development and Regulation) Act, 1957 (67 of 1957), the Odisha Government makes the Odisha Minor Minerals Concession (Amendment) Rules, 2014. After the direction from the Supreme Court the State Government amended the Rule and in Section 27 the period of lease was fixed for five years. Mining Plan was fixed as a pre-requisite to the grant of quarry lease. It was also stipulated that no quarry lease for minor minerals shall be granted without the approval of the Competent Authority as prescribed in EIA Notification 2006. For river bed sand mining it was planned that specific river stretches would be identified and mining lease would be granted stretch wise. The depth of the mining would be restricted to three metres or water level, whichever is less. Competent Authority in consultation with the local official not below the rank of Assistant Engineer of Water Resources Department would work out appropriate safety zone taking into account the structural parameters, location aspects and flow rate for carrying out mining in proximity to any bridge or embankment.

Odisha also has amended its Panchayat Act in December 1997. However, practically, the State Government has not transferred the power as per the provision of the central Act, 1996. The PESA Act devolved power to the local self government. But it is to be noted that the Odisha State Act does not give any power to Gram Sabha on matters relating to minor minerals, instead it has entrusted all these power to Zilla Parisad, which is not required to consult Gram Sabha while exercising all these power.

Sand Mine Governance in Andhra Pradesh

The High Court of Andhra Pradesh[29] suspended sand quarrying in the State in the existing sand reaches as well as new reaches for not protecting Environment and River beds. Then the State Government brought the requisite amendment in the Rules and adopted a Sand Policy - 2012 to

[28] http://m.mpinfo.org/MobApp/mobStory.aspx?StoryID=150303S1&CatId=2

[29] High Court of Andhra Pradesh, W.P.No.18822/2011 by interim orders, dated 21-03-2012, final order dated 26-04-2012

regulate the sand quarrying activity and matters connected therewith. Again the State announced its Sand Mining Policy in 2014 where Andhra Pradesh Mineral Development Corporation would be given all sand reaches and would prepare a feasibility report to get Environment Clearance. This policy has been implemented w.e.f. 1st Nov. 2014. The policy has been ensuring that Women Self-Help Groups would be excavating the sand. The policy allows only manual labour and bullocks to mine sand in riverbeds. Bullock carts, mules and other animals would be exempted from any mining tax. The changes are in line with the Andhra Pradesh Water, Land and Tree Act, 2002, which aims to promote tree cover and regulate the exploitation and use of ground and surface water. Revenue from sand has been transferred from Panchayats to the mines and geology department.

Problems still Continuing

The principles laid down by Supreme Court in its judgement[30] on the 2G spectrum and coal blocks allocation case apply equally to minor minerals. In this case the Apex Court observes that "The public trust doctrine enjoins upon the Government to protect the resources for the enjoyment of the general public rather than to permit their use for private ownership or commercial purposes. This doctrine puts an implicit embargo on the right of the State to transfer public properties to private party if such transfer affects public interest, mandates affirmative State action for effective management of natural resources and empowers the citizens to question ineffective management thereof."

Though the Supreme Court of India and the National Green Tribunal has cleared their view on illegal sand mining and reiterate their concerns in their orders, still the illegal sand mining are continuing. The National Green Tribunal again directed[31] all State Governments to ensure that there is no sand mining on the river beds being carried without prior environment clearance. The bench directed that all the State Governments

[30] Writ Petition (Civil) No. 423 OF 2010, Centre for Public Interest Litigation and others versus Union of India and others with Writ Petition (Civil) No. 10 OF 2011, Dr. Subramanian Swamy versus Union of India and others, February 2, 2012

[31] RELA & Anr. Vs. State of Andhra Pradesh & Ors. M. A. No. 19 of 2016 in Original Application No. 516 of 2015, Order Dated 7th January 2016

shall ensure that there is no illegal, unauthorised and mechanised mining on river beds contrary to/ without environmental clearance and the consent of the pollution control boards.

Killing for Sand and Plundering of Sand Continues

In June 2011, Swami Nigamananda Saraswati died after a four month fast in protest of sand mining on the banks of Ganga. His death is a warning that reckless sand mining is a threat to the River Ganga and the people whose lives and livelihoods are fuelled by it and they will face serious consequences. This warning is not only for Ganga but for all rivers in India and people who are living with it. However, the big question still asked is whether there is any solution for this threat? Have a concrete steps been taken by the States or Centre to stop these illegalities? The answer is a big 'no' and the plundering of sand still continues.

Removing sand and gravel from the bank of the Ganga in the Kumbh area started in 1970, when the Government of then undivided Uttar Pradesh notified five mining areas. Matri Sadan Ashram in Haridwar is adjacent to the mining area. Enraged by the harm caused to the Ganga, the Ashram started its agitation against mining. It launched its first protest in March 1998, in the midst of the Kumbh Mela. Nigamanand, along with his associates, staged an indefinite fast demanding a ban on mining and crushing activities in the region. The Government ordered a halt to all mining activities, but allowed it to resume soon after the festival was over and Nigamananda continued his protest. In December 2009, a two member committee of the Union Environment Ministry visited the site on the complaints of environmental activists. It found that mining was happening without any lease from the Government or environment clearance from the Centre. But the Ministry did not take any action against the errant miners. Aggrieved by the order, Nigamanad started his fast unto death. The district administration forcefully picked him up from his Ashram on April 27th 2011 and admitted him to the Haridwar district hospital. On May 2nd, the ascetic went into coma and the administration shifted him to a hospital in Dehradun where he breathed his last on June 13th 2011. Just a few days before Swami Nigamanand died while on a fast to protest State sponsored sand mining and stone crushing along the Ganga near Haridwar, the Uttarakhand Government ordered a ban on mining activities in the region considered sacred.[32] However, it is very clear that mining in Ganga has not really stopped.

Illegal sand mining in India is something continued with a hand to globe relationship of mafias and law implementers, but it has been brought under the scanner after a civil servant named Durga Shakti Nagpal who was suspended from her post in 2013. Durga Shakti was punished for her efforts to clamp down on the illegal practices of sand mining in Uttar Pradesh. She was suspended as the Sub-Divisional Magistrate of Gautam Buddh Nagar on July 27th for ordering the demolition of a mosque being built illegally on the government land in Greater Noida on the outskirts of Delhi - an act that may have led to communal disharmony in the area, the State Government claimed. However, it is a fact that the State Government took the action following her crackdown on the politically-connected sand mining mafia in the area. The area near Gautam Buddha University in Uttar Pradesh is known as the haven for illegal sand miners in River Yamuna. The mafias empowered by corrupted political leaders always threatened people and continued illegal sand mining. Threat and killing is not new in these places. An activist protesting illegal sand mining in Noida, Mangeram, was shot dead on 2013 by sand mafia.[33] The Government officials either shot dead or attempted to do that in the last few years. Durga Shakti has fearlessly taken action against the mafia and seized many dumpers carrying illegally mined sand belonging to powerful politicians who backed the mining mafia. Mining is still going on discreetly.

From Uttar Pradesh to Karnataka and Maharashtra to Bihar, the mining of sand in violation of environmental laws and Supreme Court directives has continued unabated, largely because of a

[32] A swami and sand mafia, Down to Earth, Kumar Sambhav Shrivastava, July 2011

[33] IAS officer was punished for taking on SP leaders involved in sand mining, Soma Basu, Down To Earth, July 2013

construction boom across the country. The death of IAS officer D.K. Ravihas again focused attention on the widespread illegal practice of mining sand from river beds and the threat posed by the entrenched sand mafia to upright officials who take them on. The killing of young Indian Police Service officer Narendra Kumar in Madhya Pradesh in March 2012 pointed to the deep-rooted politician-mafia nexus in illegal mining activity.[34]

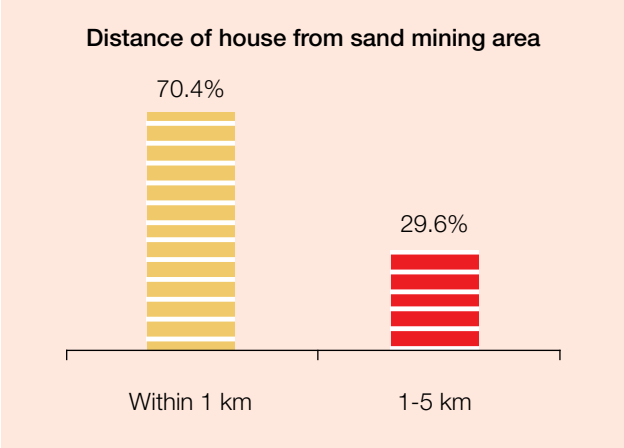
Illegal sand mining is rampant all over the country and mostly in nexus with government officials, police administration and politicians. However, when some officials tried to bust illegal mining activities, they faced stiff opposition from people involved in illegal mining. There have been cases of physical assaults during raids. India's Supreme Court warned that sand mining is undermining bridges and disrupting ecosystems all over the country, killing wildlife in the process. Regulations, however, are not rigorous enough, nor enforced to prevent its occurrence. Battles between sand mafias have reportedly killed hundreds of people in the past few years, a death toll which includes the likes of police officers and government officials. The scale on which sand is required, means it is extremely difficult to control or prevent illegal mining.

Various other attacks have taken place in numerous different States as the sand mafia conducts its illegal activities through a nexus between politicians, administration and sand miners. Often, the politicians themselves own the businesses and control large areas where illegal sand mining takes place; they do not hesitate to attack and even murder any public spirited individual who interferes with their nefarious activities. Even Government and police officials are afraid to curtail such activities.

[34] Sand mining racket fears none and profits everywhere, Rezaul H Laskar, Hindustan Times, New Delhi, March 2015

Study Findings

Sand mining is not a new phenomenon but an old practice since the time it has been used for various purposes including construction. People used to collect sand within a limit to meet their requirements without posing any threat to environment. But now river ecology, our environment and anything that depends on the river are under threat due to massive illegal mining. The study has captured diverse opinions from different people on different aspects of sand mining during data collection and interaction with people. Following findings have emerged after consolidation of data and opinions.

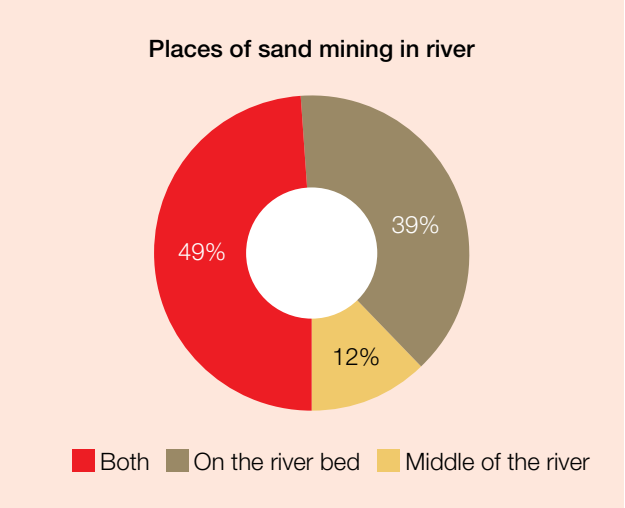


Distance of Sand Mining from Habitation

Distance of sand mining from human habitation matters a lot because of mining related activities like heavy rush of vehicles, noise pollution, water pollution and other similar problems. The nearest distance varies from less than one km to 1.5 km. More than 70 percent respondents said they are living within one kilometre of the sand mining area and little less than 30 percent respondents are living within 1 to 5 kilometre distance from mining operation. It implies that more than 70 percent people living close to sand mining areas are facing the consequences of mining activities. Human habitation is taken as a favourable option for using local roads for transportation and engaging local cheap labour in mining sand day and night. Local people's difficulties are totally ignored by the mine holders who are mostly private and profit making players. Children and women are largely affected because of close distance.

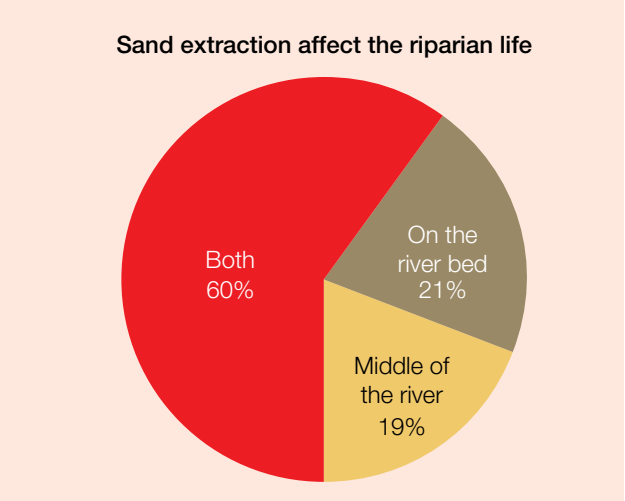
Places of Sand Mining in River

Sand extraction takes place from different places of river where sand is deposited during the course of water flow. The study found that 48.8 percent mining of sand takes place from both middle of the river and river beds. However, 12.6 percent sand mining takes place from only middle of the river and 38.6 percent sand is extracted from river beds. Taking out sand from the middle of the river is more difficult than river bed sand extraction. In study areas of Karnataka, people use local boats to carry sand from the middle of Netravathi River with water flowing to the river bed. In case there is less water flow for a boat to run or no water flow in the river, people use other forms of transport like tractors to carry sand.



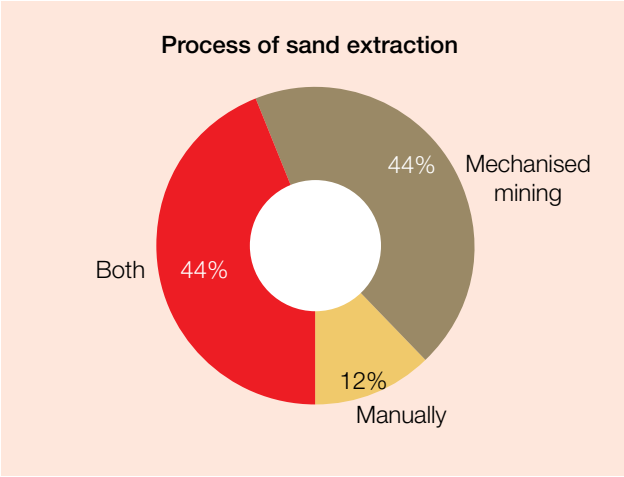
Sand Extraction Location Affects Local Communities

Sand extraction takes place from various locations of the river. Choice of locations depends on sand availability and convenience for transportation without taking care of its affects on river ecology or nearby human habitation. Sand mining affects the riparian community whatever may be location. But degree of impact varies from place to place. The study explores that 21 percent riparian are affected by river bed sand mining, 18.8 percent are affected by mining from middle of the river and 60.2 percent people are affected by mining from both places. Whatever may be the location, sand mines affects the community.



Process of Sand Extraction

Sand mining is done using different methods. In some places people have observed use of machines and tools to extract sand while in some places it is manual. The present study reveals that 44 percent sand mining happens using only mechanised tools and equipments, 12 percent sand mining happens only manually and 44 percent mining use both mechanical and manual methods. People use tractors, trucks and trolleys to carry sand from the river. But loading takes place manually in almost all places. In case of mining from Netravathi river of Karnataka, people use mechanised boats to collect sand from water flow areas to river bed where they unload and reload to a truck manually. It involves lot of manual labour work. At present people use mechanised loaders to load sand to a truck or tractor in many places.



Methods of Sand Transportation

People observed use of different modes for transportation of sand from mines to destination points. It was discussed with people in all study locations and found that 78.2 percent respondents observed trucks are used mostly for transportation, 20.8 percent said tractors and only one percent

expressed that cart is used for transportation of sand. Now a days there are no use of donkeys or horses for transportation of sand anywhere. In case of Gujarat, 100 percent transporters use trucks while in MP it accounts for only 10 percent. It is observed that in most of the study areas on an average 500 to 600 load of trucks get transported in a day.

Methods of sand transportation				
States	**Trucks**	**Tractors**	**Cart**	**Donkey/Horse**
AP	84	13	3	0
MP	10	90	0	0
Odisha	98	1	1	0
Karnataka	99	0	1	0
Gujarat	100	0	0	0
Total	391	104	5	0
Overall (%)	78.2	20.8	1	0

Duration of Sand Mining

Demand for sand extraction depends on increase in construction activities. The more the construction, the more the demand for sand increases. Construction activities differ in different seasons. It is more in the summer and winter than in rainy season. But in reality, demand for sand is increasing throughout the year now a days. Hence sand mining happens throughout the year in most of the places. The study reveals that 53.8 percent people observe sand mining happening throughout the year and only 0.4 percent respondents observe mining happening less than two months in a year. 38.2 percent observe more than eight months of sand mining in a year while 7.4 percent observe six months of mining and only 0.2 percent observe sand mining happens four months in a year. This indicates that sand mining is happening the whole year in most cases.

Duration of sand mining in a year					
States	**2 months**	**4 months**	**6 months**	**8 months**	**Whole year**
AP	2	0	6	22	70
MP	0	1	0	0	99
Odisha	0	0	0	100	0
Karnataka	0	0	31	69	0
Gujarat	0	0	0	0	100
Total	2	1	37	191	269
Overall (%)	0.4	0.2	7.4	38.2	53.8

Timing of Sand Mining

The study intends to find out seasonality of sand mining in all study areas. Of the total respondents, 40.8 percent observed that sand mining happens in all seasons. Sand extraction happens both in summer and winter as observed by 35.6 percent respondents. Only 0.6 percent observed that sand mining happens in winter, 1.2 percent observed mining happens in rainy season and in case of 21.8 percent respondents, sand mining happens in summer. The finding indicates that sand mining happens in all seasons when there is flow of water in the river. People generally observed less sand extraction in rainy season with flooded river and more in summer season when there is either no or less water flow in the river.

Timing of sand mining					
States	**Summer**	**Rainy**	**Winter**	**Both summer and winter**	**All season**
AP	87	6	0	2	5
MP	0	0	0	0	100
Odisha	0	0	0	100	0
Karnataka	22	0	2	76	0
Gujarat	0	0	1	0	99
Total	109	6	3	178	204
Overall (%)	21.8	1.2	0.6	35.6	40.8

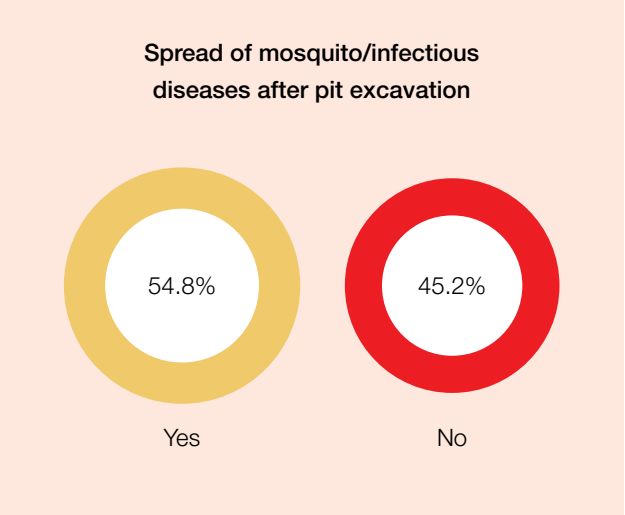
Impact of Sand Mining

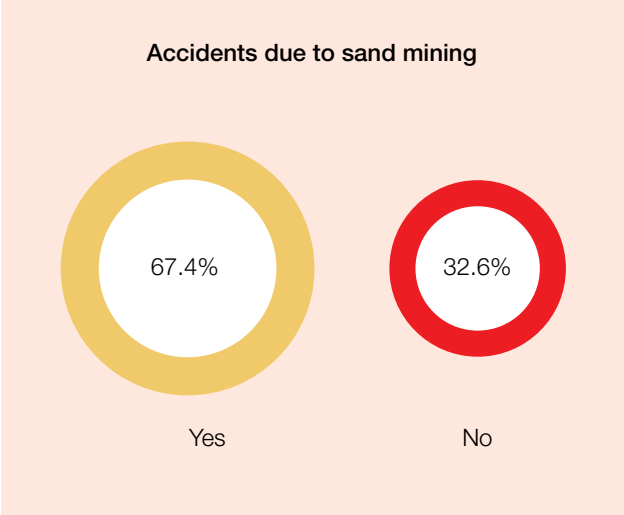
Spread of mosquito and infectious diseases due to sand mining

Sand mining has various impacts on local people especially on health and spread of diseases. Pits of different sizes are created with stagnant water due to sand mining on river beds. Those pits become breeding ground for mosquitoes and other elements of communicable diseases. People experience spread of infectious diseases in sand mining localities. Almost 54.8 percent people agreed that they had experienced spread of diseases like malaria after massive sand extraction. The rest (45.2%) people said no to this question related to spread of diseases. However, the impact on health is there when massive sand mining happens in any particular area. There has not been any study on impact of sand mining on health in the country specifically.

Accidents due to sand mining

Transportation of sand from river bed to different places through roads inside village and human habitation creates problems and causes accidents for the people. Heavy trucks and tractors run to carry sand. Local people particularly children face accidents due to this traffic. Pit excavation also creates accident for the people. Most people (67.4%) expressed that they had observed accidents of different magnitudes after increase in sand transportation from their area. This was highest in Gujarat (89%) and lowest (45%) in Andhra Pradesh. The rest (32%) of the overall study area expressed that there was no accident caused. However, accident occurs in sand mining areas and poor people face the difficulties. Since alternative roads for sand transportation were not made any where in the study area, there was heavy load on local roads. Again local roads are not built to bear the burden of heavy truck loads and are

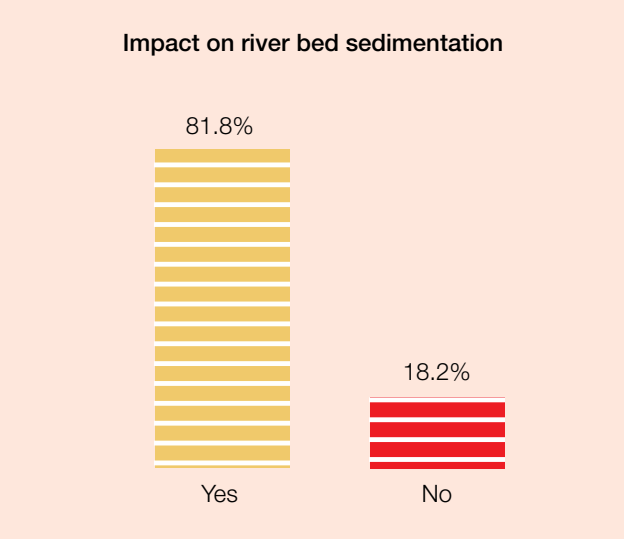




damaged after few days. Local Government does not pay any attention to this problem. There is no restoration or reclamation of pits in post mining phase. As a result abandoned pits cause problem for people and their livestock.

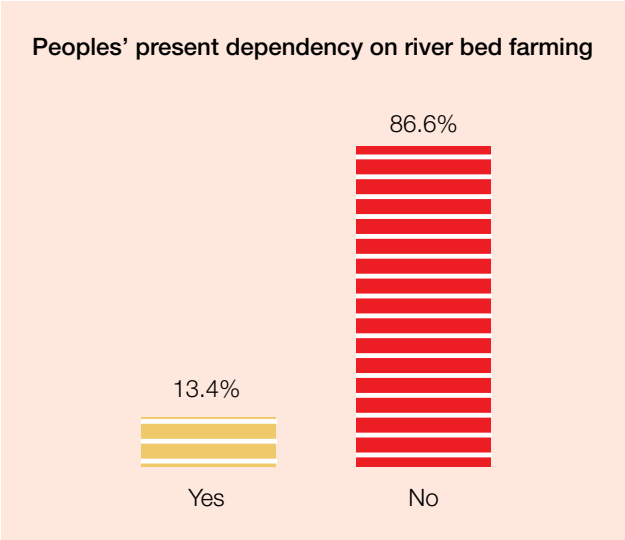
Impact on river bed sedimentation

Increase of sand mining has different effect on river beds. It affects natural process of fertile soil sedimentation on river beds which increases crop production after flooding. People have observed this over the years in different study locations. More than 80 percent (81.8%) people expressed that they experience changes in deposit of sediments on river beds and less than twenty percent (18.2%) have not experienced any changes. In terms of states more people (91%) in Gujarat have had experienced changes while people (69%) in AP have had a similar experience. It also affects the natural process of sand sedimentation on river beds and changes the course of river flow as observed by the people in different places.



Peoples' present dependency on river bed farming

People living close to rivers are associated with it in various forms. Apart from the most essential livelihood dependency, people use the river, its water, fertile soil it carries and aquatic species available from the river for their day to day life. River bed cropping is an age old practice for the river dependent communities. They cultivate different crops including vegetable, fruits and oil seeds in large varieties. But this practice has been reduced due to massive sand mining activities on river beds. More people (86.6%) currently said no



to their dependency on river bed cropping while only 13.4 percent people said that they depend on river bed cropping. It indicates that agriculture on river bed is decreasing and other activities are increasing due to sand mining.

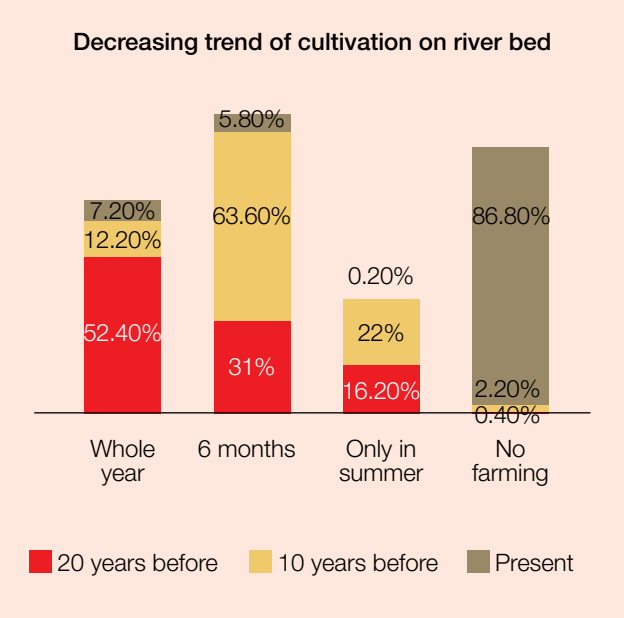
Decreasing Trend of Cultivation on River Bed

The study investigates the trend in agriculture practice on river beds in different seasons in a year since the last 20 years. Affected communities experienced a shift in pattern of agriculture practice. More than 50 percent (52.4%) people said agriculture on river beds was practiced the whole year before 20 years, 31 percent people said it was for six months and 0.4 percent people expressed that there was no agriculture practice on river beds before 20 years. It is a fact that river bed soil is fertile for agriculture and every year people get a bumper harvest after a good flood. They cultivate seasonal vegetable, fruits and oil seeds on river beds for consumption as well as for sale in local market. This study shows that before 20 years more people were doing this practice almost in every study location.

There is tremendous shift in river bed cultivation before 20 and 10 years. Only 12 percent people have experienced whole year cultivation before 10 years against 52.4 percent before twenty years. Highest percentage of people (63.6%) expressed that river bed cultivation was happening only for six months, 22 percent people said it was only in summer season and 2.2 percent said there was no cultivation on the river bed before ten years. This shift in agriculture practice has happened due to

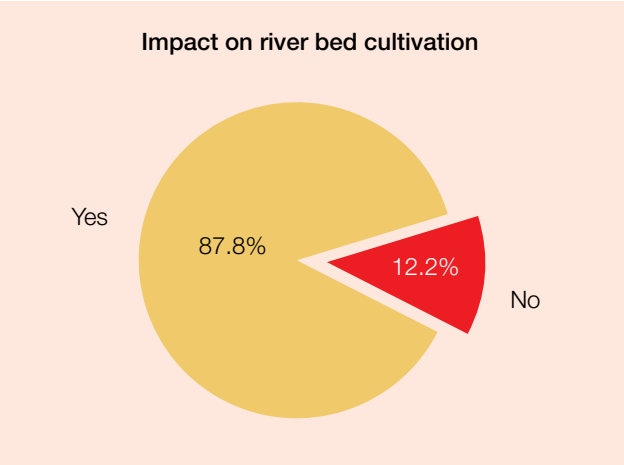
encroachment of river beds by sand miners and degradation of cultivable land due to sand mining. The decreasing trend in practice of agriculture on river beds has other ramifications on food availability and food security of local people. People say that they are not getting adequate food items since sand mining activities is increasing in the area.

The study reveals a complete reverse pattern of river bed agriculture practice presently. More than 86 percent of affected communities expressed that there is no farming at present on river beds, 7.2 percent whole year, 5.8 percent six months and 0.2 percent agriculture only in summer season.



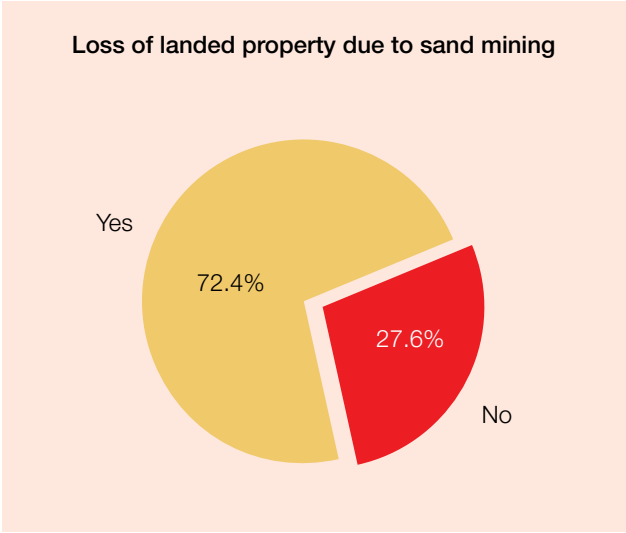
Impact on River bed Cultivation

It has been noted that 87.8 percent people said 'yes' and 12.2 percent said 'no', the river bed agriculture is being affected due to sand mining activities. Sand extraction involves lot of activities which disturb local economy, agriculture and environment. Starting from running heavy vehicles to construction of roads and pits, everything disturbs agriculture in local area. There is no regulation or compensation for this loss.



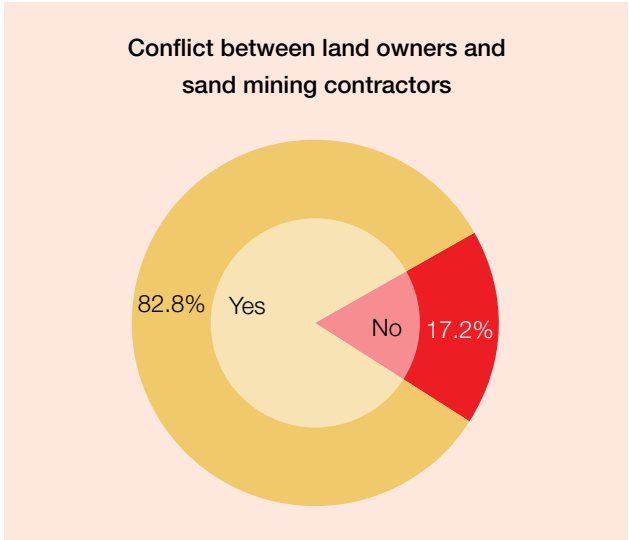
Loss of Landed Property due to Sand Mining

People have lost their agriculture, land, trees and other natural resources including commons due to sand mining. More than 70 percent (72.4%) people from study locations said there has been loss of landed property due to sand mines and 27.6 percent experienced no loss of landed property.



Conflict Between Land Owners and Sand Mining Contractors

Any external intervention in any locality leads to conflict between local and outsiders if there is



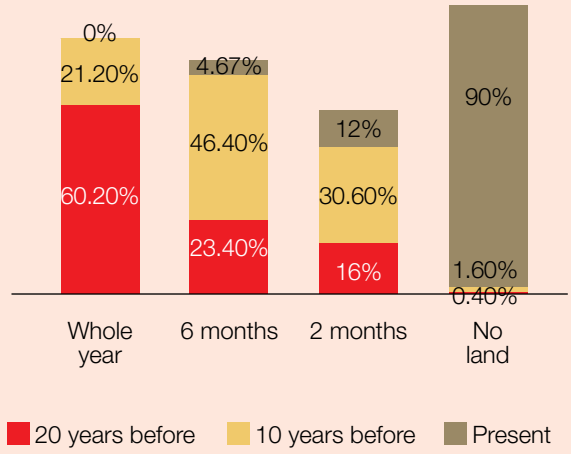
no consent of local affected people or there is no sharing of benefit. This is true in case of sand mining areas also. More than 80 percent people in sand mining locality have experienced conflict with mining contractors while rest (17.2%) face no conflicting situation. The conflict happens due to various reasons. It may be related to land, vehicle accident, labour related or loss of agriculture. The general observation is that local people are ignored in any matter related to sand mining. This leads to discontent among people.

Decreasing trend of Grazing Land in Sand Mining Area

River beds are best grazing land for domestic animals. The moisture and fertile land help to grow variety of grass and other herbs. This permanent pasture land is considered as commons to be utilised for grazing and other common activities. Before 20 years, when there was no massive sand mining or related external activities, river bed was used exclusively for grazing for whole year. But with pressure mounting on these lands, grazing period has been reduced. Study reveals that 60 percent people observe whole year of grazing while 16 percent people expressed grazing period was two months in a year before 20 years. 23.4 percent people in the study area feel grazing period was for six months before 20 years. Moreover river bed was used mostly for grazing before 20 years as many people expressed.

Availability of grazing land before 10 years in comparison to before 20 years was discussed in the study. The study reveals that only 21.2 percent people observed grazing land was available for whole year, 46.4 percent observed availability for six months while 30.6 percent feel it was for a period of two months before 10 years. Only 1.6 percent respondents felt there was no land for grazing on river bed before 10 years. It has clearly come out from this study that grazing land on river beds has reduced drastically between last 10 to 20 years adversely impacting cattle and other grazing animals.

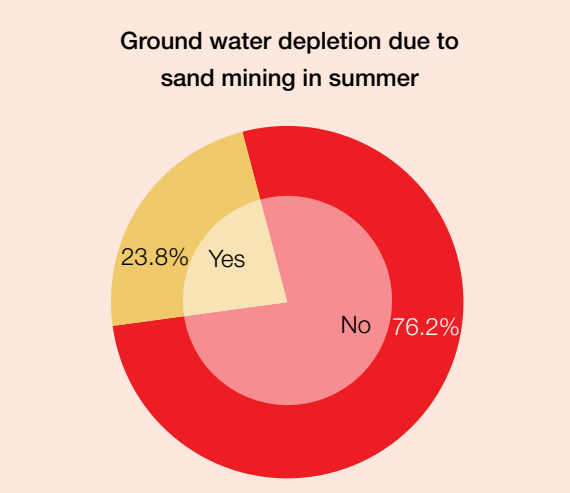
Currently the river bed commons is no more used for grazing for a whole year. More than 90 percent people said there is no land available on river beds for grazing currently, while only 4.67 percent people observed land available for grazing for six months. The study findings concluded that river



bed is not available for the cattle and other grazing animals at present but is used for sand mining and other related activities. This is happening because of absence of commons use policy in the country or states. As a result animals are becoming victims of such activities.

Ground Water Depletion due to Sand Mining in Summer

Sand mining not only affects agriculture or grazing, it affects ground water availability as well. Sand on river bed has different functions. One of these functions is to retain and recharge ground water. As a result ground water level increases helping water availability at higher level on river beds and nearest open wells. But due to over extraction of sand from river bed, it stops this important function and affects ground water, particularly in summer. The study found that 23.8 percent people said they are getting sufficient water during

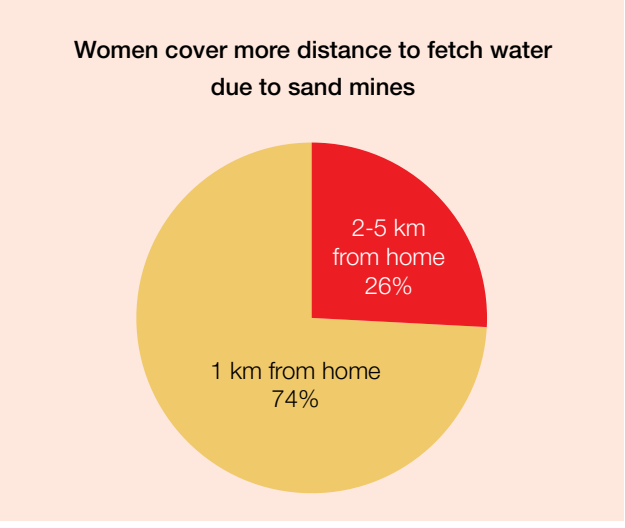


summer and more people (76.2%) said they are not getting sufficient water during summer. Sand mining has many negative impacts on the river bed and this is one of the important findings of this study. Water scarcity mostly affects the poor and vulnerable including women as they bear the burden of fetching water for domestic use.

Women Cover more Distance to Fetch Water due to Sand Mines

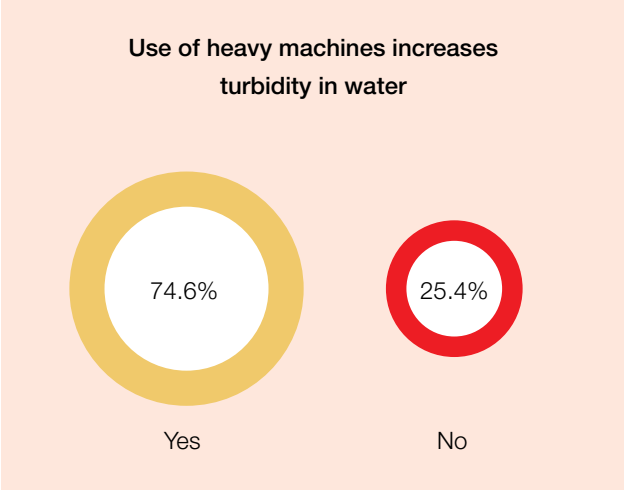
One of the direct and glaring impacts of sand mines is increase of distance from habitation to place of water in the river particularly in summer. Women use river water for many purposes like washing, bathing, cleaning and even for drinking and cooking. They depend on river for all their needs. But due to sand mining and particularly in summer, water flow reduces to a thin line at the middle or on one side of the river. This increases the distance to access water from river. The present study tries to identify how much distance women have to cover to fetch water due to mining activities. Of the total respondents 74 percent people have to walk up to one km and 26 percent people said they have to walk up to two to five km to get water. Communities affected by sand mining always bear the difficulties of getting distance access to water. It was a practice that women dig small pits (*chua*) on the river bed to collect water for domestic use. But with increasing sand mining activities, this practice is no longer observed.

Women in particular face the difficulties of accessing water because they go to water sources more times than men for various purposes. Sand mines not only create distance to water but pollute nearby water sources for the people as many people observed. However some people expressed that they have shifted their dependency from river water to pipe water supply due to non availability of river water for any purpose.



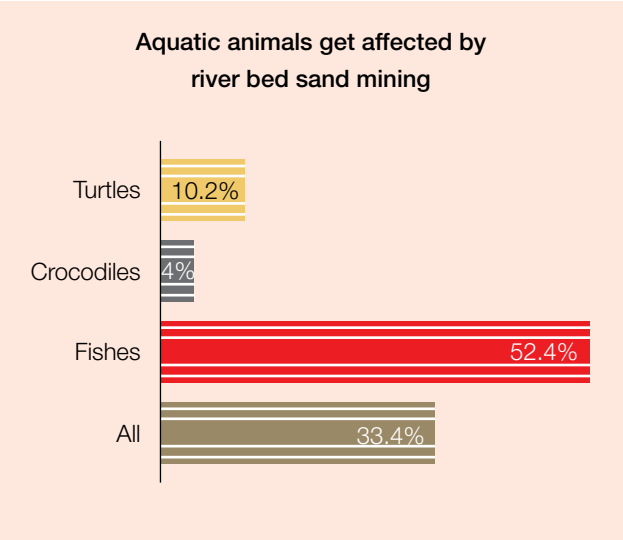
Use of Heavy Machines Increases Turbidity in Water

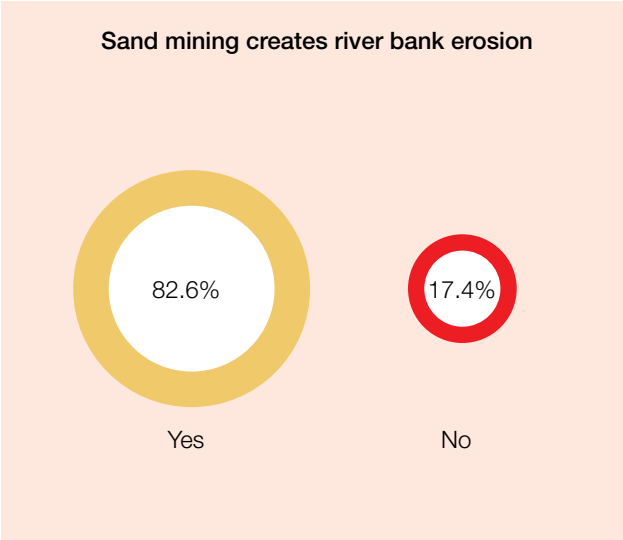
The present study on sand mines covers various aspects of its impact including impact on ecology. Ecology covers water availability, water quality, aquatic species, pollution and related problems occurring due to external activities. Turbidity in water indicates the level of water pollution due to various pollutants. In case of sand mines, they use different kinds of heavy machines to lift, load and unload sand in heavy trucks and tractors. All those machines discharge pollutants to water sources and pollute water for nearby area as well as in the downstream. The study found that more people (74.6%) observe turbidity in water and 25.4 percent people observe no turbidity in water due to heavy machines used for sand mine activities. It is a fact that water gets polluted when any external activities occur around its sources or streams. The same happens in case of sand mines and use of heavy vehicles for lifting and loading of sand. Even in some rivers, people use machine boats using diesel or petrol as fuel which create turbidity in water. But there is no regulation and control over this problem by any authority. People have strong feeling that there should be adequate regulation to control turbidity in water due to sand mines.



Aquatic Animals get Affected by River Bed Sand Mining

River has different environmental and ecological role and functions. Apart from carrying water,





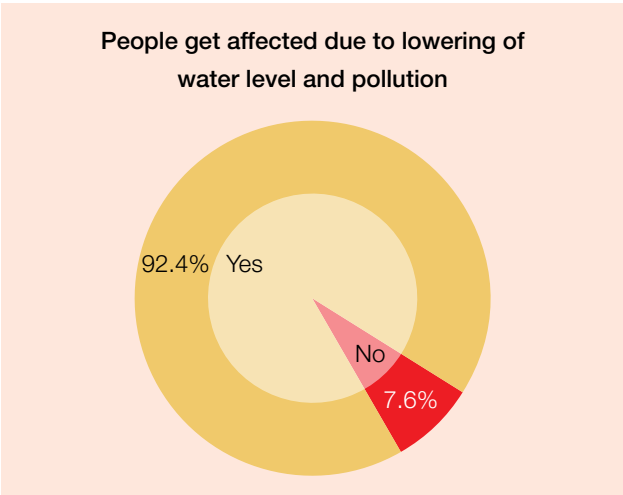
it contributes to sedimentation, functions as a source for many aquatic species including fish, crabs and prawns and creates new land due to change in river course. River follow natural cycle to regulate all its functions and help aquatic animals sustain with required environment. Although people realise all these ecological functions, they do not bother about sustaining the river and destroy river and dependent species. The present study tries to identify the kind of aquatic animals that get affected due to sand mining. It found that intensity of fish (52.4%) being affected by sand mines is more than any other species followed by turtle (10.2%). Fish is commonly found in river water everywhere. The least affected is crocodile (4%) as observed by people. It is clear that sand mining is a threat not only to the river but also to all aquatic species depending on the river. It needs special attention to protect these animals from such activities before they get extinct.

Sand Mining Creates River Bank Erosion

River bank erosion is a common problem during floods in rainy season. But its impact is very high. It washes out crops, houses and land from the bank and sometimes creates new land on either side. In the process, river changes its course which is a natural process. But sand mines contribute to river bank erosion more than any other natural process. The study found 82.6 percent people said 'yes' and rest (17.4%) said 'no' to river bank erosion due to sand mines. More people observes erosion due to sand mines which is a fact. River bank erosion due to external activities like sand mines is dangerous to river eco system and ecology. More than anything, illegal sand mines need to be regulated in terms of allocation of places for mining after looking into its possible impact.

People get Affected due to Lowering of Water Level and Pollution

Over extraction of sand from river cause lowering of water level and water pollution. Both these effects are hazardous for people living on the river bank. There might be slow or immediate impact which relates properly. But many people experience visible impact in terms of pollution or change in water flow. The flow may reduce or change its course due to sand mining. The study found that more than ninety percent (92.4%) respondents from the study area were affected and only 7.6 percent were not being affected because of lowered water level and pollution. In terms of state findings, highest numbers of people (98%) from Gujarat were affected followed by lowest (78%) of Andhra Pradesh. However, there is impact and river dependent communities are affected due to

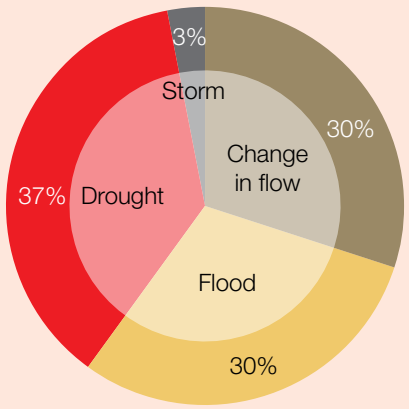


sand mining and its related activities. But there is no policy or system to address the impact as experienced by many people.

People Observe Extreme Events due to Sand Mining

River has extreme reactions if treated with anything excess. It may be sand mines, may be dams or any activity that creates changes in its natural flow. Many people living beside the river experience extreme events from time to time. Flood, drought, erosion, change in flow are some of the extreme events people normally experience in different seasons. These are mostly related to rainfall or regulation of water flow through dams and barrages. Sand mining in the river also causes extreme events. People have different experiences about this. The study found that except for a storm which only 3 percent people observed, other extreme events like flood, drought and changes in river flow are happening equally. 37 percent people observed drought as a regular event due to sand mining, 30 percent people observed that they are facing flood and change in flow of river. These extreme events are the result of maximum excavation of sand from river as experienced by the people.

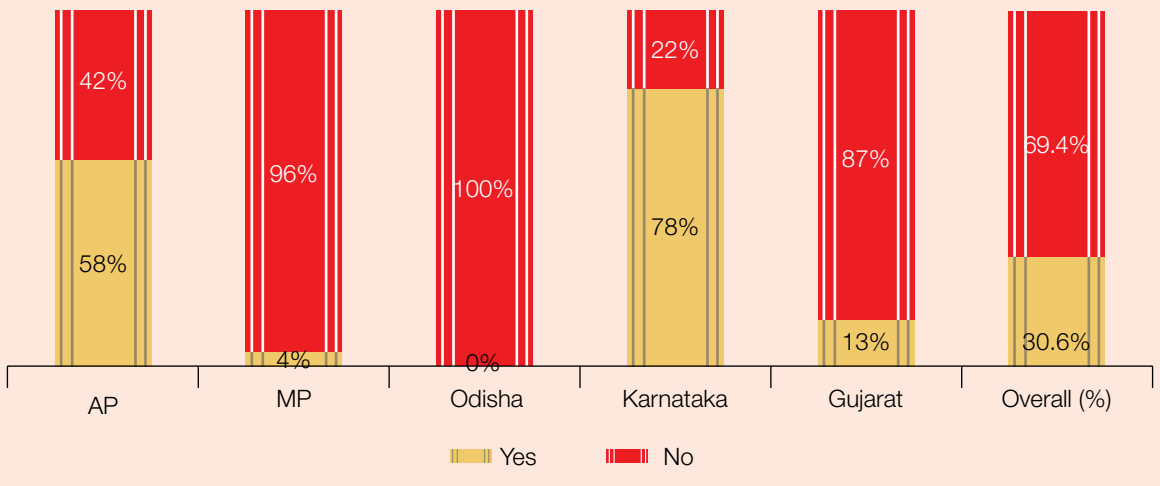
Extreme events due to sand mining



Level of Awareness among People on Sand Mining Management

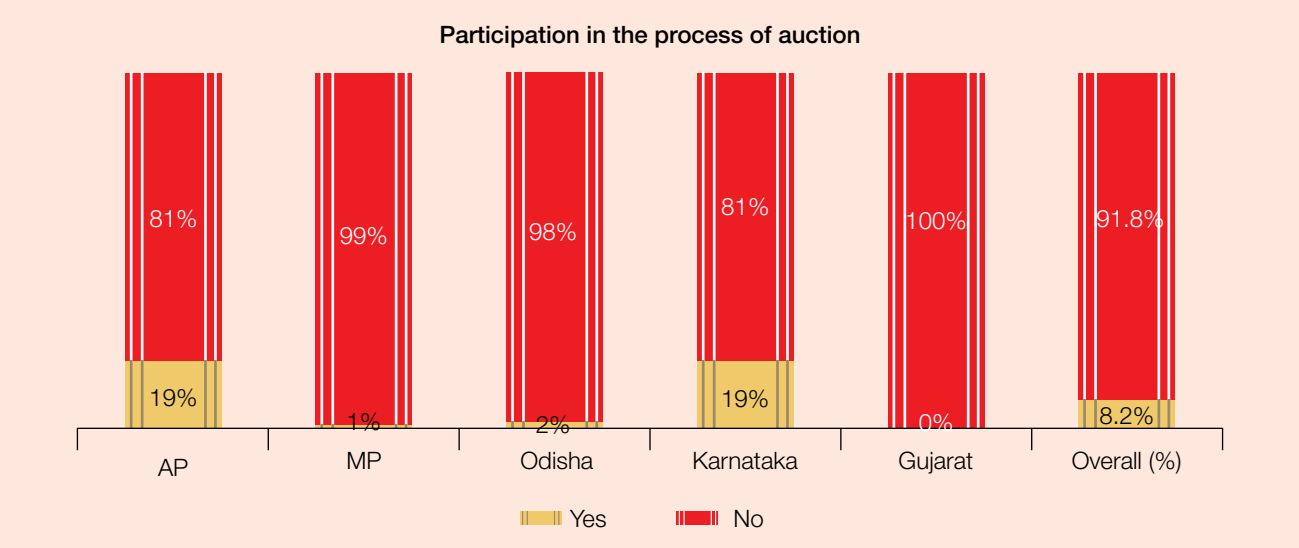
Sand mining involves lot of processes to lease out for local Government as well as people. As a minor mineral it follows rules for auction, lease and revenue system. All these are established as per law but people who are affected by sand mining are not aware of many things related to sand mining management. The study found that around seventy percent (69.4%) people are not aware of any process while only thirty percent people expressed that they are aware of lease and auction process of sand mining. As regards to state wise findings of awareness levels, 100 percent people in Odisha are not aware of any rule followed by 96 percent in Madhya Pradesh, 87 percent in Gujarat, 42 percent in AP and lowest 22 percent in Karnataka. Data indicates either there is no effort from local governance system to make people aware about sand mining rule or people have not shown interest to know the processes. However, there is a strong need to create awareness among people and involve them in management of sand mining in every location.

Awareness about sand mining management
(Lease, auction, process, rules)



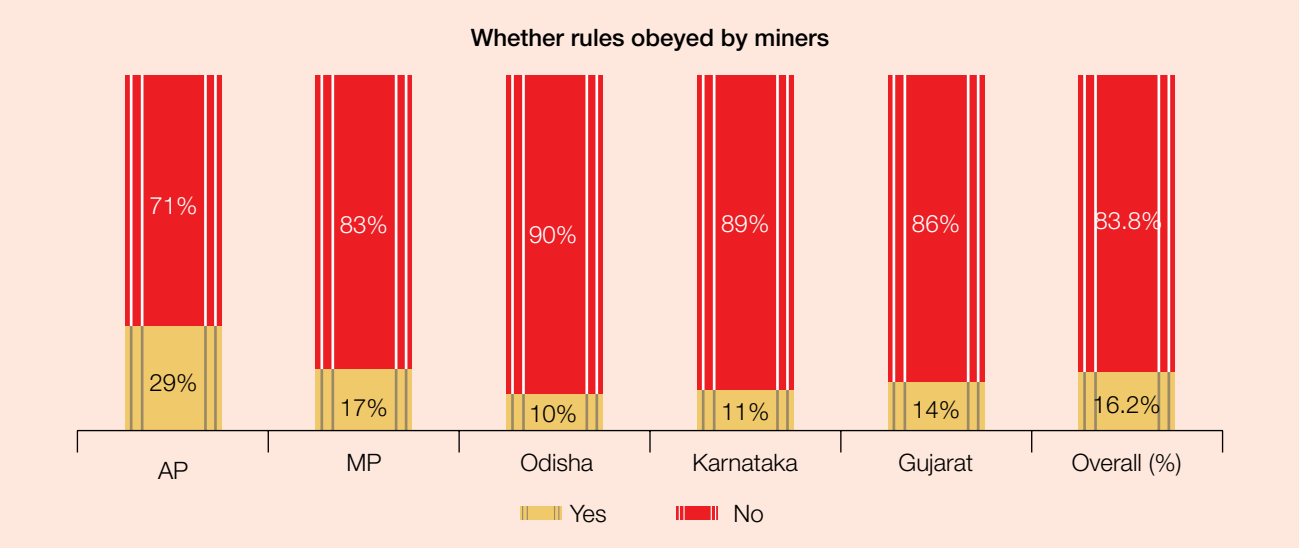
Extent of People's Participation in Sand Mining Management

People will participate in any governance system including sand mine management, when they get all information on time and when they are aware of different incidents happening around them. People are deliberately denied data and information by vested interest groups to avoid their participation. The same thing happens in case of sand mining. Study found that more than ninety percent (91.8%) people do not participate and only a little over eight percent (8.2%) participate in sand mining auction process. Maximum percentage of people who do not participate are from MP (99%) followed by Odisha (98%) and (81%) each from AP and Karnataka. This is a matter of concern for the policy makers to note that without people's participation, it is difficult to manage sand excavation and its possible impact on local people.



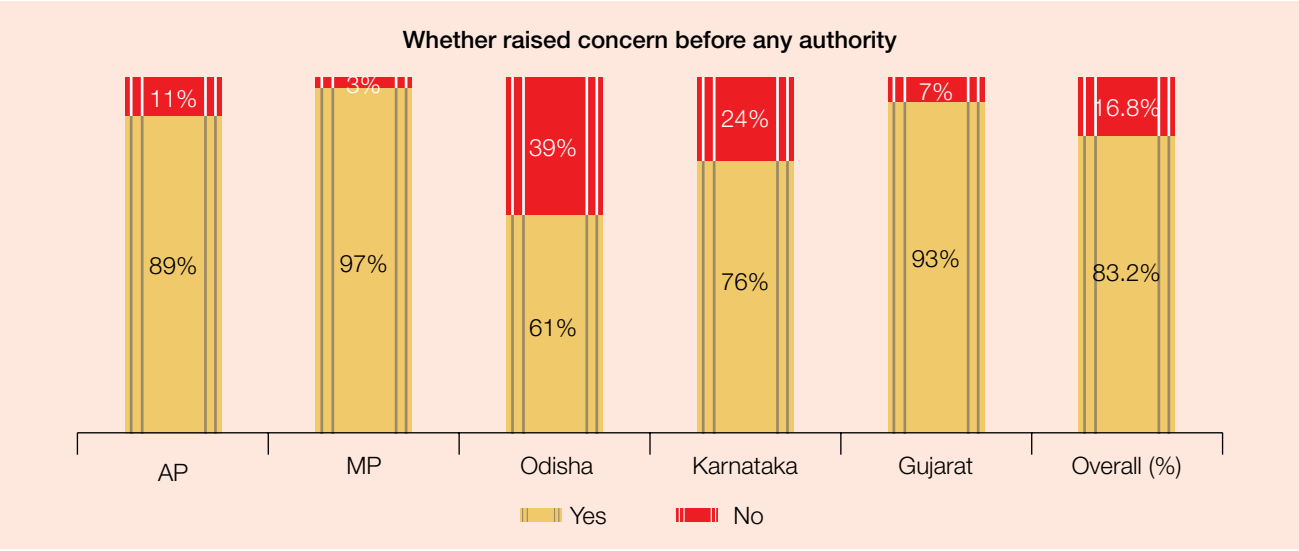
Extent of Sand Mining Rule Followed

It is expected that people who take responsibility in any governance system, follow rules and regulations irrespective of whether people are aware of those. They are the people who know laws and legislations related to any work they have taken up. But it never happens practically. In case of sand mining, the study found 83.8 percent people expressed that the miners never follow any rules in any sand mining locations and only (16.2%) people said yes to this question. Going by state wise data, more than seventy percent people in all four states expressed that miners do not follow any rule while doing sand mining activities. Almost all people said they are not aware of any authority that is responsible to inspect if rules are being followed in sand mining work.



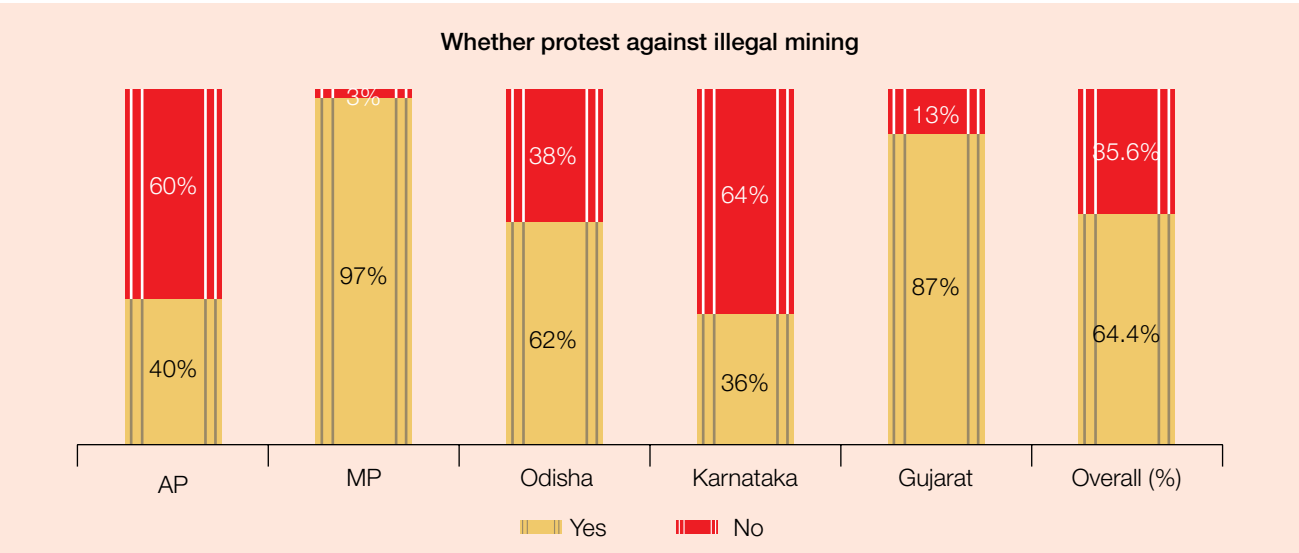
People Raise Concern before Respective Authority

Starting from revenue to pollution control board, there are many officials involved and responsible for sand mining auction and management. But nobody is accountable to people who are ultimately affected by sand mining activities. The general practice among people is to raise their concern before revenue officers at different level starting from *Tehsildar* to District Collector if anything happens to them. People in many study locations have raised their voice before responsible authorities. More than 80 percent people said they have raised their concern while only 16 percent people expressed that they not taken their concerns before any authority. It indicates that people have raised their voice but they are not being heard and no action is being taken in support of their voice. Strong grievance redressal system is needed to be set up at different levels to address the problems people face.



People Protest Against Illegal Mining

Apart from raising their voice against illegal sand mining, people have protested in different forms at different locations. Maximum protest is in MP (97%) followed by Gujarat (87%), Odisha (62%), AP (40%) and Karnataka 36 percent as per study findings. Overall study findings indicate that (64.4%) people have protested against illegal sand mining and 35 percent people have not expressed any protest. Moreover it is clear that there is protest from affected people but that is not being heard or taken up to a level where it can change national policy on sand mining. There is a need for collective approach to address people's protest which may lead to change in policy.



Positive Side of Sand Mining

The study tries to look into the positive side of sand mining if there is any and get people's reactions to this. Possible positive sides like income enhancement, profit to local groups, prevention of river bed rising were discussed and put in the questionnaire. The option for 'no profit' was also included in the schedule. It was found that more than seventy percent (72.2%) people said there is no profit for local people from sand mining while 14 percent people agreed that it prevented raising river bed, seven percent said it gives some profit to local self help groups and five percent people get income enhancement from sand mining activities. As a whole if one calculates loss and profit of sand mining, local people do not gain anything out of sand mining activities but bear the burden of loss and damage due to sand excavation. If sand mining is taken as profitable work, local people need to be given due share of the profit.

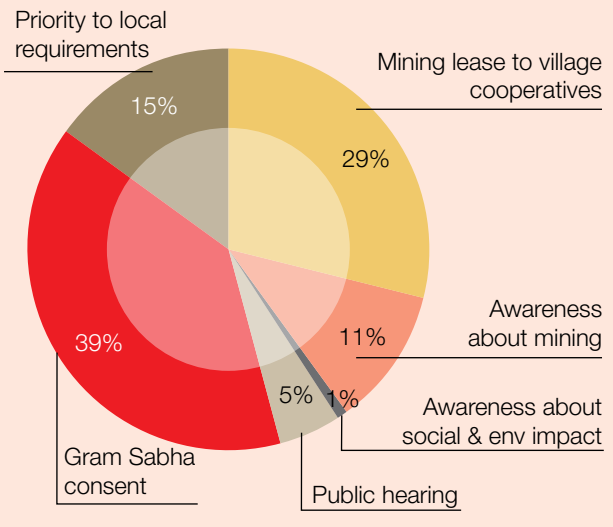
Positive side of sand mining				
States	**Income as labour**	**Profit to SHG**	**Prevention of River bed rising**	**No Profit**
AP	1	38	2	59
MP	10	0	0	90
Odisha	7	0	3	90
Karnataka	4	0	46	50
Gujarat	5	0	23	72
Total	27	38	74	361
Overall (%)	5.4	7.6	14.8	72.2

People's Participation

One of the most important aspects of this study was to know people's perception regarding their participation in sand mining governance process. Six different possible options regarding people's participation were given to the respondents to prioritise their opinions. The options were a) local community should be made aware about the area where there is planning for mining, b) people should be made aware about the social and environmental impact, c) public hearing on the impacts and management plan should be held in the mining area, d) prior and informed consent should be taken from Gram Sabha before giving lease, e) local communities requirements should be fulfilled in priority basis, f) cooperatives with members from the Gram Sabha should be prioritised for mining lease.

It was found that 39 percent people identified 'consent of Gram Sabha' as first priority for any kind of sand mining by local Government, 29 percent people priorities 'sand mining through village cooperatives', 15 percent people stated their priority that before leasing out mining area to others local community requirements should be given priority and then as per the availability rest area may be given to miners. The level of awareness and knowledge among people about processes and impact of mining seems to be very less. Hence only 11 percent people think that there is a need to make people aware about every aspect of sand mining as their priority for any kind of sand mining, five percent people give their priority to the need of public hearing before giving

Ranking for peoples' participation in sand mining governance system

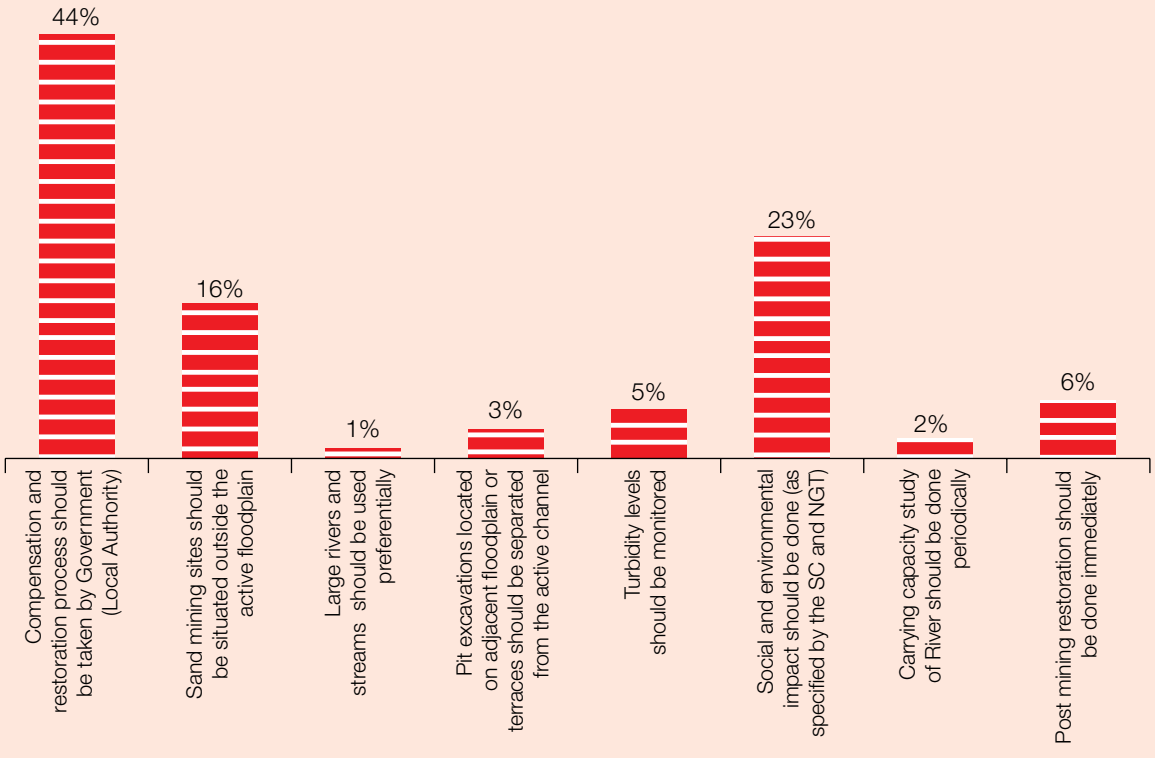


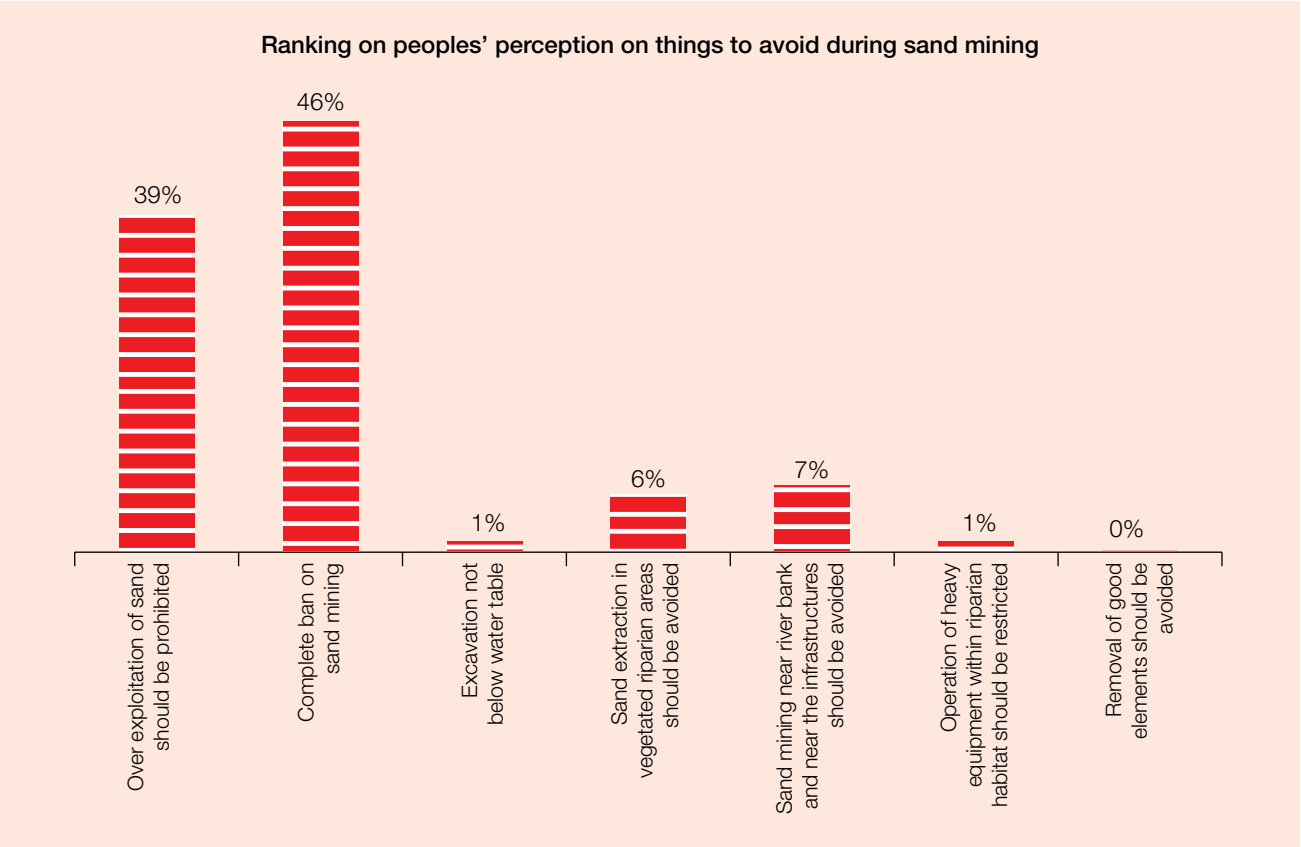
mining lease to any miners so that people will able to participate in the decision making process. Only one percent respondents have given their priority to bring more awareness among people on impact of sand mining. Moreover consent of Gram Sabha is the first and foremost priority for the people to start sand mining anywhere. This indicates people are interested to take part actively in governance of sand mining but the scope for this is very limited. This has to be addressed while planning any sand mining.

Major Steps to Take

People who are residing along side the river and for whom river is their life line, they are well aware about the judicious use of resources from the river. They are also managing the resources traditionally with plans of conservation. People know better how to conserve river ecology and the eco system. The present study intends to know perceptions of people regarding different steps to be taken up while taking up sand mining on river beds. It is a fact that dependent communities face severe loss due to sand mining because the mining lease holders do not follow any sustainable environment management plan while taking out sand. They only look for their profit and completely ignore the loss people face. The study found 44 percent people stated that 'they should be compensated properly for any loss due to sand mining' and 'restoration of post mining should be done by the Government' as their priority. As regards to the legal aspect of sand mining, the Supreme Court of India and the National Green Tribunal has given their verdict for sustainable mining. 23 percent people prioritised that there is a need to implement the Orders of those judicial authorities and follow their guidelines. Sand mining is taking place in all places without looking into the ecological and social importance of the area. 16 percent people think that the mining area should be situated outside the active flood plain area so that there is less impact on river ecology and flood plain area as a natural water recharge area should remain intact. In many cases the mining site remains open causing serious accidents. Those pits are death traps for people and pet animals. six percent people put emphasis on post restoration of mining immediately after mining is done, five percent people are concerned about the quality of river water and given importance to prevent pollution and three percent people stated that active river channels should be kept outside the mining activities. Small rivers are mostly threatened by the sand mining and two percent people think that carrying capacity assessment of rivers should be done and mining lease should be given after proper study. Big rivers and streams should be prioritised for mining as expressed by one percent of people.

Ranking on people's perception on major steps to be taken during sand mining





Things to Avoid

There are many rules, regulations and guidelines in place to regulate sand mining. However, most of them are not followed and illegal sand mining is continuing in most part of our country. To know about people's perception on things to be avoided during sand mining process, the study tried to rank people's perception based on their priority. It came out clearly that 46 percent people put emphasis on 'complete ban on sand mining'. They have observed the nexus between sand mafia, police administration, government officials and political leaders and stated that no laws or guidelines can be implemented in their true spirit so a complete ban on sand mining is the only solution to overcome illegal sand mining. 39 percent people prioritised that mining should be done in a sustainable way and over extraction of sand should be prohibited. For easy transportation miners always try to mine the sand close to areas developed by infrastructures and on river banks. Seven percent people stated that mining near river banks and infrastructures should be prohibited. Most of the people depend upon agriculture for their livelihood in the study area and sand mining affects farm land and river bed farming. six percent people think that sand mining should be avoided in vegetated areas. Some people also think that excavation of sand below water table should be restricted and operation of heavy equipment within their habitation should be prohibited.

Case Study: Sand Mining

M. Kamala aged about 58 belongs to Narayanpuram village of Burja block, Srikakulam District and is the President of 12 SHGs of the village. She says that "women of these SHGs are strongly opposing sand mining and have expressed their collective voice against mining. She informs that there are 13 SHGs in her village with more than 150 women members. In 2004 State Government identified 12 senior members of SHGs to be involved in sand mining. Kamala was appointed as President with M. Janakamma as Vice-President and V. Lakshmi as Treasurer. The Government through its policy under Development of Women and Children in Rural Areas (DWCRA) launched Pedarikamm Pai Gelupu (victory over poverty) Campaign for involving women to look after sand mining for their economic development through generating income. Eight women were selected from local SHGs, who monitor sand mining operations in two shifts with four members each. The contractors apply for sand mine lease through online registration and payment. She says sand mining in river Nagavali near her village started since August 2015 with allotment of 16 cubic metres of sand mine. So far more than 10 cubic metres has been extracted. She has raised concern over the negligible amount Rs. 5200/- paid per month as compared to the huge quantity of sand mined. The Government officials are fraudulently taking signatures from the SHG leaders of which most of the members are not aware. The rest of the members have not got even a single rupee and have expressed unhappiness and realised the manner of sand mining is no way benefitting the women SHGs thus affecting overall development of the village. Such oblivious sand mining would destroy the village environment. Kamala says that "Now I and other SHG members are strongly opposing the mining. Though the decision was good to uplift the women but proved counter productive now as the sand mafia continued to manipulate in their activities despite restrictions and monitoring".

Jaggupalli Suryanarayana aged about 55 years belongs to Kandhyam village of Burja Block, Srikakulam District of Andhra Pradesh and is the Sarpanch of Mamidivalasa Gram Panchayat (GP) narrated his view on sand mining. He stated, "I and many Sarpanchs of other GPs and village level leaders are strongly opposing sand mining. We have collectively voiced our views before administration against illegal mining irrespective of our political affiliations. Tactfully, to take the sand from our area the mining lease holders had given assurance to the villagers for doing various developmental activities like constructing *pucca* road, drinking water facilities, constructing spurs to prevent river erosion, providing wage employment to local people and providing financial support for village functions. Till date none of the promises have been fulfilled. Illegal excavation of sand is continuing. There are 140 families of the village residing in the bank of river Nagavali. There are several sand deposited points in the river. Previously, Gram Panchayat was collecting Rs. 50/-, Rs. 20/- and Rs. 200/- for one load of sand in tractor, bullock cart and lorry respectively. Per annum, the Panchayat was getting more than Rs. 2 lakhs and utilising the money for village development activities. However, tactfully the miners gave a demand draft of Rs. 10 thousand only to the Government in favour of SHGs and taking sand as per their wish and deriving high benefits selling in the market. The politicians and contractors are getting huge benefit in the name of SHGs, which receives only Rs. 10 thousand and losing huge sand reserves. We are now strongly opposing the sand mining in river Nagavali near our village and have submitted a memorandum in this regard to the District Collector to stop mining activities. But, no action is taken so far by the administration. The agitating people are preparing for a protest movement against such illegal sand mining.

Aged about 60 years **Kanubhai Manji Bhai Rathva** belongs to Sihod village of Jetpur Pawi block, Chhota Udepur district, Gujarat and is a local leader from a tribal community. He is well aware about their right on natural resources. He has been continuously fighting against illegal sand mining in river Orsang. Narrating his struggle he informed that "the lease holder of mining is from Surat, who engaged his goons and supervisors to manage the mining activities. Since 2008 mining is continuing with all illegalities. We are farmers and do not have much land for cultivation but are depending upon river bed cropping mainly tomato, cucumber, watermelon and other vegetables.

We get sufficient vegetables for consumption and also sell them in nearby markets in deriving considerable part of our livelihood. Nobody from our village was forced to migrate in search of job. Now the situation has completely changed. The sand miners have occupied all river bed land and excavated all the sand by digging pits all over. There is no land left for us to cultivate." He wondered that "when we *adivasis* try to assert our rights over the mineral wealth as our traditional rights, we are always denied even a share of that huge wealth." Now illegal exploitation of natural resources by corporate contractors has intensified. At the same time, resistance by people has also increased over the years. Kanubhai also said "We have the right to take a decision on development needs in our areas; and also to have right to free, prior and informed consent on any projects in our area. We are aware that the ownership of minerals like sand, stone, gravel lies with the State, which has been leased out to private companies. However, in Fifth Schedule Areas, the law prohibits transfer of tribal land to non-tribals. In our area Government has diverted the *gauchar* land to the miners for their parking. We often raised our concerns with the authority but nobody hears our voices due to their nexus with miners. The PESA Act also empowers Gram Sabha to decide on community resources but the officials have fraudulently taken consent of Gram Sabha without really conducting the meeting. When we challenged such a move the District Collector misinformed us saying that it does not come under Scheduled area hence, no need of consent from Gram Sabha. When we protested against such illegalities they booked us on false charges of theft and cases against people are continuing. However, in 2014 Gram Sabha had taken a decision with the resolution that this comes under scheduled area and a sand mining activity in this area is illegal. All the consent taken by the Government is false and fabricated. There is no better scope in sand mining sector after loss of permanent livelihood options. The compensation paid for loss of land and livelihoods is inadequate and ambiguous. There is a consistent design to bury our rights and facilitating easy grabbing of resources by corporates in Schedule and tribal-dominated areas.

Phulbati Natbarbhai Rathva aged about 68 years a resident of Suskal village, Jetpur Pavi block, Gujarat. She lost her young son who fell in the excavated pit of sand mine in river Orsang. She narrates her saddest part of life with a heart breaking cry as to how she lost everything but nobody bothered about her grief. She said that indiscriminate sand-mining has turned Orsang, a major tributary of Narmada into a deathtrap. Deep pits created through sand mining on river beds made the river dangerous for children, women and even for expert swimmers. Her son went to the toilet on the riverside but could not return home, he had drowned and died. In the past few years many accidents have occurred and residents have been badly affected due to illegal sand-mining. The mid and low-land areas of the river are originally sand storage zones where most casualties happen due to indiscriminate mining. The heavy machine used in day and night mining over the years and selective extraction of construction grade sand created nine to 10 metre pits that are filled with mud. The pits are getting deeper and deeper along the mining of sand and profile of river. During monsoon as the high flow regime leads to landslides and head-ward erosion that cause the river to be more vulnerable, later. It brings unpredictable changes in the under currents of water hence it becomes difficult to warn people in advance against venturing into particular parts of the river. She says, "A person would find it impossible to retrieve if he/she steps into deep pits and I lost my son as a victim of the similar situation. She alleges that they organised and protested against illegal mining but who was there to listen to us? Police is threatening us instead and says that sand mining on the river is going as per State Government rules. But as per rules, sand mines will not be done below water level or within some metres and the pits have to be refilled. Here, the pits remain open and they are excavating deeper and deeper. The police only registered a case of accidental death. Officials, however, said they would investigate the allegations. "When my son approached the pit, farmers from the area had seen him near the pit since it was filled with water. After a while, however, the farmers realised that he is not around and called us and other villagers. Then

we searched the pit and found the dead body of my son." When *Tehsildar* visited our village, angry villagers alleged that sand mining in the river is illegal and blamed the revenue officials. However, he said that mining is legal and tried to convince us to bring the situation under control. Orsang River is heavily mined and district administration earns crores of rupees by giving tenders, however, villagers across the river often complain of serious irregularities and huge environmental degradation. We frequently complain about the dangers of open pits but no official has ever paid attention.

The sand mining creates serious health problems for cows and domestic animals due to exposure to sand mining operations. **Rakubhai Anantbhai Rathva,** a 48 year man of Motirasli village, Jetpur Pavi block, Gujarat is a farmer deriving his livelihood from agriculture and livestock. He narrated his plight "Four of my cows were drowned in the sand excavation pit which was abandoned after sand mining. When wind blows hard continuously from the riverside, we get the sand set over our village and land. In summer sand mine blowing around is more serious; people living in this area are not getting clean and healthy air now. Sand mine in river Orsang is affecting the overall health of humans and animals in the surrounding areas. All land, vegetation, trees, people, and animals are affected due to the dust debris and disruption of the ground. This area where we have live a for generations is no longer one of the healthy areas to live because it turns into mass destruction of natural beauty. The trees are dying. River is now dried and destroyed only for few to make instant money. The water table is seriously down. The river water is not fit for human and animal use. Removal of topsoil that acts as a natural filter for aquifers; removal of natural vegetations has made the area barren and reduced grazing land for livestock. Serious noise pollution is caused due to mining with machineries operating day and night over the year. The sand pits remain open and put animals in danger. He said "I am feeling terrified for our next generations and destruction of the habitat of livestock. The public are aware about destruction made by sand miners to natural resources upon which the natives have been sustaining for generations. Sand mining is also affecting food production as sand mining is destroying the land use.

Hilari Pirera, the President of village organisation is a resident of Tumbe village, Bantwala block, Dakshina Kannada District of Karnataka. She mention the problem faced by women collecting drinking water from river Netravathi. The village inhabited by 200 families, mostly depend on Netravathi for drinking water. Due to sand mining the women are not able to collect drinking water from the river very close to the village. The river water is now used only for other domestic needs including cattle. In the village, there are 5 bore wells, three open wells and seven water taps for drinking water. However, these are not functioning properly and the water is not fit for drinking, the tap water is supplied only for one hour depending upon availability of electricity. Every day women fetch drinking water from the river. Since the last few years increased illegal sand mining is only giving benefit to contractors and politicians while people get no benefit. Unscientific and indiscriminate sand mining has increased due to growth of real estate and construction activities. It pollutes rivers and streams resulted in the destruction of aquatic and riparian habitat. Resulted impact includes bed degradation and coarsening, reduced water tables and channel instability leading to agrarian distress, triggered exodus of people to urban clusters, upsetting economic and cultural balance and creates social-tension. Now women travel two kms more to collect drinking water and in summer it is more difficult. The women have started opposing the mining activities.

A 60 year old, **Mosri Bamniya** lives in Mayala village of Alirajpur Block, Alirajpur District, Madhya Pradesh and belongs to Bhilala community. He has narrated their relationship with the river and religious belief. "Water plays a special role in our culture and tradition. It is a sacred gift of nature. In our civilisation river purifies sins and bridges link between man and divine. We worship river with high ecological and spiritual regard. Therefore, it is our duty to keep our river clean and free flowing. River water is used for bath and ritual offering. We worship river Sukkad as part of holy Narmada; in many occasions we perform rituals in the bank of Narmada. The situation has entirely changed. There is no water in Sukkad River, which has lost its physical identity through mining. A big banyan tree which witnessed our sorrow and celebrations is being uprooted due to river bank

erosion caused through sand mining. Ecologically, free flowing rivers have huge significance. Presently, there is almost no free-flowing of rivers. Last few years we have seen the death of Sukkad and have forgotten the value of free-flowing rivers for the need of our society. Now the arbitrary sand mining has led to species extinction, loss of prime farmland and forests, social upheaval, pollution of water, dried river, destroyed fisheries, etc. The natural flow of river supports specific ecological functions like groundwater recharge, nutrient balancing in soils, fish spawning, the movement of sediments, and more. It also provide innumerable community services like fisheries, land-replenishing silts, religious rituals and irrigation, water supply, etc to name a few. The value of ecological goods and cultural services remain unaccounted for human beings. Unfortunately, now we are only see our profit and mine those free flowing rivers to make those rivers dead. It is high time that we learn the lesson that conservation is better than restoration. The need to protect our free-flowing river is very much necessary and urgent. There is no substitute of river and its water; we cannot perform our rituals with bottled water inside our house. River should be protected for the benefit of current and future generations."

Kunwar Singh Mangliya aged about 61 years of village Bada Undva of Alirajpur block. Madhya Pradesh has said that the most important effect of sand mining is the reduction or loss of farmlands. A agriculture is the predominant economy and way of life in the area mostly carried in rainy season. We irrigate our river bed land from Sukkad River and do farming. But sand mining has taken up our productive lands resulting in confrontation between farmers and miners. The frequency and number of sand mining in Sukkad River is higher in comparison to other rivers in the State. Mining has a significant impact on agriculture and the environment. The impact is severe as most of the mines work round the year by using heavy machineries. Poor execution of regulations and monitoring are the key problems we are facing. Companies and contractors continue to take advantage by illegal mining due to our lack of awareness on our rights. Due to sand mining river bank erosion has increased and we are gradually losing our farm lands to the river. Again the miners use lands adjacent to the river dumping sand to sell in monsoon season. We are facing severe loss to our life and livelihood. Farming and animal husbandry are key activities in the area but sand mining has taken out most of the productive land. Previously they irrigated the lands from river but it is not possible today as the water table has gone down.

Kulamani Tarai aged about 49 years of village Arakha Pada, Dharmasala block, Jajpur District, Odisha belongs to the fisherman community whose prime occupation is fishing from river Brahmani. At present, it is not a viable option to feed his seven member family. He says that illegal mining is rampant to meet need of recent construction and development projects, which made great impact on the river ecology and livelihood of the people. The sand mining causes widening of the river-bed and reduced depth of the river results in affecting the micro-organisms, making movement of fishes difficult in shallow water and encroachment of land created in river bed. The loss from illegal mining is heavy than the profit it gives. Sustainable sand budget is required for all river ecosystems and regulates the limit of mining sand. He also said crumbling of habitat is responsible for change in local biodiversity of river. Sand mining increases river pollution seriously reducing fish species, soil erosion and degrading natural riparian habitats. Traditionally inland fisheries in rivers provided livelihood to fishermen like me. As a healthy indicator of aquatic habitat, any river system can be determined from the quality and quantity of fish species. Fresh water fishing is the traditional livelihood and survival of our community living with low income, low education, and lack of other skills. We use traditional fishing traps and nets. Any land use change in river catchment has a far reaching impact on the water course and fish availability reflected in species diversity and availability. The changing fish diversity in Brahmani indicates a declining trend through impact of sand mining. River sand are mined extensively and intensively in the main channels, basically lower reaches of the rivers near our village with use of heavy machines rapidly. As major source of livelihood, serious decline in fish diversity, large number of traditional fishermen have left fishing and shifted towards other occupations for survival.

A 41 year farmer **Sanatana Mallick** of village Bhubana of Dharmasala block, Jajpur District of Odisha now forced to migrate in search of livelihood. He says river Brahmani is turning fast into a stream of despair because of exploitative and mindless sand mining. It has led to deepening of river beds and deep pits in pockets. Sand is the soil of the river virtually providing and sustaining all life that exists in the river. Traditional river-based irrigation system is in a mess. Mining destroys the source of drinking water causing lasting damage to river ecosystem. It sometimes becomes very difficult to take action against sand mafia since the entire operations involve huge black money and people living in the vicinity of the river. He says that "sand mining causes groundwater depletion and destruction of farmland which adversely impact my livelihood as I survive on agriculture". Besides, people residing on the banks of the river struggle to get the water, which was once available in plenty. He suggests that indiscriminate sand mining should not be permitted near habitation and in flood plain areas and proper dredging of sand in river bed is needed. Lots of lands in flood plain areas used to get fertile silts that his parents and grandparents were cultivating and deriving their livelihood. As a farmer he also cultivated paddy, vegetables and peanuts on his farmland in the bank of river Brahmani but very less quantity than his parents. Due to sand mining gradually most of the lands merged in the river due to massive bank erosion. It has changed the direction of the river.

Conclusion and Recommendations

Sand has become a very important mineral for the expansion of society. Sand is a naturally occurring granular material composed of finely divided rock and mineral particles. River sand is one of the world's most plentiful resources (perhaps as much as 20 percent of the Earth's crust is sand) and has the ability to replenish itself. Sand is essential for infrastructure development and considered to be an integral part of our life. It is the most consumable thing next to air and water. Nature creates and recreates sand through river and flow of water to fulfil our need but when we strive for more to fulfil our greed, it becomes hazardous. Sand is a common resource everybody owns. With growing demand for more sand than created, dependent communities have a role to regulate and manage this resource. Sand is considered as a minor mineral and governed by laws related to mines and minerals

Government is the owner of all mines and minerals as per the law. State Governments are the owners of minerals located within their respective boundaries. The Central Government is the owner of the minerals underlying the ocean within the territorial waters or the Exclusive Economic Zone of India. Hence governance of minerals like sand is under control of State Government. The Mines & Mineral (Development and Regulation) Act, (MMDR Act), 1957 is the law governing the Mineral Sector (other than Petroleum and Natural Gas) of the Country. The Mineral Concession Rules, 1960 and the Mineral Conservation and Development Rules, 1988 are the rules covering the sector.

The National Mineral Policy (NMP) was notified in 2008. The Mineral Policy seeks to develop a Sustainable Development Framework for optimum utilisation of the country's natural mineral resources for industrial growth. The policy ignores local community and their needs while dealing with mineral resources. Supreme Court of India and National Green Tribunal have put restrictions on rampant sand mines in their verdict from time to time but those are not followed properly.

Mining of sand has a diverse impact. It depletes water in the rivers. Water table drops and affects river bed cultivation. River becomes sick because of mining activities. Rampant illegal sand excavation using mechanised tools round the clock from across river beds in India affects river ecology. Some states have banned mechanised mining but mafias do not obey this directive. The fisherman community are not getting proper fish catch and losing their livelihood. Women bear the burden of walking more distance to use river water because sand mining widens the gap and increases distance from habitation. Accidents and unexpected incidents increase due to sand mining activities and transportation. Sand mining leads to river bank erosion and loss of entire habitats. All those impacts do not give any return to the people but put them in trouble.

Sand mining is a largely unacknowledged but major threat to biodiversity. Effects of sand mining on biodiversity have not been studied properly by the Governments of most countries or even by independent scientific researchers. When sand, the medium in which riverine fauna and flora prosper and the most common interface between river and people living besides the river is removed, the entire ecosystem is inevitably and irreversibly destroyed.

Sand is necessary to fuel the construction boom driving the rapid pace of urbanisation and the rapid economic growth patterns of developing countries like India. Rapid growth necessarily requires rapid construction of industrial, commercial and residential spaces. But there is need to regulate extraction and use of sand keeping in mind the need of local community. Some states have exempted tax on sand mines if local people take it using carts or local transport without mechanised equipments.

Alternative to sand mining is rarely discussed. Some projects have proved that such alternatives do exist and are being used in various parts of the world including recycled slag and debris. However, cost of natural sand is cheaper than the cost of such materials. There is no study which would determine the real cost of natural sand, after factoring in environmental costs.

At present there is continuous legal fight in different judicial bodies to regulate sand mining activities. The operators continue to blatantly rob the rivers of essential ingredients and attacked the Government officials striking terror in the heart of common man. Some of the significant steps have been taken by Central and various State Governments to control and regulate unsustainable excavation of river bed sand mining. Introduction of “sustainable sand mining policy” draft notification by Ministry of Environment Forest & Climate Change (MoEF & CC) was the most significant development pertaining to sand mining in 2015. Accepting that sand was essential for the health of rivers, Minister, MoEF & CC stated “Sand is for river, what RBC is for blood”. In every decision of the Central Government it seems there is too much faith in technology and IT with very little in the people at the grass roots level. In issues like sand mining, there has to be a greater role of the local communities in decision making and also monitoring and compliance.

Different State Governments take some measures to control illegal sand mining, but majority of these steps were forced by respective Courts. The formation of Sustainable Sand Mining Policy by MoEF & CC was only due to the intervention of NGT decision. Despite of majors taken by State Governments and Central Government, unsustainable and unscientific removal of sand from rivers continues to remain wide spread in India. The sand miners have grown stronger and have been threatening everybody that protests the illegalities. Affected villagers allege politicians to be either directly involved or supporting the illegal mining indirectly, hence finding it difficult to raise their voices. State Governments have failed in restricting illegal mining. In many cases their policies are found ineffective to check the illegal activities. It is mainly the judicial interventions that are trying to make the Governments correct its mistakes, but we have yet to see effectiveness of judicial interventions.

Judiciary especially NGT has been issuing number of orders, directing Central and States Governments to check unsustainable river bed mining. It is important to note that despite so

many orders, MoEF & CC and State Governments failed to effectively implement the Court orders and check illegal extraction of sand from different rivers. Repeated court orders are clear signs of failure of the State and Central Government on this front. Again we see incidents of unchecked sand mining and attacks on law enforcers and activists by unauthorised sand operators as if nothing has changed on the ground.

Recommendations

Sand mining has already caused serious social and ecological impacts in all study areas. These problems include land degradation, damage to water, loss of productive farmlands, destruction of landscape, spread of diseases, harm to biodiversity and ecology of river, conflicts and confrontation. Although the State Governments and the Central Governments have taken some measures to deal with the issues, but those are not followed properly. To address the impact of sand mining, the following measures are suggested by the people in the study area.

Local people are the key players in governance of natural resources including sand. However plenty or scarce sand may be, local **people should be made aware of** any planning for sand mining. This includes giving detail information about social and environmental impact of the mining on human being, river ecology, vegetation and dependent animal and other aquatic species. The information must be in local language which people can understand and explain.

Despite legal provisions and clear guidelines for **public hearing** to get people's consent before any mining activities, nowhere is this process followed. The study recommends in favour of public hearing for any kind of sand mining anywhere in the country.

Gram Sabha is considered as the lowest constitutional body where people directly participate in democratic process. Gram Sabha has the power to decide if any mining activity to be undertaken in its respective areas. This has been proved in case of Niyamgiri of Odisha, where twelve Gram Sabha rejected proposal for bauxite mines. The study clearly recommends free, prior and informed **consent from Gram Sabha** before starting of sand mines at any place.

The study found that many states have come out with progressive policy 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.

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.

The study identified more than 70 percent of sand mines located within one km distance from human habitation causing difficulties for men, women and children in particular and for animals in general. Local people's difficulties are not addressed either by mining lease holders or by local lease approving authorities. The study clearly recommends that sand mining should be located outside human habitation and outside the active flood plain.

As far as sand mining location is concerned, it is found that people extract sand both from middle of the river as well as river beds. Sand mining from middle of the river affects water level and water flow. The study recommends that **large rivers and streams should be used** preferentially for sand mining keeping flow of water intact. Pit excavations located on adjacent flood plain or terraces should be separated from the active channels. Excavation should not take place from below the water level. As far as practicable sand extraction in vegetated riparian areas should be avoided. Over extraction of sand must be prohibited from any river bed.

Sand mines and related activities cause water pollution and affects lower riparian community. There is no system that exists anywhere to monitor and regulate water pollution in the river. The study recommends that **pollution level be monitored** and checked by appropriate authority and with active participation of local people. Operation of heavy equipment within riparian habitat must be restricted. Alternative diverted road may be used if at all it is necessary for any specific work.

The impact of sand mining varies from social, environmental to economic aspects. But there is no effort to assess the impact or undertake any management plan. The present study recommends undertaking **social, environmental and economic impact assessment** and proper management plan for sand mining activities. This should also include plans for post mining restoration which must be done immediately after the mining or before unset of rain. Wherever necessary, proper compensation and restoration process should be taken up by local government authority to maintain river ecology.

As far as practicable, **manual excavation** of sand is to be done. Mechanical tools and equipments must be discouraged for sand mining. This will provide employment opportunity to local people and ensure their involvement in sand mines.

Sand mining is happening throughout the year without taking care of the river. The study recommends that timing of sand mines **must be restricted** to winter and summer days. No mining of sand during rainy days from river should be done.

It is clear that sand mining is a threat not only to river but also to all **aquatic species** depending on river. It needs special attention to protect these animals from such activities before they get extinct.

As a whole if one calculates loss and profit of sand mining, local people do not gain anything out of sand mining activities but bear the burden of loss and damage due to sand excavation. If sand mining is taken as a profitable work, local people need to be given **due share of the profit**.

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