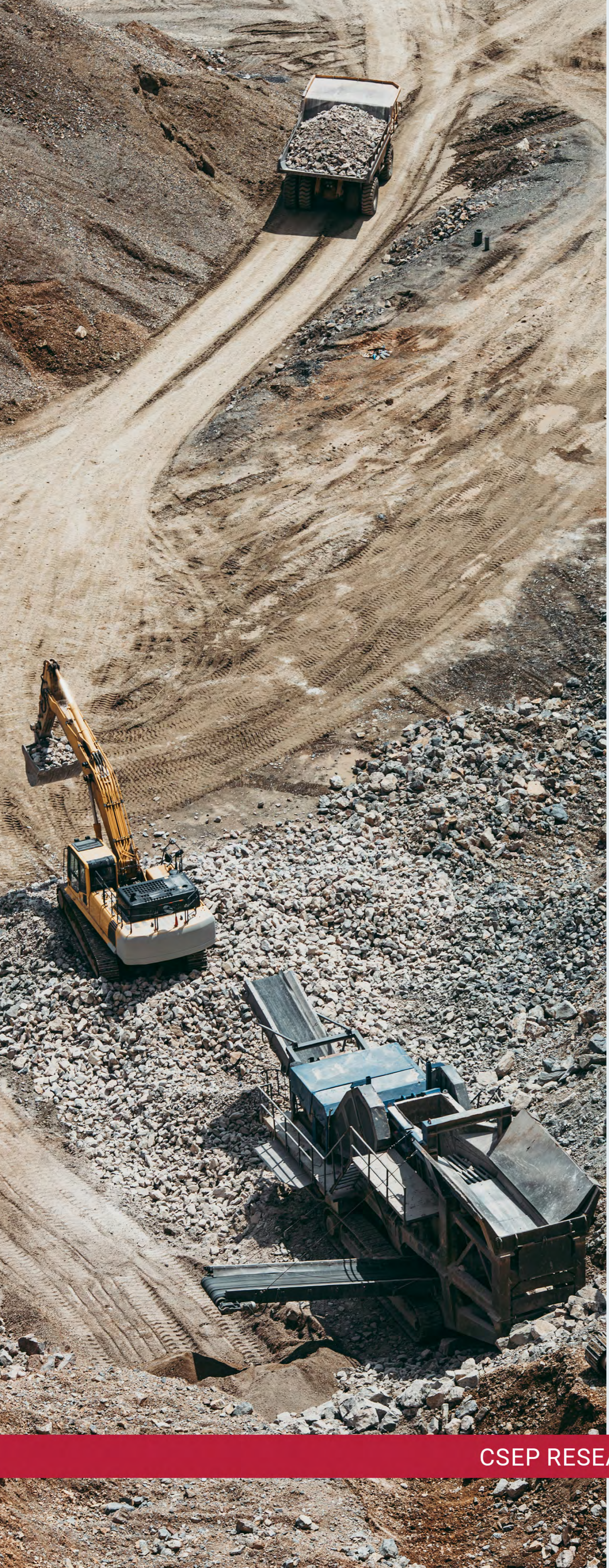

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CSEP Sustainable Mining Attractiveness Index (SMAI)

District-level Study of Major Mining States in India

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Designed by Umesh Kumar

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Abstract

This paper presents the second edition of the CSEP Sustainable Mining Attractiveness Index (CSEP-SMAI). The first edition evaluated the mining sustainability of 24 districts of Jharkhand. The second edition has expanded the scope to 323 districts across India's top 12 mining states—Andhra Pradesh, Chhattisgarh, Goa, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, and Telangana. These states produce various minerals, including bauxite, chromite, copper, iron, lead, manganese, zinc, and limestone.

Although they have significant mineral resources, some of these states are among the country's more impoverished and rank poorly in various human development metrics. The paper highlights the economic importance of mining activities and the need to be environmentally responsible and safeguard the welfare and livelihoods of the local communities.

The SMAI aims to provide stakeholders with a holistic understanding of the potential of mineral resources-led, district-level development in states. The performance of all 323 districts from the 12 mining states has been divided into three groups (high, medium, and low) based on their mining characteristics and their mining potential and performance (MPP).

The SMAI has been computed by evaluating the districts under these three groups using various secondary data. The data were normalised and aggregated under the five broad pillars that reflect the sustainable mining attractiveness of a district: (1) mining potential and performance; (2) infrastructure; (3) policy and governance; (4) socio-economic status; and (5) the environment. The weighted arithmetic mean of the scores of the five pillars has been calculated to reach the SMAI score for each district.

The Index is computed based on investment attractiveness and sustainability. The MPP and the business-enabling positive economics pillars (policy and governance; and infrastructure) constitute investment attractiveness. The sustainability attribute rests on the normative economics pillars (socio-economic status; and the environment). The study results provide information for potential mining businesses and highlight policy priorities for respective governments and administrations to improve the attractiveness of districts for holistic, sustainable mining development.

1. Backdrop

Mining in India provides the essential raw materials to various industries and has generated many jobs. However, mining-related activities are often criticised for their environmental and sustainability impact. The Centre for Social and Economic Progress (CSEP) Sustainable Mining Attractiveness Index (CSEP-SMAI) aims to provide stakeholders with a holistic understanding of the potential of state mineral resources-led, district-level development.

The Index is computed based on investment attractiveness and sustainability (Figure 1). Mining potential and performance (MPP) and the positive economics pillars (policy and governance; and infrastructure) constitute investment attractiveness. The sustainability attribute rests on normative economics pillars (socio-economic status; and the environment).

Hence, the Index provides potential investors with information on the MPP of 323 districts in 12 states and their positive and normative attributes. These 323 districts are divided into three groups based on their mining characteristics: high, medium, and low MPP.

1.1. India: A Mineral-rich Country

As of 2021–22, India produces 95 minerals, of which 4 are fuel, 10 metallic, 23 non-metallic, 3 atomic, and 55 minor minerals, with a total value of production estimated at US$ 25.8 billion (Ministry of Mines, 2022). The mining and quarrying sector[11] contributed 2 per cent to the country's gross value-added in 2021–22 (National Accounts Statistics, 2023) and employs over half a million people.

As part of the Gondwana region, India's mineral geology is similar to that of the mining-rich jurisdictions of Western Australia, South America, and South Africa. However, only 29 per cent of India's obvious geological potential has been explored. There is an urgent need to incentivise exploration and enable the optimum use of untapped geological mineral abundance (Ministry of Mines, 2023).

Some of the poorest communities inhabit many districts in India that could have significant mineral resources. The development of mining would help bring jobs and social development to these districts. Creating a vibrant mining sector would also provide fiscal gains for the State governments and spawn linkages with downstream industries.

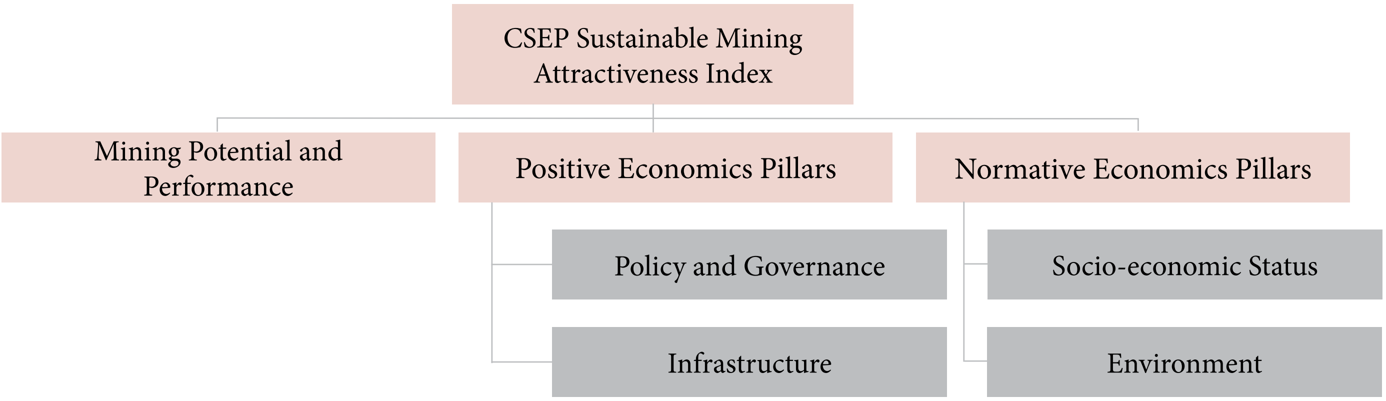
The mining sector provides the raw materials for key industrial sectors such as steel, cement, fertilisers, chemicals, and electronics. Given India's commitment to a clean climate regime, India must also ensure its resilient access to *critical minerals* for manufacturing clean energy technologies, electric vehicles, and high-tech equipment (Chadha, Sivamani, & Bansal, 2023).

1.2. Sustainable Mining Development

Any further developments in the mining sector must ensure sustainable operations, including adherence to global practices and principles of community welfare and environmental protection. This is especially important considering the controversies in which the mining sector has been embroiled, affecting its economic performance. The National Mineral Policy (NMP), proposed by the government in 2019, emphasises proper 'exploration', 'streamlining regulatory mechanisms', and operating with the utmost environmental and social responsibility. The NMP envisions India doubling its production of major minerals by 2025 and reducing its trade deficit for these minerals by 50 per cent (Ministry of Mines, 2019).

[1] Includes both fuel and non-fuel minerals.

Figure 1: Structure of the CSEP Sustainable Mining Attractiveness Index



Source: Authors' elaboration.

2. Scope of the Study

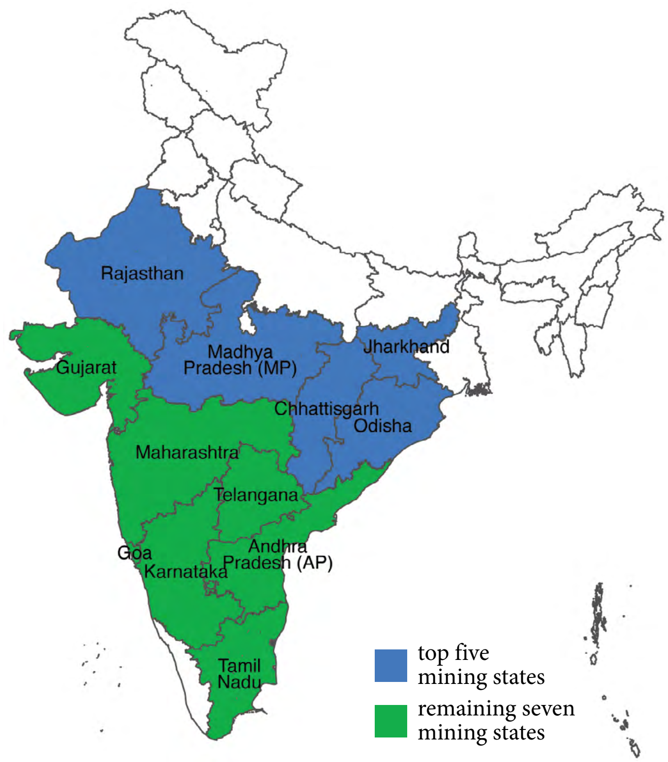
2.1. Choice of States

India's 12 major mining states—Andhra Pradesh, Chhattisgarh, Goa, Gujarat, Jharkhand, Karnataka, Maharashtra, Madhya Pradesh, Odisha, Rajasthan, Tamil Nadu, and Telangana—were identified based on their significant mineral and mining performance and potential (Map 1). They account for 99.3 per cent of India's mineral royalties (Table 1). They also produce almost all the major minerals in the country, such as bauxite, chromite, copper ore, iron ore, lead ore, manganese ore, zinc ore, and limestone. The 12 states have 350 districts in all. However, the CSEP-SMAI covers only 323 of the total districts, as 27 districts have no mining activity or potential.

The 12 states contribute 69.3 per cent to the national gross domestic product (GDP). The top five mining states—Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, and Rajasthan—contribute 89 per cent of the total mineral royalty but account for only 18 per cent of India's GDP. The per capita income in these five states is also lower than the national average, as are their Human Development Index (HDI) values.

The remaining seven states have a higher HDI than the average Indian HDI of 0.646. Ten of the 12 selected states fall into the medium human development category (0.55–0.69), while the remaining two, Goa and Tamil Nadu, are classified as high human development states (0.70–0.79).

Map 1: Top 12 Mining States in India



Source: Authors' elaboration.

The Sustainable Development Goals (SDG) India Index (2020–21) shows that Tamil Nadu, Goa, Andhra Pradesh, Karnataka, Maharashtra, Gujarat and Telangana are 'front-runner' states, while Madhya Pradesh, Chhattisgarh, Odisha, Rajasthan, and Jharkhand are categorised as 'performer' states (NITI

Table 1: States Evaluated and Key Indicators

State	Number of Districts	Districts studied for SMAI	Share of National Mineral Royalty (%)	Share of National GDP (%)	HDI	Rank in SDG Index India 2020–21
Andhra Pradesh	13	13	2.1	4.7	0.649	4
Chhattisgarh	27	27	14.3	1.7	0.611	27
Goa	2	2	0.5	7.8	0.763	4
Gujarat	33	32	1.7	7.8	0.672	10
Jharkhand	24	24	6.6	1.5	0.598	35
Karnataka	30	30	8.8	7.8	0.683	4
Madhya Pradesh	51	32	3.0	4.5	0.603	23
Maharashtra	36	35	1.0	13.6	0.697	9
Odisha	30	30	41.5	2.6	0.605	27
Rajasthan	33	33	17.8	4.8	0.628	30
Tamil Nadu	38	32	0.9	8.7	0.709	2
Telangana	33	33	1.2	4.6	0.669	10

Sources: Ministry of Mines (2022); Global Data Lab (2019); and NITI Aayog (2020).

Aayog, 2021). Given the relatively poor performances of some of these states, minerals-led sustainable development can provide an impetus for human development and economic growth.

As mentioned above, the top 12 mining states have 350 districts, but 27 show no mining activity or potential. Of the excluded 27 districts, 19 are in Madhya Pradesh, 6 in Tamil Nadu, 1 in Gujarat, and 1 in Maharashtra.

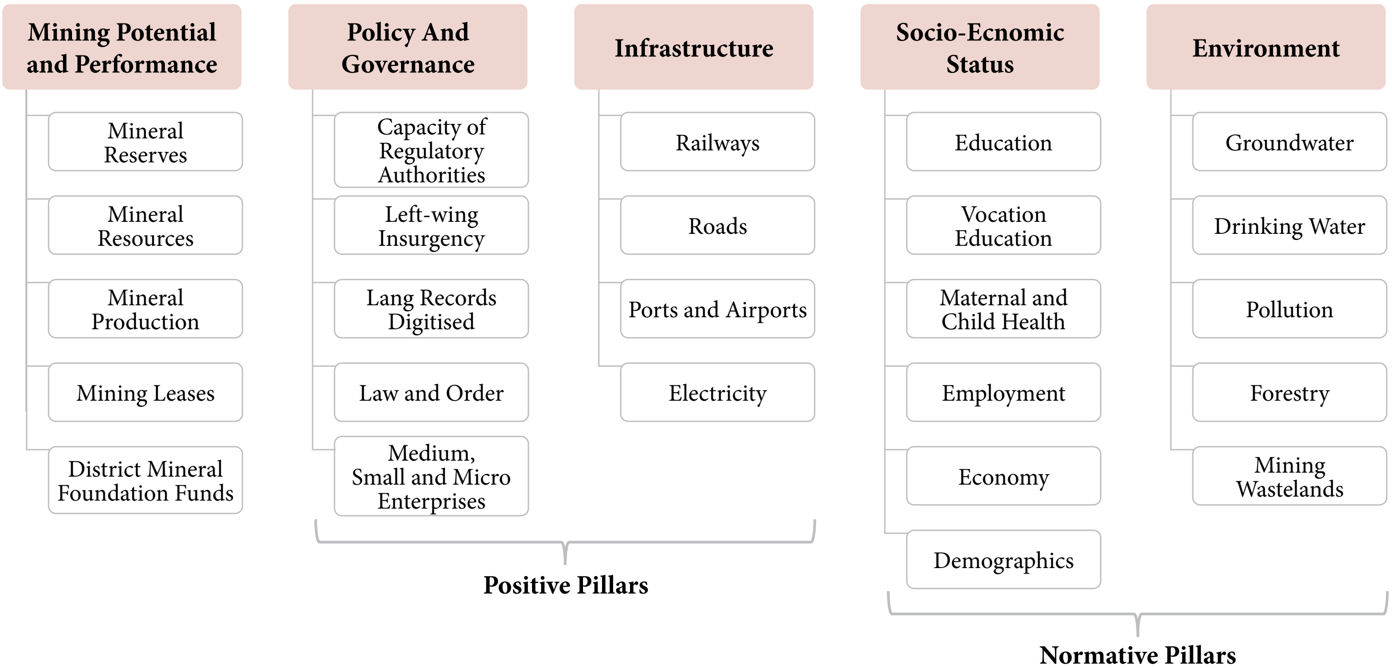
3. Pillars of the CSEP-SMAI

The CSEP Sustainable Mining Attractiveness Index quantitatively evaluates several factors central to the mining sector's business attractiveness, economic viability and sustainability. The study is based on five pillars, each with several indicators (see Figure 2). The sub-indicators have been normalised with regard to the geographical area or population of the districts, where required. The study analyses three groups (high, low and medium) of districts with mining potential across the 12 states under these five pillars.

The latest data from various secondary sources have been used to extract information for the five pillars of the CSEP-SMAI. These include government data and reports, legislation and regulation, and papers published by accredited agencies. For some sub-indicators, the raw data has been normalised using various parameters such as the geographic area, population, etc., as mentioned above. A comprehensive list of sub-indicators, data sources and normalisation parameters is given in Appendix A.1. District-level data on minor mineral production was unavailable, so only major mineral production was considered.[2]

[2] "Minor Minerals" means building stones, gravel, ordinary clay, ordinary sand other than sand used for prescribed purposes, and any other mineral which the Central government may, by notification in the Official Gazette, declare to be a minor mineral. All the other minerals (except hydrocarbons, atomic and minor minerals) are called major minerals.
https://www.indiacode.nic.in/handle/123456789/1421?view_type=search&sam_handle=123456789/1362

Figure 2: Pillars and Indicators of CSEP-SMAI



Source: Authors' elaboration.

Table 2: Mining Potential and Performance (MPP) Indicators

Indicator	Significance
Reserves	Districts with more significant reserves and resources are more attractive for investment by mining and exploration companies.
Remaining Resources	
Production	Districts with high mineral production and more mining leases are more attractive for investments, as there is an established mining presence in the district, an indicator of mineral wealth.
Mining Leases	
Mineral Revenue (DMF revenue)	DMF revenue is a measure of the wealth of resources in the district.

Source: Authors' elaboration.

3.1. Mining Potential and Performance

The mining potential of a district refers to the documented values of its reserves and its resources of coal and non-fuel minerals. The United Nations Framework Classification for Resources (UNFC) defines the mineral reserve as the economically mineable part of the measured or indicated resource (Indian Bureau of Mines, 2009). Through further reconnaissance, prospecting, and detailed exploration activities, ore bodies classified as resources can be converted to reserves and, eventually, to mineral production.

This study considered data for 23 minerals grouped into seven categories based on the Indian Bureau of Mines (IBM) classification—ferrous, non-ferrous, strategic, precious, fertiliser, other non-fuel minerals and coal (see Appendix A.2.).

The total mining lease area, the value of mineral production, and the volume of revenues collected from District Mineral Foundation (DMF) funds are indicators of the district's ongoing mining performance (Table 2). The extraction of ores indicates how well the resources and reserves have been explored and mines made operational and is a significant indicator of mining performance.

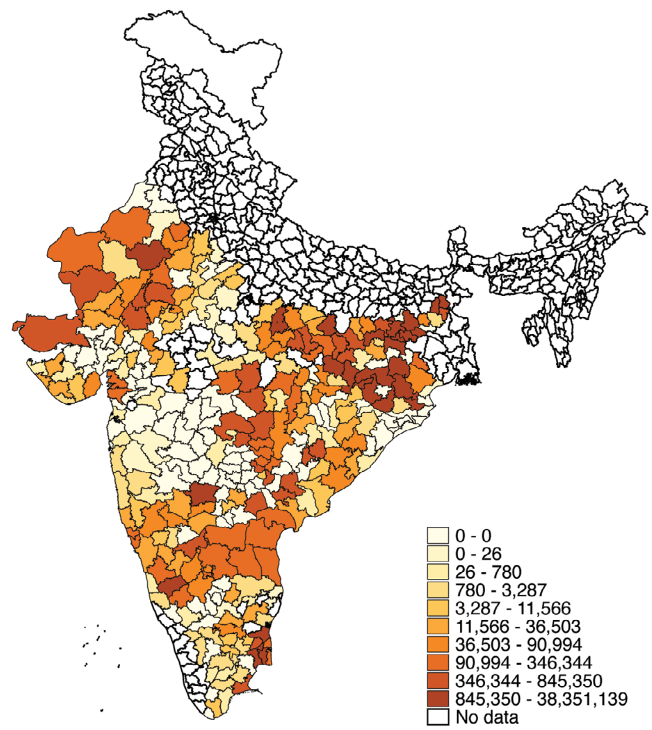
The DMFs are trusts established to work for the welfare of mining-affected communities and are also an important indicator of mining performance. The DMF revenue is a proportion of the royalty revenue paid by the mining companies to the respective State governments. Mining leases granted before the introduction of the auction regime in 2015 are required to pay 30 per cent of their royalties towards the DMF, while mining leases given through the auction system pay 10 per cent of their royalties.

Map 2 is a visualisation of the distribution of mineral resources across the 323 districts covered by the study. The total resource value of the seven mineral categories —ferrous, non-ferrous, strategic, precious, fertiliser, other non-fuel minerals and coal—has been calculated. It is observed that most districts in Jharkhand, Madhya Pradesh, Odisha and Rajasthan have significant mineral resources, while many districts of Telangana and Maharashtra have relatively fewer mineral resources.

3.2. Socio-Economic Status

While realising that each district's mining potential is important, relating this to its socio-economic status and progress is equally desirable. A district's socio-economic status is gauged by measuring its performance on various sub-indicators: per capita income, sex ratio, labour force participation rate (LFPR), participation by women in the workforce, vocational education, and outcomes in education and health (Table 3). Education indicators include primary, middle, secondary, higher and graduate literacy rates. The health indicators include maternal and infant mortality rates, anaemic women aged 15–49, and children below age five who are stunted, wasted and underweight.[3]

Map 2: Total Resource Value (₹ crore) in 323 Districts



Source: Authors' elaboration and National Mineral Inventory.

[3] Stunted, underweight and wasted are key indicators used to assess the prevalence of malnutrition in children. These terms are defined as followed by the World Bank:

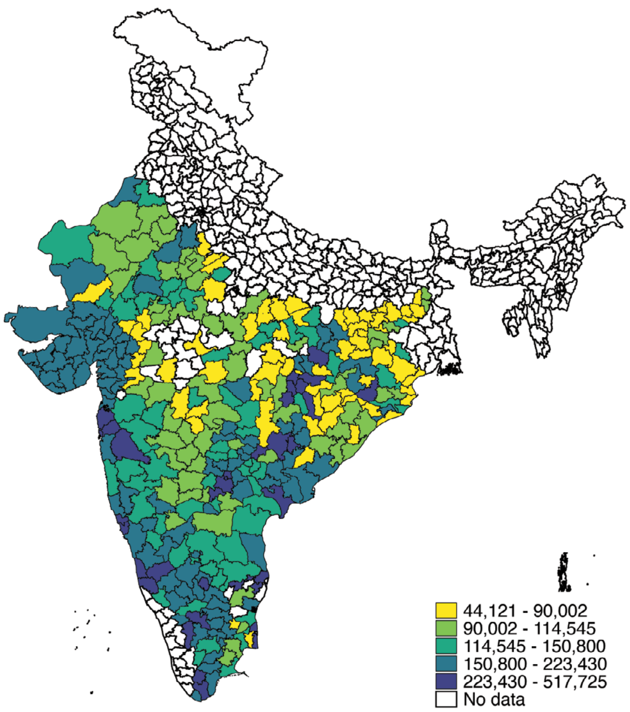
Stunted: Prevalence of stunting, is the percentage of children under age 5 whose height for age is more than two standard deviations below the median for the international reference population aged 0–59 months.

Underweight: Prevalence of underweight children is the percentage of children under age 5 whose weight for age is more than two standard deviations below the median for the international reference population aged 0–59 months. The data are based on the WHO's child growth standards released in 2006.

Wasted: Prevalence of wasting, is the proportion of children under 5 whose weight for height is more than two standard deviations below the median for the international reference population aged 0–59.

Map 3 shows the per capita income of 323 districts of the study. Approximately 170 districts have per capita income exceeding the national average of ₹1,25,397 in 2018–19.[4] High per capita income districts belong to Telangana, Chhattisgarh, Tamil Nadu, Karnataka and Goa. Some of the lowest per capita income districts belong to Jharkhand, Odisha and Madhya Pradesh.

Map 3: Per Capita GDDP (in ₹) of the 323 Districts



Source: Various State Directorates of Economics and Statistics, 2018-19.

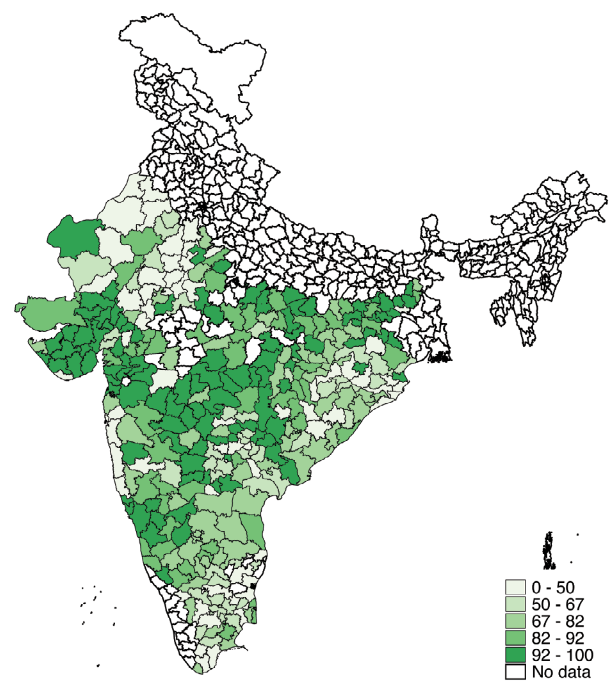
3.3. Policy and Governance

Mining companies prefer jurisdictions with supportive policies and good governance. While many policies and governance issues are standard across the districts of a state, some factors are unique to certain districts (Table 4)—such as left-wing insurgency, law and order, land records, and the number of medium, small, and micro enterprises (MSMEs). In addition to these, the study also looks at the percentage of environment clearances (ECs) granted in a district within the prescribed 180 days. This aids in measuring each state's district-level effectiveness in providing post-lease clearances for mining projects.

Left-wing insurgency is a vital governance indicator for many regions in India. Several mining-rich districts in Andhra Pradesh, Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Odisha and Telangana are affected by it. This form of insurgency has adversely impacted local communities and normal business operations. Law and order indicators are measured using the number of police stations and the cognisable crime rates in each district. The industrial activity in the 12 mining states is gauged by the number of MSMEs registered under the Udyam Portal of the Ministry of Micro, Small and Medium Enterprises (Press India Bureau, 2022).

Map 4 shows the percentage of ECs granted within 180 days of application in a district between 2015 and 2022. This is based on the prescribed timeline of 180 days given by the Ministry of Environment, Forest and Climate Change (MoEF&CC). About 69 of the 323 districts had 100 per cent ECs granted within 180 days (shown in dark green in Map 4). These 69 districts mainly belong to Goa, Gujarat, Jharkhand and Telangana. However, there are 22 districts where no EC was granted within 180 days, primarily in Rajasthan.

Map 4: Percentage of ECs Granted within 180 Days in 323 Districts



Source: PARIVESH Portal.

[4] Data was available for most of the districts for 2018-19

Table 3: Socio-economic Status (SES) Indicators

Indicator	Significance
Education	Education includes primary, middle, secondary, higher and graduate literacy rates. Higher levels of education benefit the population by offering more career opportunities and the mining operators by providing skilled local employees.
Vocational Education	Vocational training broadens career opportunities and increases the pool of skilled employees for mining companies.
Health	Health includes maternal and infant mortality rates, percentage of anaemic women and stunted, wasted and underweight children below five years of age. Better maternal, infant and child outcomes imply a healthier population.
LFPR (Women and overall)	A more economically active population is beneficial for business. Greater participation by women in the labour force indicates a more equitable district.
Per capita Income	Higher per capita gross district domestic product (GDDP) values indicate the district is economically more productive.
Sex Ratio	Higher sex ratios point to a more equitable district.

Source: Authors' elaboration.

Table 4: Policy and Governance Indicators

Indicator	Significance
Capacity of Regulatory Authority	Districts with higher percentages of ECs indicate better capacity of regulatory bodies to meet prescribed timelines.
Left-wing Insurgency	The number of left-wing insurgency incidents from 2008–22 has been considered. Districts with fewer incidents may be perceived to be safer for business investment.
Land	Access to digitised maps and Records of Rights would make it easier for businesses to make investment decisions.
Law and Order	The number of cognisable crimes committed per lakh population and police stations per lakh population have been used. Businesses would be more inclined to invest in safer districts for their employees.
Industries	A higher number of MSMEs indicates more significant industrial activity in a district.

Source: Authors' elaboration.

3.4. Infrastructure

Infrastructure provides logistical support to business operations, and mining operations are no different. Good rail, road, air, and seaport connectivity benefits local communities and encourages the setting up of businesses (Table 5). Consistent power supply is another essential element. As a proxy of the consistency of power supply, the study uses domestic power consumption per capita; data on district-wise power outages were unavailable.

Two parameters have been used to estimate each district's rail connectivity: the density of railway stations and the percentage of railway stations receiving 50 or more long-distance trains weekly. The state-highway density of a district is a measure of road connectivity.

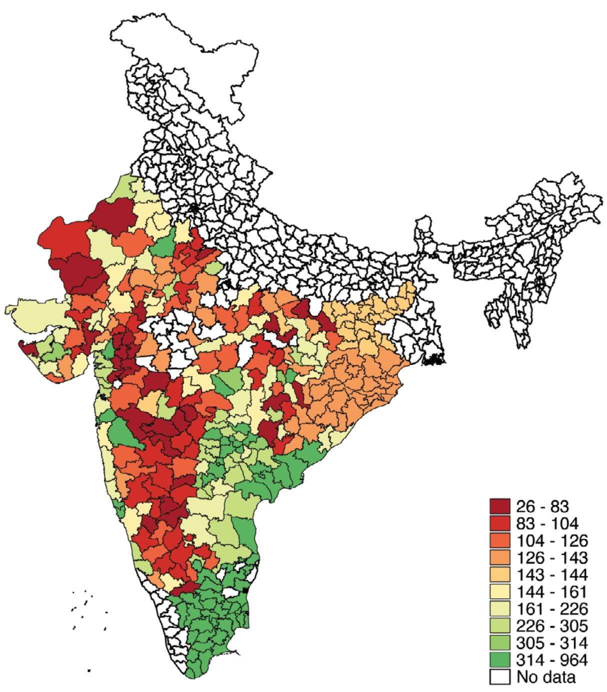
Table 5: Infrastructure Indicators

Indicator	Significance
Railways	The percentage of railway stations with 50 long-distance trains or more, and railway-station density, have been used. Greater rail access makes it easier for businesses to move people and conduct business.
Roads	Greater road access makes it easier for businesses to move people and conduct business.
Ports and Airports	Proximity to ports and airports is beneficial for ease of travel and doing business.
Electricity	Higher consumption and more reliable access to power are beneficial for businesses.

Source: Authors' elaboration.

Map 5 shows the domestic power consumption per capita across districts in 2018–19. The districts in red register lower per capita electricity consumption, while districts in green have much higher per capita consumption. As can be seen, Goa, Telangana and Tamil Nadu districts have much higher domestic per capita electricity consumption. In contrast, districts in Rajasthan, Maharashtra and Karnataka have poorer domestic per capita electricity consumption.

Map 5: Domestic Per Capita Electricity Consumption in 323 Districts (in kWh)



Source: Various State Directorates of Economics and Statistics, 2018-19.

3.5. Environment

Environmental conservation is an essential component of sustainable mining. Under this pillar, the indicators are the availability and consumption of groundwater, availability of safe drinking water, pollution caused by particulate matter (PM) 2.5 in the air, protection of forest cover, and mining wastelands (Table 6).

The quantity and quality of groundwater availability have been estimated using three sub-indicators: groundwater availability per capita, the ratio of groundwater consumption over availability, and pollution content in groundwater samples. Pollution in groundwater is measured through six pollutants—salinity, fluoride, nitrate, arsenic, iron and heavy metals. Similarly, drinking water availability has been estimated from the number of households with tap water supply and the percentage of contaminated sources through bacteriological and chemical factors.

Preservation of forests and the surrounding geography is measured through a district's change in forest cover from 2019–21 and the ratio of the district's forest cover to the average forest cover of its agro-climatic zones (India is divided into 15 agro-climatic zones). The 12 states fall under nine agro-climatic zones—the Trans-Gangetic Plains, Plateau and Hills (Eastern, Central, Western, and Southern), East Coast Plains, Ghats, Gujarat Plains, and the Western Dry Regions.

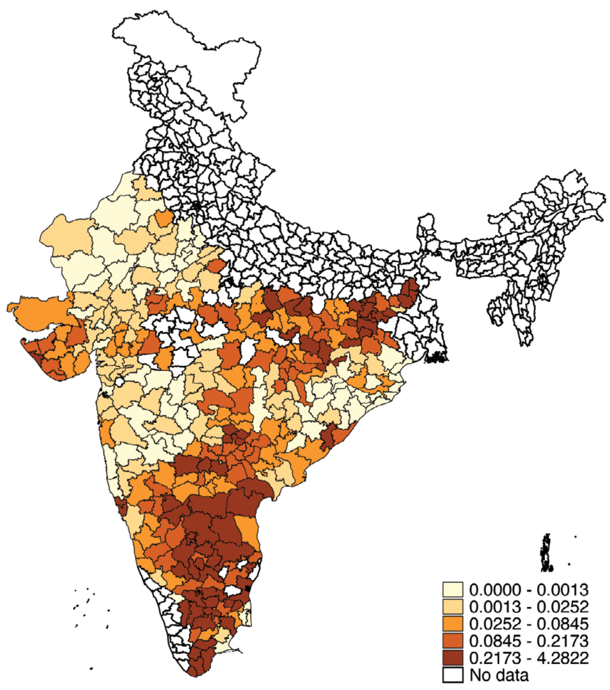
Map 6 shows the percentage of each district's geographical area covered by mining wastelands. Districts in Andhra Pradesh, Jharkhand, Tamil Nadu and Telangana register relatively higher rates of mining wastelands. Mining wastelands have been defined as dumps where waste debris is accumulated after the extraction of minerals (Ministry of Land Resources, 2019).

Table 6: Environment Indicators

Indicator	Significance
Groundwater	Higher availability, low consumption and unpolluted groundwater show greater availability for agriculture, industry and domestic use.
Drinking Water	Tap water supply and uncontaminated drinking water are required for consumption.
Pollution	A lower PM 2.5 concentration is healthier for the population.
Forestry	Larger forest areas are beneficial for human health and the ecosystem.
Mining wastelands	Mining wastelands can cause air, soil and water pollution, which are detrimental to the health of local communities.

Source: Authors' elaboration.

Map 6: Percentage of Area Covered by Mining Wastelands in 323 Districts



Source: Authors' elaboration.

4. Indexing Methodology

This second edition of the CSEP-SMAI study uses a methodology similar to the first edition, which drew upon methods used by other institutions and agencies, both Indian and international. The approaches under consideration include the Annual Survey of Mining Companies by Fraser Institute (Canada) (Stedman, Yunis, & Aliakbari, 2020), the State Investment Potential Index by the National Council of Applied Economic Research (NCAER) (National Council of Applied Economic Research, 2018), and the Global Competitive Index (GCI) (Schwab & Zahidi, 2020).

The CSEP-SMAI score of a district is constructed by aggregating five pillars. Multiple sub-indicators constitute each pillar. The sub-indicators are first normalised using the min-max transformation, making them unit-free, to a range of 0 to 100 (where 0 represents the worst-performing district and 100 the best). Equation 1 is used for normalising those sub-indicators that are 'positive' (i.e., a higher value is more desirable), and Equation 2 is used for normalising sub-indicators that are 'negative'.

Positive sub-indicators are those where higher scores imply better performance (e.g., per capita income), while negative sub-indicators with lower scores indicate better performance (e.g., pollution level).

$$S_{ij}^{k} = \frac{x_{ij}^{k} - \min\left(x_{1j}^{k}, x_{2j}^{k}, \ldots \ldots, x_{24j}^{k}\right)}{max\left(x_{1j}^{k}, x_{2j}^{k}, \ldots \ldots, x_{24j}^{k}\right) - min\left(x_{1j}^{k}, x_{2j}^{k}, \ldots \ldots, x_{24j}^{k}\right)} \quad (1)$$

$$S_{ij}^{k} = \frac{\max\left(x_{1j}^{k}, x_{2j}^{k}, \ldots \ldots, x_{24j}^{k}\right) - x_{ij}^{k}}{max\left(x_{1j}^{k}, x_{2j}^{k}, \ldots \ldots, x_{24j}^{k}\right) - min\left(x_{1j}^{k}, x_{2j}^{k}, \ldots \ldots, x_{24j}^{k}\right)} \quad (2)$$

The weighted average of the sub-indicators (the weights of each are provided in Appendix B.2) gives the district-wise pillar score. Finally, the SMAI score is computed as the weighted arithmetic mean of the five pillars, with equal weights given to each except for the MPP, which gets double weightage.

Three aggregate pillars have also been created using the pillar scores: MPP, positive, and normative. These provide broader policy perspectives on the factors affecting investment decisions (mining-specific investments) and the environmental and societal externalities.

The positive index is computed with equal weightage to the policy and governance; and infrastructure pillars. The normative index is calculated with equal weightage to the socio-economic status and environmental pillars. Detailed methodology is discussed in Appendix B.1.

5. District Mining Potential and Performance

As discussed in the previous sections, the five pillars—MPP, socio-economic status, policy and governance, infrastructure, and environment—are used to create the CSEP-SMAI. However, these districts cannot easily be compared on their sustainable mining performance, as the mining status varies considerably by district, and each district exhibits different attributes on the MPP pillar. While some have limited quantities of minor mineral production, others are major mining hotspots.

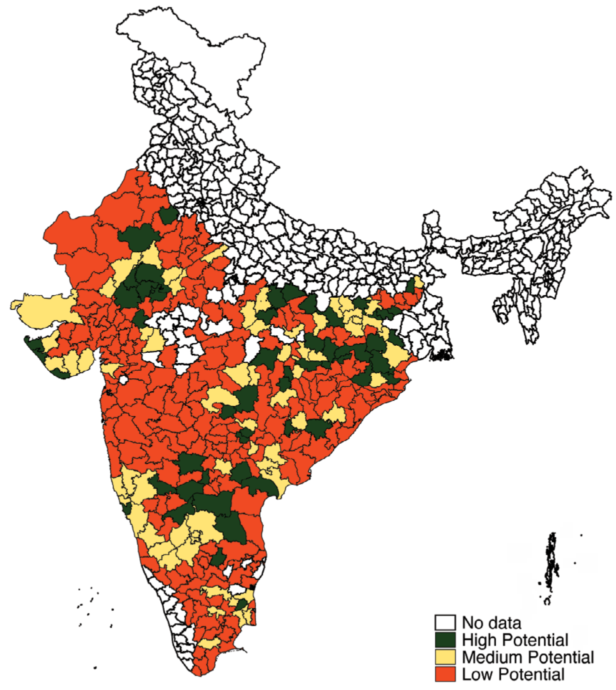
The districts have been divided into three groups (high potential, medium potential and low potential) based on their MPP pillar score for more explicit district-wise policy recommendations based on their mining characteristics. There are 52 high-potential districts and 64 medium-potential districts; the remaining 207 districts fall in the low-potential category.

State-wise distribution of all the districts under the three MPP groups is provided in Appendix D. The CSEP-SMAI is computed independently for each of these three groups. The results of the three groups are not comparable, as each group has a separate index calculated using different bases. However, the raw data of the sub-indicators have been used to compare districts across groups.

5.1. High Mining Potential and Performance Districts

The high-potential districts are the top 52 MPP districts across all the 12 mining states. The most significant representation is in Chhattisgarh, Jharkhand and Rajasthan, with seven districts each. These districts have high mining potential and performance because they have high mineral resources, reserves and production.

Map 7: Division of Districts Based on MPP Score



Source: Authors' elaboration.

Pashchimi Singhbhum in Jharkhand, for example, has high iron and manganese ore resources. It converted these resources into reserves and started production of iron and manganese. Pashchimi Singhbhum also produces ferrous minerals, collects DMF revenues and has mining leases.

Another example is Ariyalur (Tamil Nadu), which has minimal coal and limestone resources. It has efficiently converted these into reserves and is producing a majority of the limestone in the country. This results in high mining performance in the district.

5.2. Medium Mining Potential and Performance Districts

There are 64 medium potential districts across all 12 mining states, with the most significant representation from Jharkhand (nine districts). The 64 districts qualify as medium potential and performance districts because they have high mineral resources but do not have large mineral reserves and have not commenced production.

For instance, Sirohi district in Rajasthan has limestone, copper, gold, lead, zinc and tungsten resources. However, it has converted only limestone into reserves and begun production. Thus, while it has significant resources of multiple minerals, it produces minimal quantities of only one mineral, showing some mining potential and performance.

Another similar district is Hazaribagh (Jharkhand), which has resources of coal, limestone and copper but has reserves of only limestone and coal and produces only coal. Resources of copper have not been converted into reserves. Limestone has not been extracted from its reserves.

5.3. Low Mining Potential and Performance Districts

There are 207 low-potential districts across 11 mining states (Goa as the exception), with the most significant representation from Maharashtra (29). Low-MPP districts show mining potential through some mineral resources that are yet to be converted into mineable reserves and production.

For example, Dharwad district (Karnataka) has resources of iron ore and gold but has no mining activities as the district has been unable to convert them into mineable reserves. Another example is West Godavari district (Andhra Pradesh), which has significant coal resources but has only been able to convert a small portion into reserves. No coal production has begun in the West Godavari district, indicating low MPP.

6. Results

6.1. High Mining Potential and Performance Districts

In this section, the study discusses the indexing results of two of the top high-MPP districts (both in Jharkhand)—Pashchimi Singhbhum (ranked 5) and Dhanbad (ranked 11) (Table 7 and Appendix E.1). It is important to understand the relevant factors that drive the SMAI results. This is done by analysing a district's performance on the sub-indicators to determine focus areas for the various stakeholders, such as the district administration. The complete list of pillar-wise scores and overall SMAI results for all 52 high-potential districts is mentioned in Appendices E.1 and F.1.

As mentioned, Pashchimi Singhbhum district ranks 5 out of 52 on the MPP pillar, showing very high mining potential. However, it ranks very low on the positive (policy and governance: ranked 39; infrastructure: ranked 35) and normative aggregate pillars (socio-economic status: ranked 52; environment: ranked 32), thus bringing down the district's SMAI ranking to 49.

Table 7: Top 10 (of 52) High-MPP Districts

State[5]	District	MPP	Positive	Normative	SMAI
OD	Keonjhar	**1**	39	21	3
CG	Dantewada	**2**	44	2	2
OD	Jajapur	**3**	37	34	15
MP	Satna	**4**	36	45	29
JH	Pashchimi Singhbhum	**5**	40	51	49
TN	Ariyalur	**6**	35	5	4
OD	Sundargarh	**7**	18	25	11
RJ	Rajsamand	**8**	28	37	21
OD	Jharsuguda	**9**	21	36	19
RJ	Udaipur	**10**	43	39	37

Source: Authors' elaboration.

[5] State names and codes are provided in Appendix C.

It is the poorest performing district on the socio-economic status pillar because the district differentials show poor maternal and child health, poor literacy, poor employment, and low per capita incomes. In addition, tap water supply in the district is limited.

Focussing on the abovementioned issues would help build sustainable practices in the district. The district must also promote industry growth and connectivity through railways and roadways. Without basic infrastructure and industry, attracting the required investment to realise Pashchimi Singhbhum's abundant mining potential will be difficult.

Another interesting case is Dhanbad district, which has high mineral potential (rank 11), particularly for coal, sound policy and governance (rank 4), and good infrastructure (rank 17). However, its sustainability ranks are inferior (socio-economic status: rank 36; the environment: rank 52).

Some focus areas to improve sustainability in the Dhanbad district are its LFPR, groundwater usage, tap water supply, pollution levels and forest cover. Natural resources like water and forests have been over-utilised, leading to poorer outcomes. To mine sustainably in the future, these are some significant areas the district administration in Dhanbad needs to work towards.

6.2. Medium Mining Potential and Performance Districts

This section discusses the indexing results of the medium potential and performance districts (Table 8). Among the 64 districts, medium MMP districts, the performance of 4 districts is analysed below: Rayagada (Odisha), Lohardaga and Saraikela (Jharkhand), and Panna (Madhya Pradesh). The complete list of pillar-wise scores and overall SMAI results for all the medium-potential districts is mentioned in Appendices E.2 and F.2.

Rayagada district (ranked 1) in Odisha and Lohardaga district (ranked 4) in Jharkhand are two important examples that highlight the focus areas that would improve their performance on the MPP pillar. The two districts show some resources of non-ferrous minerals that they have successfully converted into mineral reserves. However, they do not qualify as high MPP districts because they do not register high production and royalty collections. However, they have many non-functional mining leases. If these non-functioning mining leases are turned into operational leases, they could fully utilise the mining potential in their districts.

Panna district (Madhya Pradesh) is ranked 10 on the MPP pillar, showing good mining potential. However, it ranks very low on the positive pillars (policy and governance: ranked 25; infrastructure: ranked 56) and normative pillars (socio-economic status: ranked 64; and

Table 8: Top 10 (of 64) Medium-MPP Districts

State	District	MPP	Positive	Normative	SMAI
OD	Rayagada	**1**	51	33	17
KA	Chitradurga	**2**	23	36	10
RJ	Ajmer	**3**	10	59	13
JH	Lohardaga	**4**	19	55	19
JH	Gumla	**5**	57	46	36
RJ	Sirohi	**6**	59	54	45
CG	Kanker	**7**	63	11	23
MH	Kolhapur	**8**	15	4	3
AP	Krishna	**9**	1	25	2
MP	Panna	**10**	41	57	43

Source: Authors' elaboration.

the environment: ranked 22), thus bringing down the district's SMAI ranking to 43. It is the poorest performing district on the socio-economic status pillar (rank 64).

Panna, however, shows low per capita income, low education levels and low LFPR. In addition, the tap water supply in the district is lower than in other districts. The district must focus on the areas mentioned above to achieve sustainability. The district must focus on improving industries, railways, roads and electricity consumption to attract investment.

Saraikela district in Jharkhand is an example of the importance of sustainability in SMAI. The district performs well on its investment potential (MPP: ranked 17; policy and governance: ranked 13; infrastructure: ranked 41). However, it performs poorly on the normative pillars (socio-economic status: rank 59; the environment: rank 55).

Primary focus areas to improve sustainability in Saraikela district would be per capita income, education levels, child-health indicators, groundwater availability, tap water supply and forest cover.

6.3. Low Potential and Performance Districts

The SMAI results show that 207 of the 323 districts analysed fall in the low-MPP category (Table 9). The performance of these districts was analysed on the sub-indicators to understand the factors driving the SMAI results. The complete list of pillar-wise scores and overall SMAI results for all the low-potential districts is mentioned in Appendices E.3 and F.3.

We analyse the results of two districts—Vizianagaram (Andhra Pradesh) ranked 1 in the low-MPP rankings, and Udupi (Karnataka) ranked 14—highlighting how they can increase their sustainable mining attractiveness by focusing on their MPP, as they already perform well on the positive and normative pillars.

Vizianagaram district in Andhra Pradesh ranked 1 among low-MPP districts. It performed well on the positive (policy and governance: ranked 87; infrastructure: ranked 25) and normative aggregate pillars (socio-economic status: ranked 74; and the environment: ranked 48). This indicates that the district is sustainable and has the policy, governance and infrastructure to make it attractive to investors.

Vizianagaram can convert from a low MPP to a high MPP district as it has limestone, manganese and graphite resources which are underutilised, with minimal reserves of limestone and manganese and only small amounts of manganese ore production.

Similarly, Udupi district (ranked 14) in Karnataka is also towards the top on the positive (policy and governance: ranked 5; and infrastructure: ranked 38) and normative aggregate pillars (socio-economic status: ranked 2; and environment: ranked 28). The district, however, lacks in terms of mining performance.

Table 9: Top 10 (of 207) Low-MPP Districts

State	District	MPP	Positive	Normative	SMAI
AP	Vizianagaram	**1**	24	61	66
MH	Raigad	**2**	56	72	19
OD	Nuapada	**3**	146	149	13
RJ	Jaisalmer	**4**	160	206	35
TN	Tirunelveli	**5**	103	42	43
TN	Namakkal	**6**	117	24	16
MH	Ratnagiri	**7**	155	86	2
OD	Bargarh	**8**	145	148	10
RJ	Jaipur	**9**	39	172	64
TN	Tenkasi	**10**	185	37	147

Source: Authors' elaboration.

Udupi has reasonable prospects of becoming a high-MPP district as it has resources of limestone and bauxite. However, due to a lack of exploration, these have not been converted into reserves, let alone used for production.

7. Policy and Conclusions

The CSEP Sustainable Mining Attractiveness Index (SMAI) is derived from five pillars: mining potential and performance, policy and governance, infrastructure, socio-economic status, and environment. The index guides mining investment decisions and sustainability practices across 323 districts in 12 major mining states in India. It also provides policy amendment signals at the district and state levels.

While mining potential is an essential incentive for mining investments, policy, governance, and infrastructure are also important. Additionally, socio-economic status and environmental aspects help boost the sustainability of mining businesses while compensating for the externalities.

7.1. Slack in Exploration

The slack in exploration has been one of the most debilitating factors keeping the Indian mining sector's performance behind its peers. While much of the policy discourse centres around national-level mining policies, State governments also play a significant role through their policy parameters.

For example, iron-ore resources have been discovered in 73 of the 323 mining districts, but only 31 districts have converted them into mineable reserves through further exploration. This indicates a slack in exploration, as less than half the districts with iron-ore resources have converted them into reserves, and fewer still have started production (only 26 districts).

Hassan (Karnataka) and North Goa (Goa) are examples of medium mining potential districts with resources and reserves of iron ore but no production, showing poor mining performance. Similarly, 68 of all 323 districts have bauxite resources, but bauxite reserves exist in only 29 districts, and bauxite production takes place in only 20 districts. The conversion rate of bauxite resources to reserves is thus only about 20 per cent, which is lower than the global standard. Dantewada (Chhattisgarh) and Satna (Madhya Pradesh) are high-mining potential districts with resources and bauxite reserves that have not yet started production.

Hence, it can generally be observed that mineral resources in India have not yet been converted into reserves.

7.2. Sustainable Mining: Environment, Education and Health

Despite the gap created by slack in exploration, these 323 mining districts could have done much better on sustainable mining, but for the oversight on the normative pillars (socio-economic status; and environment).

There are several policy focus areas to increase the mitigation of environmental externalities. Pollution of groundwater and tap water sources is a significant issue in mining districts. In over 85 per cent of the districts, groundwater and tap water sources were contaminated with pollutants.

Secondly, overexploitation of the available groundwater is seen in almost 55 districts, with the highest consumption in the low mining potential district, Jaisalmer (Rajasthan), at about 300 per cent of the annual replenishment.

Finally, about 85 per cent of the mining districts show poor mine closure practices due to the spread of mining wasteland areas. Guntur (Andhra Pradesh), a high mining potential district, has the most significant footprint of mining wastelands at almost 4 per cent of its geographical area.

Similarly, health and education indicators have overt policy implications for the districts. Sub-indicators for health measure access to healthcare for women and children. About 81 per cent of districts have more than 50 per cent of the women classified as anaemic, with the highest percentage (80 per cent) of anaemic women in Kondagaon (Chhattisgarh), a low mining potential district.

The mining districts do not perform any better on the child health indicators, with most districts showing that a high percentage of children under five years are stunted, wasted and underweight.

Education indicators measure the population percentage in a district with primary, middle, secondary, higher and graduate-level education. In 13 districts in our study, less than 50 per cent of the population had primary-level education. Smaller percentages have received education at higher levels. For example, in Malkangiri (Odisha), a low-mining potential district, only 10 per cent of the population has secondary-level education.

As discussed earlier, DMF funds are trusts established to work for the welfare of the mining-affected communities. The DMF funds are linked to the Pradhan Mantri Khanij Kalyan Yojana (PMKKKY), which implements various welfare programmes for the mining-affected communities and the environment. Environmental, education and health issues are high-priority areas under PMKKY (Chadha & Kapoor, 2022).

The CSEP-SMAI study can, thus, be used by the district officials to isolate the focus areas where DMF funds can be best utilised.

8. Further Work

8.1. State-wise District-level Analysis

The scope of this study can further be expanded to create district-level individual indices for each of the 12 states. A case study of Jharkhand state has already been carried out. State-level indices are important for engaging with State governments. In addition, future investors interested in minerals available in specific states can use individual studies to understand the state policies and their investment potential.

8.2. The CSEP-SMAI Dashboard

The study team proposes publishing the data collected on an online dashboard, which allows users to adjust the weights for the sub-indicators and to create alternative indices. Such information would be helpful for researchers, governments, local communities, civil society, and mining companies. An example would be an ore-specific index for critical minerals, i.e., mining companies specialising in just one type of mineral could adjust weights such that only districts with that ore are shown. In addition, the mining companies may be interested in locating more sustainable districts with critical mineral resources.

8.3. Personal Visits and Focus Group Discussions

Personal visits to mining areas and focus group discussions (FGDs) with State governments, district administrations, mining companies, civil society, and local communities would help to understand better the implications of mining on sustainable development in a district. These FGDs would aim to capture opinions on externalities affecting the environment, the well-being of local communities, ease of mining operations, and enforcement of regulations.

9. References

Chadha, R., & Kapoor, I. (2022). *District Mineral Foundation Funds: Evaluating the Performance.* Centre for Social and Economic Progress. Retrieved from https://csep.org/discussion-note/district-mineral-foundation-funds-evaluating-the-performance/

Chadha, R., Sivamani, G., & Bansal, K. (2023). *Critical Minerals for India 2023.* New Delhi: Centre for Social and Economic Progress. Retrieved from https://csep.org/working-paper/critical-minerals-for-india-2023/

Chatterjee, B., & Chadha, R. (2020). *Enhancing mineral exploration in India.* Brookings India. Retrieved from https://csep.org/discussion-note/indias-mineral-exploration-legacy/

Global Data Lab. (2019). *Subnational HDI.* Global Data Lab. Retrieved from https://globaldatalab.org/shdi/table/shdi/IND/?levels=1+4&interpolation=0&extrapolation=0

Indian Bureau of Mines. (2009). *Guidelines Under MCDR for United Nations Framework Classification of Mineral Reserves / Resources.* Nagpur: Indian Burea of Mines. Retrieved from http://ibm.nic.in/writereaddata/files/07042014175101unfc.pdf

Ministry of Land Resources. (2019). *Wastelands Atlas of India 2019.* Retrieved from https://dolr.gov.in/en/documents/wasteland-atlas-of-india

Ministry of Mines. (2019). *National Mineral Policy 2019.* Retrieved from https://mines.gov.in/admin/storage/app/uploads/64352887bcfa41681205383.pdf

Ministry of Mines. (2022). *Annual Report.* Ministry of Mines. Retrieved from https://mines.gov.in/writereaddata/UploadFile/Mines_AR_2021-22_English.pdf

Ministry of Mines. (2023). *Proposal for Amendment of the Mines and Minerals (Development and Regulation) Act, 1957.* New Delhi: Ministry of Mines.

Ministry of Statistics and Programme Implementation. (2023). *National Accounts Statistics.* Delhi: Ministry of Statistics and Programme Implementation. Retrieved from https://www.mospi.gov.in/publication/national-accounts-statistics-2023

National Council of Applied Economic Research. (2018). *NCAER State Investment Potential Index 2018.* New Delhi: National Council of Applied Economic Research. Retrieved from https://www.ncaer.org/publication_details.php?pID=296

NITI Aayog. (2021). *SDG India Index Report 2020-21.* Retrieved from https://sdgindiaindex.niti.gov.in/assets/Files/SDG3.0_Final_04.03.2021_Web_Spreads.pdf

Press India Bureau. (2022). *Udyam Portal of Ministry of MSME achieves landmark One crore registrations.* Retrieved from PIB: https://pib.gov.in/PressReleasePage.aspx?PRID=1847452

Schwab, K., & Zahidi, S. (2020). *The Global Competitiveness Report.* World Economic Forum. Retrieved from https://www.weforum.org/reports/the-global-competitiveness-report-2020/

Stedman, A., Yunis, J., & Aliakbari, E. (2020). *Annual Survey of Mining Companie 2019.* Fraser Institute. Retrieved from https://www.fraserinstitute.org/studies/annual-survey-of-mining-companies-2019

10. Appendices

Appendix A. Pillars and Indicators of CSEP-SMAI

Appendix A.1. Data Sources

Indicator	Sub-indicator	Source	Normalisation	Year
Mining Potential and Performance				
Mineral reserves	Reserves, resources and production of 23 minerals classified into 7 categories	"Indian Mineral Inventory", Indian Bureau of Mines (IBM) evaluated using average sale price *Coal Directory of India*[6]	Geographic area	2015 2020–21
Remaining mineral resources				
Mineral production		*Indian Mineral Yearbook 2020*[7] *Coal Directory of India*[8]		2019–20 2020–21
Mining leases	Total mining lease area	*IBM Bulletin*[9]	Geographic area	2021
Mineral revenue	DMF collection	Lok Sabha questions and answers[10]	Geographic area	2020
Socio-economic Status				
Education	% working-age population with primary education	NSS 75th round for Schedule 25.2 – Social Consumption: Education[11]		2017–18
	% working-age population with middle education			
	% working-age population with secondary education			
	% working-age population with higher education			
	% working-age population with graduate education			

[6] https://coal.gov.in/en/whats-new/coal-directory-india-2020-21
[7] https://ibm.gov.in/IBMPortal/pages/Indian_Minerals_Yearbook
[8] https://coal.gov.in/en/whats-new/coal-directory-india-2020-21
[9] https://ibm.gov.in/writereaddata/files/10312022163546MLPL_2021.pdf
[10] https://sansad.in/ls/questions/questions-and-answers
[11] https://mospi.gov.in/sites/default/files/publication_reports/KI_Education_75th_Final.pdf

Indicator	Sub-indicator	Source	Normalisation	Year
Vocational education	% working-age population with any vocational/ technical training	NSS 75th round for Schedule 25.2 – Social Consumption: Education[12]		2017–18
Health	Maternal mortality rate	Health Management Information System[13]	Maternal deaths per 100,000 live births	2019–20
	Infant mortality rate		Infant deaths per 1,000 live births	
	% women anaemic			
	% children under five who are stunted			
	% children under five who are wasted			
	% children under five who are underweight			
Employment	Labour force participation rate	Periodic Labour Force Survey[14]		2019–20
	Women participation rate in the labour force			
Economy	GDDP	Individual state directorates of economics and statistics (DES)	Per capita	2018–19
Demographics	Sex ratio	National Family Health Survey – 5[15]		2019–20
Policy and Governance				
Capacity of regulatory authority	% ECs granted within 180 days	PARIVESH portal[16]	% of Total EC applied	2015–22
Left-wing insurgency	Incidents from 2008–2015	South Asian Terrorism Portal[17]		2008–22
	Incidents from 2016–2022			
Land	Cadastral maps linked to the record of rights	Ministry of Rural Development[18]	% of total cadastral maps	2022

[12] https://mospi.gov.in/sites/default/files/publication_reports/KI_Education_75th_Final.pdf
[13] https://hmis.mohfw.gov.in/#!/
[14] https://www.mospi.gov.in/unit-level-data-periodic-labour-force-survey-plfs-july-2019-june-2020
[15] http://rchiips.org/nfhs/factsheet_NFHS-5.shtml
[16] https://parivesh.nic.in/
[17] https://www.satp.org/
[18] https://dilrmp.gov.in/faces/rptstatewisephysical/rptMapDigitization.xhtml

Indicator	Sub-indicator	Source	Normalisation	Year
Law and order	Cognisable crimes committed	State police portals	Per lakh population	2019–20
	Police stations		Per lakh population	
Industrial area	Micro, small and medium enterprises (MSME)	Udyam registration portal[19]	Per capita	October 10, 2022
Infrastructure				
Railways	% railway stations with 50 long-distance trains or more	RailYatri[20]		2022
	Railway station density		Geographic area	
Roads	State highway road density	Individual State governments	Geographic area	2022
Ports and airports	Distance to nearest airport from district HQ	Google maps, Indian Ports Association, Airports Authority of India		2022
	Distance to nearest shipping port from district HQ			
Electricity	Domestic electricity consumption	Individual state Directorates of Economics and Statistics (DES)	Per capita	2018–19
Environment				
Groundwater	Groundwater availability	*Dynamic Groundwater Resources of India*[21]	Per capita	2019–20
	Groundwater consumption as % of availability			
	Pollutants found in Groundwater	*State Groundwater Yearbook*[22]	Total number of pollutants tested (six)	2020–21
Drinking water	% households with tap water supply	Ministry of Drinking Water and Sanitation[23]		2020–21
	% sources contaminated: chemical			
	% sources contaminated: bacteriological			
Pollution	Average PM 2.5 concentrations	Urban Emissions[24]		2018–20

19 https://udyamregistration.gov.in/Government-India/Ministry-MSME-registration.htm
20 https://www.railyatri.in/stations
21 https://cgwb.gov.in/documents/2021-08-02-GWRA_India_2020.pdf
22 http://cgwb.gov.in/gw-year-book-state.html
23 https://jalshakti-ddws.gov.in/
24 https://urbanemissions.info/

Indicator	Sub-indicator	Source	Normalisation	Year
Forestry	Ratio of district forest cover to average in its agro-climatic zone	*Indian State of Forest Report*[25]		2020–21
	% change of forest cover from 2019 assessment			
Mining impact	Mining wastelands	*Wastelands Atlas*[26]	Share of geographic area	2019

Appendix A. 2. Mineral Categories

Mineral Category	Minerals
Ferrous	Iron ore, Manganese ore, Chromite
Non-ferrous	Bauxite, Copper ore, Lead ore, Zinc ore, Platinum
Strategic	Cobalt ore, Nickel ore, Molybdenum, Tungsten, Vanadium, Tin
Precious	Gold ore, Emerald, Silver ore
Fertiliser	Apatite, Phosphorous, Potash

[25] https://fsi.nic.in/forest-report-2021-details
[26] https://dolr.gov.in/en/documents/wasteland-atlas-of-india

Appendix B. Indexing Methodology and Weighting Diagram

Appendix B.1. Indexing Methodology

The CSEP-SMAI is constructed using five pillars that incorporate mining potential and performance measures, infrastructure, environment, socio-economic status, and policy and governance. Each pillar has four to six indicators, further divided into various sub-indicators. These sub-indicators are aggregated to give individual pillar scores, then used to construct the aggregate Index, SMAI. The SMAI is designed to provide a holistic understanding of the district's potential for mineral resources-led development.

Standardised data: Constructing the index first requires normalising the data into a unitless index between 0 and 100. The sub-indicators are normalised using a min-max transformation. This methodology is similar to the NCAER State Investment Potential Index, the Annual Survey of Mining Companies by Fraser Index, and the Global Competitive Index (GCI). The sub-indicators are normalised using equation 1.1 if the sub-indicator is positive; if negative, it uses equation 1.2 to normalise the data.

$$S_{ij}^{k} = \frac{x_{ij}^{k} - \min\left(x_{1j}^{k}, x_{2j}^{k}, \dots\dots, x_{24j}^{k}\right)}{max\left(x_{1j}^{k}, x_{2j}^{k}, \dots\dots, x_{24j}^{k}\right) - min\left(x_{1j}^{k}, x_{2j}^{k}, \dots\dots, x_{24j}^{k}\right)} \quad (1.1)$$

$$S_{ij}^{k} = \frac{\max\left(x_{1j}^{k}, x_{2j}^{k}, \dots\dots, x_{24j}^{k}\right) - x_{ij}^{k}}{max\left(x_{1j}^{k}, x_{2j}^{k}, \dots\dots, x_{24j}^{k}\right) - min\left(x_{1j}^{k}, x_{2j}^{k}, \dots\dots, x_{24j}^{k}\right)} \quad (1.2)$$

Where i = 1, 2, ……, 24 represents the number of districts, j = 1,2,…..,m represents the number of sub-indicators in each pillar, and k=1, 2, …., 5 represents the five pillars. Higher values of S_{ij}^{k} indicate better performance. For negative sub-indicators, where the higher value represents lower performance, equation 1.2 shows the adjusted value.

Weights: The MPP pillar is assigned a double weight in the index, while the four pillars are given equal weightage. Within each pillar, the weighting diagram varies. Details about the weight diagram and the rationale behind it are given in Appendix B.2. The weighted arithmetic mean of all the sub-indicators in each pillar is used to calculate the final pillar score in each district 'i',

$$\rho_{i}^{k} = \frac{\sum_{j=1}^{m} w_j s_{ij}^{k}}{m} \quad (2)$$

where w_j represents the weight of each sub-indicator, k =1, 2, …., 5 represents the five pillars, and m is the number of sub-indicators under each pillar.

Final score: A weighted arithmetic mean is calculated based on the pillar scores. Mining Potential and Performance pillar gets a weight of two, while the other pillars are assigned one weight. This creates an aggregate score across all pillars called the final score (FSi).

$$FS_i = \frac{\sum_{k=1}^{5} w_k \rho_{i}^{k}}{5} \quad (3)$$

where k = 1, 2, 3, 4, 5 represent the ρ pillars and w_k represents the weights for each of the five pillars. Additionally, the pillar ρ_{i}^{k} scores are also used to create two additional indices—positive and normative. The positive index is calculated using a weighted arithmetic mean of the policy and governance, and infrastructure pillar scores. Both the pillar scores get an equal weight.

$$Positive_i = \frac{\sum_{k=1}^{2} w_k \rho_{i}^{k}}{2} \quad (4)$$

where k = 1, 2 represent the ρ pillars and w_k represents the weight of each of the five pillars. Similarly, the normative index is calculated using the weighted arithmetic mean of the socio-economic status and environment pillar scores. Both the socio-economic status and environment pillar are assigned equal weights.

$$Normative_i = \frac{\sum_{k=1}^{2} w_k \rho_{i}^{k}}{2} \quad (5)$$

where k = 1, 2 represent the ρ pillars and w_k represents the weight of each of the five pillars.

Appendix B.2. Weights and Rationales

Indicator	Sub-indicator	Weight	+ve / -ve	Rationales for weight choice
Mineral Potential and Performance				
Mineral reserves	7 categories of reserves	25% (equally divided)	+	The mining potential of a district is an important indicator of mining potential and attractiveness, and the quantities of reserves and remaining resources were given a weight of 25% each (higher than the average 20%). Each of the 7 mineral categories were given an equal weight within these indicators (i.e., 25%/7 each).
Remaining resource	7 categories of resources	25% (equally divided)	+	
Mineral production	Production of 7 categories	20% (equally divided)	+	Mineral production represents the current status of mining and was given the average weight of an indicator.
Mining leases	Ratio of mining lease area to total GA	20%	+	The area of mining leases represents the current mining status and was given the average weight of an indicator.
Mineral revenue	DMF collection normalised by GA	10%	+	DMF collection was given a lower weight than the average indicator weight, since mining production already gives a picture of the resources extracted.
Socio-economic Status				
Education	% working-age population with primary education	4%	+	The education pillar was given the average weight of an indicator (20%). Each of the five sub-indicators was divided equally to give 4% each.
	% working-age population with middle education	4%	+	
	% working-age population with secondary education	4%	+	
	% working-age population with higher education	4%	+	
	% working-age population with graduate education	4%	+	
Vocational education	% working-age population with any vocational/ technical training	10%	+	The vocational education indicator was given a lower-than-average weight. It is an important metric of skills training and is given half the weight of overall formal education.

Indicator	Sub-indicator	Weight	+ve / -ve	Rationales for weight choice
Health	Maternal mortality rate (maternal deaths per 100,000 live births)	3.3%	+	The health indicator was given the average indicator weight, and each sub-indicator was given one-sixth of this (3.3% each).
	Infant mortality rate (infant deaths per 1,000 live births)	3.3%	–	
	% women anaemic	3.3%	–	
	% children under five who are stunted	3.3%	–	
	% children under five who are wasted	3.3%	–	
	% children under five who are underweight	3.3%	–	
Employment	Labour force participation rate	13%	+	The employment indicator was given the average indicator weight. The overall labour force participation was given a higher weight than the women's labour force participation, since it would include both men and women.
	Women's participation in the labour force	7%	+	
Economy	GDDP per capita	20%	+	The economic indicator was given the average indicator weight.
Demographics	Sex ratio	10%	+	Sex ratio was given half the average indicator weight. It is an important metric of demographics and gender equity.
Policy and Governance				
Capacity of regulatory authority	% ECs granted within 180 days	20%	+	This indicator was given the average indicator weight.
Left-wing insurgency	Incidents from 2008–2015	7%	–	This indicator was given the average indicator weight. More importance was given to more recent incidents of left-wing insurgency.
	Incidents from 2016–2022	13%	–	
Land	% cadastral maps linked to the record of rights	20%	+	This indicator was given the average indicator weight.
Law and order	Cognisable crimes committed per lakh population	15%	-	This indicator was given the average indicator weight. A higher weight is given to cognisable crimes committed per lakh.
	Police stations per lakh population	5%	+	
Industrial area	Per capita micro, small and medium enterprises (MSME)	20%	+	This indicator was given the average indicator weight.

Indicator	Sub-indicator	Weight	+ve / -ve	Rationales for weight choice
Infrastructure				
Railways	% railway stations with 50 long-distance trains or more	10%	+	This indicator was given the average indicator weight. A slightly higher weight was given to railway station density.
	Railway station density	15%	+	
Roads	State highway road density	25%	+	This indicator was given the average indicator weight.
Ports and airports	Distance to nearest airport from district HQ	17%	–	This indicator was given the average indicator weight. A lower weight was given to the cargo ports sub-indicator.
	Distance to nearest shipping port from district HQ	8%	–	
Electricity	Per capita domestic electricity consumption	25%	+	This indicator was given the average indicator weight.
Environment				
Groundwater	Groundwater availability per capita	12%	+	This indicator was given the average indicator weight. The availability sub-indicator was given the largest weight, followed by the consumption percentage (a measure of scarcity). The pollution level was given a low weight as the available data was unidimensional.
	Groundwater consumption as % of availability	6%	–	
	Groundwater pollution level	2%	–	
Drinking water	% households with tap water supply	10%	+	This indicator was given the average indicator weight. The percentage of households with tap water supply was given the highest weight of the three sub-indicators, as access to drinking water was considered the most important. Both chemical and bacteriological contamination were given equal weights.
	% sources contaminated: chemical	5%	–	
	% sources contaminated: bacteriological	5%	–	
Pollution	Average PM 2.5 concentrations	20%	–	This indicator was given the average indicator weight.
Forestry	Ratio of district forest cover to average in its agro-climatic zone	13%	+	This indicator was given the average indicator weight. A higher weight was given to the ratio of forest cover to average in the relevant agro-climatic zone.
	% change of forest cover from the 2019 assessment	7%	+	
Mining impact	Mining wastelands: share of GA	20%	–	This indicator was given the average indicator weight.

Appendix C. State codes

State	State Code
Andhra Pradesh	AP
Chhattisgarh	CG
Goa	GA
Gujarat	GJ
Jharkhand	JH
Karnataka	KA
Madhya Pradesh	MP
Maharashtra	MH
Odisha	OD
Rajasthan	RJ
Tamil Nadu	TN
Telangana	TS

Appendix D. Number of Districts in each MPP Category by State

States	High Potential	Medium Potential	Low Potential
Chhattisgarh	7	7	13
Jharkhand	7	9	9
Rajasthan	7	5	21
Andhra Pradesh	3	2	8
Goa	1	1	0
Gujarat	3	6	23
Karnataka	5	7	18
Maharashtra	1	5	29
Madhya Pradesh	6	7	19
Odisha	6	3	21
Tamil Nadu	1	7	24
Telangana	5	5	23

Appendix E. Results: Pillar-wise Scores

Appendix E.1. High Potential and Performance Districts

State	Districts	MPP	SES	P&G	Infrastructure	Environment	SMAI
OD	Keonjhar	**34.86**	40	71	20	61	44
CG	Dantewada	**28.29**	53	55	32	73	45
OD	Jajapur	**26.66**	36	63	29	54	39
MP	Satna	**18.72**	36	67	24	47	35
JH	Pashchimi Singhbhum	**18.31**	19	61	28	49	32
TN	Ariyalur	**18.06**	54	48	44	68	42
OD	Sundargarh	**17.43**	45	70	37	54	40
RJ	Rajsamand	**16.67**	41	73	28	45	37
OD	Jharsuguda	**15.28**	37	73	32	49	37
RJ	Udaipur	**14.64**	38	50	38	49	34
JH	Dhanbad	**13.80**	39	82	36	28	35
JH	Ramgarh	**13.19**	34	90	50	47	41
RJ	Bhilwara	**12.97**	44	63	25	39	33
KA	Bellary	**11.85**	39	81	46	55	41

State	Districts	MPP	SES	P&G	Infrastructure	Environment	SMAI
GA	South Goa	**11.76**	63	88	53	69	50
RJ	Chittaurgarh	**11.35**	43	74	27	43	35
KA	Kolar	**10.89**	50	77	38	52	40
GJ	Porbandar	**10.72**	49	72	39	61	41
CG	Baloda Bazar	**10.69**	59	72	36	48	39
MP	Katni	**10.48**	26	73	27	56	34
KA	Gulbarga	**10.31**	39	81	51	56	41
OD	Angul	**9.20**	42	59	27	60	34
CG	Durg	**8.98**	66	76	45	40	41
TS	Nalgonda	**8.90**	49	62	33	67	38
MP	Singroli	**8.67**	38	73	8	57	32
CG	Balrampur	**8.59**	54	72	19	60	37
GJ	Gir Somnath	**8.35**	42	43	39	78	36
CG	Korba	**8.23**	58	75	27	51	38
RJ	Jhunjhunu	**7.94**	53	77	23	45	36
TS	Adilabad	**7.37**	40	53	20	74	34
OD	Koraput	**7.31**	35	52	30	65	33
JH	Purbi Singhbhum	**7.16**	36	76	34	40	33
CG	Balod	**7.02**	67	74	24	41	37
KA	Bagalkote	**6.91**	46	81	37	60	40
TS	Peddapalle	**6.44**	41	54	18	76	33
JH	Bokaro	**6.39**	42	82	28	39	34
AP	Cuddapah	**5.88**	50	64	52	64	40
JH	Godda	**5.66**	29	76	33	43	32
AP	Kurnool	**5.50**	46	71	37	43	35
CG	Raigarh	**5.41**	49	71	31	48	35
TS	Narayanpet	**5.30**	50	58	26	75	37
GJ	Devbhumi Dwarka	**5.22**	50	61	36	61	36
RJ	Nagaur	**4.99**	38	81	35	40	34
MH	Chandrapur	**4.54**	44	57	30	58	33
AP	Guntur	**4.36**	52	49	64	40	36
MP	Neemuch	**4.35**	34	78	25	57	34
KA	Raichur	**4.26**	33	77	30	58	34
MP	Balaghat	**4.16**	40	76	30	61	36
RJ	Banswara	**4.11**	39	58	20	45	28
JH	Chatra	**4.08**	38	74	28	48	33
TS	Karimnagar	**4.08**	49	66	29	73	38
MP	Rewa	**4.02**	40	75	19	45	31

Appendix E.2. Medium Potential and Performance Districts

State	Districts	MPP	SES	P&G	Infrastructure	Environment	SMAI
OD	Rayagada	**25.37**	34	63	24	65	40
KA	Chitradurga	**25.12**	44	78	27	53	42
RJ	Ajmer	**24.63**	39	76	43	36	41
JH	Lohardaga	**24.53**	29	76	32	51	40
JH	Gumla	**23.36**	35	61	23	52	36
RJ	Sirohi	**22.74**	37	60	22	44	35
CG	Kanker	**21.13**	50	60	18	64	39
MH	Kolhapur	**20.87**	53	63	47	69	46
AP	Krishna	**20.57**	46	73	64	59	47
MP	Panna	**19.93**	17	71	22	59	35
TN	Salem	**18.68**	52	51	46	56	40
JH	Palamu	**18.53**	36	61	26	50	35
JH	Ranchi	**18.50**	43	72	40	45	39
RJ	Pali	**17.13**	32	73	35	40	36
CG	Bilaspur	**17.11**	45	75	35	46	39
GJ	Bhavnagar	**16.69**	40	57	42	60	39
JH	Saraikela	**16.20**	30	76	28	45	35
GJ	Amreli	**15.25**	39	57	46	67	40
RJ	Bundi	**14.95**	34	54	23	40	30
GA	North Goa	**14.86**	61	86	52	58	48
MH	Yavatmal	**14.78**	37	56	24	60	35
TS	Rangareddy	**14.68**	66	57	48	56	43
JH	Garhwa	**14.21**	32	64	23	54	34
JH	Hazaribagh	**13.33**	38	56	29	46	33
GJ	Jamnagar	**13.04**	45	79	48	68	44
TN	Virudhunagar	**13.02**	54	54	50	53	40
MP	Damoh	**12.48**	40	71	23	56	36
MP	Dhar	**12.41**	36	71	29	53	36
TN	Cuddalore	**12.25**	51	44	50	59	38
MP	Anuppur	**12.02**	33	72	18	51	33
MH	Nagpur	**11.48**	44	79	51	60	43
GJ	Kachchh	**11.37**	36	65	45	61	38
TS	Mancherial	**11.32**	43	62	24	84	39
GJ	Surat	**11.28**	42	71	56	65	43
MH	Sindhudurg	**11.27**	47	55	40	62	38
TN	Karur	**11.20**	54	51	44	48	37
RJ	Kota	**10.73**	35	50	30	40	29
OD	Dhenkanal	**10.13**	28	67	26	56	33
KA	Uttara Kannada	**10.01**	43	84	42	67	43

State	Districts	MPP	SES	P&G	Infrastructure	Environment	SMAI
CG	Janjgir Champa	**9.87**	40	70	33	42	34
CG	Bastar	**9.74**	48	65	28	54	36
TS	Bhadradri	**9.42**	45	56	28	79	38
CG	Kabirdham	**8.91**	48	66	18	58	35
MH	Bhandara	**8.89**	37	62	45	65	38
JH	Latehar	**8.85**	38	67	21	57	34
TN	Perambalur	**8.46**	48	44	46	50	34
KA	Belgaum	**8.36**	44	78	55	56	42
MP	Jabalpur	**8.34**	37	69	36	53	35
KA	Tumkur	**7.39**	44	74	33	53	36
JH	Sahibganj	**7.32**	29	71	26	30	28
CG	Surajpur	**7.25**	49	73	15	54	34
CG	Raipur	**7.13**	61	80	49	49	42
OD	Mayurbhanj	**7.12**	33	72	18	56	32
AP	Anantapur	**6.88**	39	60	44	38	32
TS	Khammam	**6.58**	44	55	32	75	37
MP	Morena	**6.38**	30	72	24	46	31
KA	Hassan	**6.34**	55	77	43	62	42
GJ	Junagadh	**6.29**	42	65	48	74	40
MP	Jhabua	**5.00**	36	72	20	52	32
KA	Shimoga	**4.06**	41	80	30	66	37
KA	Chikmagalur	**3.68**	45	79	30	65	38
TS	Warangal Rural	**3.58**	42	50	20	78	33
TN	Thanjavur	**3.57**	58	41	56	59	37
TN	Tiruvarur	**2.99**	52	43	52	55	35

Appendix E.3. Low Potential and Performance Districts

State	Districts	MPP	SES	P&G	Infrastructure	Environment	SMAI
AP	Vizianagaram	**27.09**	42	69	45	64	46
MH	Raigad	**20.86**	43	52	51	62	42
OD	Nuapada	**20.28**	29	65	23	63	37
RJ	Jaisalmer	**19.34**	28	60	24	38	32
TN	Tirunelveli	**18.82**	51	50	45	59	40
TN	Namakkal	**18.41**	54	53	40	59	41
MH	Ratnagiri	**18.03**	40	44	42	62	37
OD	Bargarh	**17.79**	39	64	24	53	36
RJ	Jaipur	**16.18**	45	63	45	41	38
TN	Tenkasi	**15.89**	51	37	39	60	36
AP	Nellore	**15.39**	41	55	44	69	40
CG	Surguja	**15.19**	50	72	14	57	37

State	Districts	MPP	SES	P&G	Infrastructure	Environment	SMAI
TN	Thoothukudi	**14.60**	48	50	47	57	38
KA	Udupi	**13.16**	63	80	42	68	46
TN	Tiruchirappalli	**12.84**	49	49	45	62	38
KA	Mysore	**12.31**	44	78	41	63	42
JH	Deoghar	**11.55**	34	73	42	48	37
CG	Koriya	**11.55**	43	71	21	60	36
CG	Rajnandgaon	**11.15**	53	68	29	56	38
TN	Coimbatore	**10.60**	53	77	42	65	43
TN	Krishnagiri	**10.33**	43	71	33	55	37
AP	Prakasam	**10.04**	42	70	36	54	37
MH	Mumbai Suburban	**10.00**	50	44	61	60	39
MP	Chhatarpur	**9.72**	26	73	23	52	32
TS	Suryapet	**9.00**	40	48	24	71	34
TS	Komarambhem	**8.77**	37	47	20	73	33
MP	Shahdol	**8.73**	29	75	22	57	33
KA	Gadag	**7.54**	37	75	38	61	38
RJ	Sikar	**6.97**	48	74	30	49	36
GJ	Kheda	**6.89**	33	55	41	61	34
TS	Mahabubnagar	**6.84**	49	54	33	64	36
CG	Sukma	**6.70**	51	52	21	68	34
TS	Warangal Urban	**6.27**	42	50	35	69	35
MP	Chhindwada	**6.07**	41	74	25	60	36
TS	Jayashankar	**5.77**	47	59	20	75	35
TN	Dindigul	**5.73**	42	45	35	61	32
MH	Gadchiroli	**5.66**	37	45	19	64	29
GJ	Sabar Kantha	**5.53**	34	75	38	63	37
TS	Vikarabad	**5.47**	38	50	27	63	32
AP	Vishakapatnam	**5.24**	44	69	51	62	39
JH	Pakur	**5.20**	32	74	31	37	31
JH	Giridih	**5.11**	32	75	26	49	32
TS	Hyderabad	**4.91**	52	45	57	61	38
MP	Umaria	**4.91**	31	72	28	60	33
TS	Medchal	**4.84**	51	64	34	66	37
CG	Narayanpur	**4.71**	50	47	24	70	33
OD	Kalahandi	**4.51**	32	71	21	59	32
KA	Davanagere	**4.50**	36	77	33	59	36
GJ	Chhotaudepur	**4.40**	42	68	25	63	35
AP	East Godavari	**4.27**	35	71	48	71	39
AP	West Godavari	**4.18**	36	76	53	69	40
GJ	Banas Kantha	**4.03**	36	75	30	58	34

State	Districts	MPP	SES	P&G	Infrastructure	Environment	SMAI
MP	Gwalior	**3.99**	33	76	34	49	33
GJ	Rajkot	**3.94**	35	71	54	61	38
KA	Dharwad	**3.91**	38	83	45	64	40
RJ	Jalor	**3.81**	27	58	24	48	28
MP	Betul	**3.64**	36	74	21	65	34
RJ	Alwar	**3.57**	38	59	31	40	29
KA	Haveri	**3.55**	36	77	33	63	36
TN	Madurai	**3.37**	47	51	47	61	35
MP	Sagar	**3.24**	34	73	25	55	32
MP	Siddhi	**3.18**	36	73	16	50	30
MP	Alirajpur	**3.13**	37	71	34	60	35
TN	Dharmapuri	**3.03**	44	66	37	60	36
RJ	Dausa	**2.79**	39	58	29	37	28
RJ	Barmer	**2.72**	33	55	21	43	26
GJ	Bharuch	**2.47**	34	71	43	63	36
KA	Yadgir	**2.37**	36	78	33	58	35
KA	Bangalore Urban	**2.28**	63	82	54	43	41
TS	Siddipet	**2.14**	49	48	24	66	32
OD	Balangir	**2.06**	30	67	23	53	30
GJ	Aravalli	**2.03**	32	75	36	66	35
TN	Ramanathapuram	**1.92**	44	54	37	59	33
TN	Sivaganga	**1.86**	45	56	37	61	34
GJ	Navsari	**1.78**	44	69	49	71	39
TS	Rajanna	**1.74**	49	58	24	66	33
OD	Sonapur	**1.71**	32	69	21	57	30
TS	Sangareddy	**1.62**	42	51	27	64	31
KA	Koppal	**1.60**	35	72	35	47	32
KA	Ramanagar	**1.60**	37	73	35	58	34
CG	Bemetara	**1.60**	56	76	23	53	35
KA	Bangalore Rural	**1.56**	43	82	41	51	37
TS	Yadadri	**1.54**	46	57	27	65	33
MH	Gondiya	**1.52**	38	59	33	65	33
AP	Srikakulam	**1.50**	43	72	44	56	36
OD	Malkangiri	**1.43**	27	61	21	63	29
KA	Chikkaballapur	**1.34**	42	76	30	49	33
GJ	Panch Mahals	**1.32**	39	55	39	65	33
OD	Sambalpur	**1.27**	41	66	30	59	33
CG	Jashpur	**1.21**	44	72	21	54	32
TN	Tiruvannamalai	**1.17**	44	36	34	62	30
TN	Vellore	**1.15**	59	52	39	63	36

State	Districts	MPP	SES	P&G	Infrastructure	Environment	SMAI
RJ	Bharatpur	**1.10**	33	70	32	32	28
RJ	Pratapgarh	**1.07**	36	38	25	49	25
KA	Bijapur	**0.95**	38	72	26	54	32
TN	Nagapattinam	**0.94**	54	47	36	53	32
TS	Nagarkurnool	**0.93**	41	57	21	67	31
TS	Jagtial	**0.92**	53	57	18	68	33
JH	Dumka	**0.88**	34	76	31	47	32
MP	Mandsaur	**0.86**	33	79	23	52	31
AP	Chittoor	**0.85**	43	72	43	50	35
TS	Mahabubabad	**0.82**	40	50	22	73	31
GJ	Vadodara	**0.81**	40	73	65	61	40
RJ	Tonk	**0.66**	37	45	23	42	25
CG	Kondagaon	**0.64**	50	71	21	59	34
TS	Medak	**0.64**	44	48	28	62	31
TN	Kanniyakumari	**0.64**	51	56	47	65	37
KA	Chamarajanagar	**0.64**	38	74	27	70	35
MP	Narsinghpur	**0.61**	38	73	24	63	33
TN	Theni	**0.60**	46	45	35	70	33
GJ	Gandhinagar	**0.58**	40	76	56	59	39
TN	Kanchipuram	**0.58**	64	55	32	60	35
RJ	Bikaner	**0.58**	33	54	29	48	28
TS	Mulug	**0.56**	41	55	18	77	32
TN	Tiruppur	**0.55**	47	69	44	61	37
RJ	Dhaulpur	**0.54**	31	53	22	36	24
RJ	Dungarpur	**0.52**	38	63	26	48	29
KA	Dakshina Kannada	**0.51**	54	80	46	67	41
MH	Thane	**0.50**	50	58	47	59	36
MH	Palghar	**0.50**	49	57	37	57	34
OD	Ganjam	**0.49**	39	72	31	64	34
GJ	Tapi	**0.47**	45	65	31	74	36
TS	Jangaon	**0.45**	39	48	25	73	31
MH	Akola	**0.42**	41	59	29	53	30
MH	Osmanabad	**0.42**	34	60	33	59	31
TS	Nizamabad	**0.40**	46	55	26	66	32
RJ	Sawai Madhopur	**0.39**	29	42	24	42	23
CG	Gariyaband	**0.38**	54	73	25	52	34
GJ	Valsad	**0.38**	47	79	43	79	41
TN	Nilgiris	**0.37**	51	52	33	67	34
TN	Villupuram	**0.37**	48	44	39	57	31
TS	Kamareddy	**0.37**	39	61	22	69	32

State	Districts	MPP	SES	P&G	Infrastructure	Environment	SMAI
GJ	Surendranagar	**0.35**	32	74	36	61	34
MH	Wardha	**0.35**	40	59	54	60	36
GJ	Mahesana	**0.34**	36	74	49	59	36
RJ	Jodhpur	**0.33**	33	56	38	41	28
MH	Pune	**0.31**	46	67	54	58	38
JH	Khunti	**0.30**	29	72	29	50	30
TS	Wanaparthy	**0.29**	41	58	22	69	32
TN	Pudukkottai	**0.29**	47	50	39	57	32
GJ	Morbi	**0.27**	36	60	31	62	32
RJ	Jhalawar	**0.26**	25	61	13	47	24
MH	Parbhani	**0.26**	34	59	30	55	30
MH	Amravati	**0.26**	38	75	32	63	35
CG	Dhamtari	**0.25**	48	69	30	57	34
CG	Mungeli	**0.25**	48	68	20	50	31
MH	Bid	**0.25**	36	59	22	52	28
MP	Khargone	**0.24**	30	73	20	61	31
MH	Aurangabad	**0.24**	39	66	39	54	33
OD	Kandhamal	**0.23**	31	69	19	61	30
JH	Koderma	**0.23**	28	78	30	46	30
TS	Nirmal	**0.22**	46	38	24	73	30
JH	Jamtara	**0.22**	29	55	35	48	28
MH	Satara	**0.21**	43	63	33	63	34
RJ	Karauli	**0.21**	27	71	16	42	26
MH	Jalgaon	**0.20**	32	49	42	61	31
MH	Nanded	**0.20**	36	58	36	55	31
OD	Baleshwar	**0.20**	37	68	25	56	31
MP	Hoshangabad	**0.20**	32	70	31	69	34
MH	Jalna	**0.19**	39	61	35	54	32
MH	Solapur	**0.18**	38	62	40	58	33
JH	Simdega	**0.17**	33	75	22	44	29
MH	Washim	**0.17**	38	54	25	57	29
TN	Tiruvallur	**0.17**	49	42	52	60	34
MH	Buldana	**0.17**	33	58	27	55	29
MH	Latur	**0.16**	37	55	31	58	30
TN	Erode	**0.16**	54	58	35	59	35
MH	Sangli	**0.16**	47	51	41	59	33
GJ	Mahisagar	**0.16**	39	64	31	63	33
CG	Mahasamund	**0.16**	51	71	25	51	33
GJ	Ahmedabad	**0.16**	43	81	51	57	39
GJ	Botad	**0.16**	42	66	33	64	34

State	Districts	MPP	SES	P&G	Infrastructure	Environment	SMAI
RJ	Hanumangarh	**0.15**	38	57	26	50	29
TS	Jogulamba	**0.15**	40	38	27	70	29
MH	Nashik	**0.14**	36	63	47	60	34
RJ	Ganganagar	**0.14**	35	52	27	53	28
OD	Cuttack	**0.13**	33	66	37	58	33
MH	Dhule	**0.12**	31	59	29	60	30
MH	Hingoli	**0.12**	36	58	23	58	29
MP	Mandla	**0.11**	36	75	20	63	32
GJ	Anand	**0.10**	34	52	42	60	31
GJ	Narmada	**0.09**	42	74	26	73	36
GJ	Dohad	**0.08**	39	71	29	65	34
OD	Nabarangapur	**0.08**	28	57	25	62	29
OD	Jagatsinghpur	**0.07**	39	58	30	55	30
MH	Nandurbar	**0.07**	26	56	28	59	28
RJ	Churu	**0.06**	37	61	25	45	28
OD	Khordha	**0.06**	42	78	37	58	36
KA	Mandya	**0.06**	49	76	36	59	37
GJ	Patan	**0.06**	34	66	27	56	31
MP	Sheopur	**0.06**	20	70	13	61	27
MH	Ahmednagar	**0.05**	36	59	35	56	31
KA	Bidar	**0.04**	38	77	28	57	34
OD	Gajapati	**0.04**	31	69	22	70	32
RJ	Baran	**0.04**	31	46	14	49	23
KA	Kodagu	**0.04**	52	80	34	72	40
OD	Kendrapara	**0.03**	35	66	26	58	31
MP	Sehore	**0.03**	32	74	25	56	31
OD	Nayagarh	**0.02**	35	71	26	63	33
OD	Baudh	**0.02**	33	70	21	62	31
OD	Puri	**0.01**	36	58	32	60	31
OD	Deogarh	**0.01**	41	76	19	64	33
OD	Bhadrak	**0.01**	34	76	38	58	34
CG	Bijapur	**0.00**	46	55	16	70	31
MP	Guna	**0.00**	28	75	21	56	30
MP	Shivpuri	**0.00**	25	71	18	54	28
MP	Vidisha	**0.00**	30	77	30	54	32

Appendix F. Results: Pillar-wise Ranks

Appendix F.1. High Potential and Performance Districts

State	District	MPP	SES	P&G	Infrastructure	Environment	SMAI
OD	Keonjhar	**1**	31	30	48	13	3
CG	Dantewada	**2**	9	45	24	6	2
OD	Jajapur	**3**	45	37	31	26	15
MP	Satna	**4**	44	33	43	37	29
JH	Pashchimi Singhbhum	**5**	52	39	35	32	49
TN	Ariyalur	**6**	7	51	8	8	4
OD	Sundargarh	**7**	21	32	14	27	11
RJ	Rajsamand	**8**	28	25	32	39	21
OD	Jharsuguda	**9**	42	22	23	30	19
RJ	Udaipur	**10**	41	49	12	31	37
JH	Dhanbad	**11**	36	4	17	52	30
JH	Ramgarh	**12**	47	1	5	36	6
RJ	Bhilwara	**13**	22	36	42	50	45
KA	Bellary	**14**	35	7	6	25	8
GA	South Goa	**15**	3	2	2	7	1
RJ	Chittaurgarh	**16**	24	19	36	42	32
KA	Kolar	**17**	11	12	11	28	12
GJ	Porbandar	**18**	18	26	9	12	9
CG	Baloda Bazar	**19**	4	27	18	35	14
MP	Katni	**20**	51	24	37	23	36
KA	Gulbarga	**21**	34	8	4	24	5
OD	Angul	**22**	27	41	38	18	34
CG	Durg	**23**	2	15	7	48	7
TS	Nalgonda	**24**	16	38	21	9	16
MP	Singroli	**25**	38	23	52	21	48
CG	Balrampur	**26**	6	28	50	17	20
GJ	Gir Somnath	**27**	26	52	10	1	25
CG	Korba	**28**	5	17	39	29	17
RJ	Jhunjhunu	**29**	8	10	45	41	27
TS	Adilabad	**30**	32	47	47	4	41
OD	Koraput	**31**	46	48	28	10	46
JH	Purbi Singhbhum	**32**	43	13	20	46	42
CG	Balod	**33**	1	21	44	45	22
KA	Bagalkote	**34**	19	5	13	16	13
TS	Peddapalle	**35**	29	46	51	2	43
JH	Bokaro	**36**	25	3	34	51	39

State	District	MPP	SES	P&G	Infrastructure	Environment	SMAI
AP	Cuddapah	**37**	12	35	3	11	10
JH	Godda	**38**	50	14	22	43	50
AP	Kurnool	**39**	20	31	15	44	33
CG	Raigarh	**40**	17	29	25	34	31
TS	Narayanpet	**41**	13	42	40	3	23
GJ	Devbhumi Dwarka	**42**	14	40	16	14	24
RJ	Nagaur	**43**	40	6	19	47	38
MH	Chandrapur	**44**	23	44	26	19	44
AP	Guntur	**45**	10	50	1	49	28
MP	Neemuch	**46**	48	9	41	22	40
KA	Raichur	**47**	49	11	29	20	35
MP	Balaghat	**48**	30	16	27	15	26
RJ	Banswara	**49**	37	43	46	40	52
JH	Chatra	**50**	39	20	33	33	47
TS	Karimnagar	**51**	15	34	30	5	18
MP	Rewa	**52**	33	18	49	38	51

Appendix F.2. Medium Potential and Performance Districts

State	District	MPP	SES	P&G	Infrastructure	Environment	SMAI
OD	Rayagada	**1**	54	39	47	13	17
KA	Chitradurga	**2**	26	9	43	42	10
RJ	Ajmer	**3**	38	11	22	63	13
JH	Lohardaga	**4**	61	12	34	47	19
JH	Gumla	**5**	51	43	52	44	36
RJ	Sirohi	**6**	46	44	55	57	45
CG	Kanker	**7**	12	46	63	15	23
MH	Kolhapur	**8**	8	38	14	6	3
AP	Krishna	**9**	18	16	1	23	2
MP	Panna	**10**	64	25	56	22	43
TN	Salem	**11**	10	57	17	29	14
JH	Palamu	**12**	49	42	46	49	44
JH	Ranchi	**13**	30	20	27	56	20
RJ	Pali	**14**	58	18	29	61	40
CG	Bilaspur	**15**	20	14	30	53	22
GJ	Bhavnagar	**16**	37	47	25	20	24
JH	Saraikela	**17**	59	13	41	55	42
GJ	Amreli	**18**	39	48	16	8	16
RJ	Bundi	**19**	53	55	51	59	62
GA	North Goa	**20**	2	1	6	26	1
MH	Yavatmal	**21**	44	52	48	19	48

State	District	MPP	SES	P&G	Infrastructure	Environment	SMAI
TS	Rangareddy	**22**	1	49	13	34	8
JH	Garhwa	**23**	57	37	54	38	52
JH	Hazaribagh	**24**	42	50	39	52	57
GJ	Jamnagar	**25**	21	7	12	7	4
TN	Virudhunagar	**26**	7	56	9	40	18
MP	Damoh	**27**	36	24	53	31	37
MP	Dhar	**28**	48	27	38	39	38
TN	Cuddalore	**29**	11	61	8	25	27
MP	Anuppur	**30**	55	22	61	46	54
MH	Nagpur	**31**	25	5	7	21	5
GJ	Kachchh	**32**	50	34	18	18	25
TS	Mancherial	**33**	28	40	49	1	21
GJ	Surat	**34**	31	26	3	12	6
MH	Sindhudurg	**35**	17	53	26	17	29
TN	Karur	**36**	6	58	21	51	34
RJ	Kota	**37**	52	60	37	60	63
OD	Dhenkanal	**38**	63	32	45	33	55
KA	Uttara Kannada	**39**	29	2	24	9	7
CG	Janjgir Champa	**40**	35	29	31	58	50
CG	Bastar	**41**	16	36	42	37	39
TS	Bhadradri	**42**	19	51	40	2	26
CG	Kabirdham	**43**	14	33	62	27	46
MH	Bhandara	**44**	43	41	19	11	28
JH	Latehar	**45**	41	31	57	28	53
TN	Perambalur	**46**	15	62	15	48	51
KA	Belgaum	**47**	23	8	4	32	11
MP	Jabalpur	**48**	45	30	28	41	41
KA	Tumkur	**49**	27	15	32	43	35
JH	Sahibganj	**50**	62	28	44	64	64
CG	Surajpur	**51**	13	17	64	36	49
CG	Raipur	**52**	3	4	10	50	9
OD	Mayurbhanj	**53**	56	19	60	30	59
AP	Anantapur	**54**	40	45	20	62	58
TS	Khammam	**55**	24	54	33	4	33
MP	Morena	**56**	60	21	50	54	61
KA	Hassan	**57**	5	10	23	16	12
GJ	Junagadh	**58**	32	35	11	5	15
MP	Jhabua	**59**	47	23	59	45	60
KA	Shimoga	**60**	34	3	35	10	31
KA	Chikmagalur	**61**	22	6	36	14	30

State	District	MPP	SES	P&G	Infrastructure	Environment	SMAI
TS	Warangal Rural	**62**	33	59	58	3	56
TN	Thanjavur	**63**	4	64	2	24	32
TN	Tiruvarur	**64**	9	63	5	35	47

Appendix F.3. Low Potential and Performance Districts

State	District	MPP	SES	P&G	Infrastructure	Environment	SMAI
AP	Vizianagaram	**1**	74	87	25	48	2
MH	Raigad	**2**	68	170	11	71	4
OD	Nuapada	**3**	192	105	169	62	38
RJ	Jaisalmer	**4**	196	120	154	203	137
TN	Tirunelveli	**5**	19	178	27	114	11
TN	Namakkal	**6**	8	167	45	109	9
MH	Ratnagiri	**7**	94	198	37	68	31
OD	Bargarh	**8**	98	107	160	163	48
RJ	Jaipur	**9**	52	109	24	201	27
TN	Tenkasi	**10**	19	206	47	101	42
AP	Nellore	**11**	86	152	30	25	13
CG	Surguja	**12**	23	58	204	139	32
TN	Thoothukudi	**13**	38	182	19	134	22
KA	Udupi	**14**	2	5	38	28	1
TN	Tiruchirappalli	**15**	31	184	26	74	24
KA	Mysore	**16**	62	12	41	56	5
JH	Deoghar	**17**	159	55	35	186	41
CG	Koriya	**18**	63	74	184	102	44
CG	Rajnandgaon	**19**	12	91	115	147	25
TN	Coimbatore	**20**	11	15	39	41	3
TN	Krishnagiri	**21**	69	76	86	151	34
AP	Prakasam	**22**	73	78	66	160	35
MH	Mumbai Suburban	**23**	25	199	2	90	18
MP	Chhatarpur	**24**	203	49	168	170	124
TS	Suryapet	**25**	89	185	162	13	93
TS	Komarambhem	**26**	120	189	190	6	115
MP	Shahdol	**27**	195	29	174	130	97
KA	Gadag	**28**	123	28	52	81	26
RJ	Sikar	**29**	37	41	112	178	54
GJ	Kheda	**30**	166	153	42	82	83
TS	Mahabubnagar	**31**	34	162	88	49	58
CG	Sukma	**32**	21	173	181	27	79
TS	Warangal Urban	**33**	77	177	75	21	69
MP	Chhindwada	**34**	81	40	141	91	59

State	District	MPP	SES	P&G	Infrastructure	Environment	SMAI
TS	Jayashankar	**35**	45	130	192	3	63
TN	Dindigul	**36**	78	193	72	86	119
MH	Gadchiroli	**37**	127	196	197	45	178
GJ	Sabar Kantha	**38**	160	37	55	65	40
TS	Vikarabad	**39**	114	179	130	52	140
AP	Vishakapatnam	**40**	56	89	12	75	16
JH	Pakur	**41**	174	45	97	205	160
JH	Giridih	**42**	181	35	139	180	133
TS	Hyderabad	**43**	14	197	3	83	29
MP	Umaria	**44**	183	63	124	99	99
TS	Medchal	**45**	17	108	77	34	30
CG	Narayanpur	**46**	27	191	153	18	101
OD	Kalahandi	**47**	176	72	183	108	126
KA	Davanagere	**48**	145	17	82	111	55
GJ	Chhotaudepur	**49**	79	94	142	57	72
AP	East Godavari	**50**	151	75	16	12	19
AP	West Godavari	**51**	130	21	9	24	10
GJ	Banas Kantha	**52**	141	36	109	119	73
MP	Gwalior	**53**	172	24	81	181	103
GJ	Rajkot	**54**	146	69	7	77	23
KA	Dharwad	**55**	113	1	23	51	14
RJ	Jalor	**56**	200	134	155	185	197
MP	Betul	**57**	140	38	189	40	87
RJ	Alwar	**58**	110	122	103	202	179
KA	Haveri	**59**	136	14	83	64	47
TN	Madurai	**60**	43	175	21	80	62
MP	Sagar	**61**	157	54	150	150	121
MP	Siddhi	**62**	133	47	201	174	163
MP	Alirajpur	**63**	121	68	78	97	68
TN	Dharmapuri	**64**	58	99	60	92	57
RJ	Dausa	**65**	102	135	116	204	189
RJ	Barmer	**66**	170	160	178	196	200
GJ	Bharuch	**67**	155	77	31	66	50
KA	Yadgir	**68**	138	10	85	129	67
KA	Bangalore Urban	**69**	3	3	6	195	8
TS	Siddipet	**70**	33	186	156	35	134
OD	Balangir	**71**	189	95	164	164	176
GJ	Aravalli	**72**	173	34	67	36	60
TN	Ramanathapuram	**73**	57	164	59	115	111
TN	Sivaganga	**74**	53	150	57	89	89

State	District	MPP	SES	P&G	Infrastructure	Environment	SMAI
GJ	Navsari	**75**	61	90	14	11	17
TS	Rajanna	**76**	30	139	158	33	95
OD	Sonapur	**77**	180	86	187	136	164
TS	Sangareddy	**78**	76	174	128	50	146
KA	Koppal	**79**	148	61	76	190	128
KA	Ramanagar	**80**	125	53	73	121	76
CG	Bemetara	**81**	5	20	167	162	64
KA	Bangalore Rural	**82**	66	2	40	171	37
TS	Yadadri	**83**	47	147	131	37	108
MH	Gondiya	**84**	116	129	87	38	112
AP	Srikakulam	**85**	67	59	28	146	43
OD	Malkangiri	**86**	202	118	185	63	184
KA	Chikkaballapur	**87**	80	26	106	183	104
GJ	Panch Mahals	**88**	106	159	50	39	98
OD	Sambalpur	**89**	88	101	107	117	107
CG	Jashpur	**90**	55	64	188	156	123
TN	Tiruvannamalai	**91**	59	207	80	73	175
TN	Vellore	**92**	4	172	49	53	46
RJ	Bharatpur	**93**	167	80	93	207	193
RJ	Pratapgarh	**94**	129	204	147	179	202
KA	Bijapur	**95**	109	57	137	155	125
TN	Nagapattinam	**96**	6	190	65	161	127
TS	Nagarkurnool	**97**	85	146	180	30	144
TS	Jagtial	**98**	13	144	198	26	109
JH	Dumka	**99**	158	27	101	189	139
MP	Mandsaur	**100**	165	9	165	169	141
AP	Chittoor	**101**	65	60	32	177	66
TS	Mahabubabad	**102**	91	181	170	8	148
GJ	Vadodara	**103**	92	51	1	85	12
RJ	Tonk	**104**	124	195	163	199	203
CG	Kondagaon	**105**	24	70	186	106	88
TS	Medak	**106**	60	188	122	69	162
TN	Kanniyakumari	**107**	22	148	17	42	39
KA	Chamarajanagar	**108**	107	46	126	16	65
MP	Narsinghpur	**109**	115	48	157	58	100
TN	Theni	**110**	51	194	68	19	114
GJ	Gandhinagar	**111**	93	22	4	112	21
TN	Kanchipuram	**112**	1	154	95	98	61
RJ	Bikaner	**113**	162	163	118	187	198
TS	Mulug	**114**	83	156	200	2	130

State	District	MPP	SES	P&G	Infrastructure	Environment	SMAI
TN	Tiruppur	**115**	40	85	29	88	33
RJ	Dhaulpur	**116**	182	166	176	206	205
RJ	Dungarpur	**117**	118	110	134	184	177
KA	Dakshina Kannada	**118**	10	6	22	29	6
MH	Thane	**119**	26	132	20	116	52
MH	Palghar	**120**	32	142	58	137	94
OD	Ganjam	**121**	96	62	102	46	74
GJ	Tapi	**122**	54	104	104	4	51
TS	Jangaon	**123**	100	187	151	9	155
MH	Akola	**124**	84	125	120	165	166
MH	Osmanabad	**125**	153	121	89	105	149
TS	Nizamabad	**126**	48	161	133	32	118
RJ	Sawai Madhopur	**127**	193	202	161	197	207
CG	Gariyaband	**128**	7	52	148	168	80
GJ	Valsad	**129**	44	8	33	1	7
TN	Nilgiris	**130**	16	169	90	31	85
TN	Villupuram	**131**	39	200	46	140	143
TS	Kamareddy	**132**	101	117	173	22	131
GJ	Surendranagar	**133**	177	42	63	87	86
MH	Wardha	**134**	90	126	8	93	56
GJ	Mahesana	**135**	139	43	15	118	45
RJ	Jodhpur	**136**	171	149	53	200	190
MH	Pune	**137**	50	96	5	127	28
JH	Khunti	**138**	191	56	117	175	167
TS	Wanaparthy	**139**	87	136	172	20	135
TN	Pudukkottai	**140**	41	180	51	131	122
GJ	Morbi	**141**	134	119	100	70	136
RJ	Jhalawar	**142**	206	114	207	191	204
MH	Parbhani	**143**	156	123	110	152	173
MH	Amravati	**144**	117	33	94	54	70
CG	Dhamtari	**145**	35	88	113	133	81
CG	Mungeli	**146**	36	92	194	176	150
MH	Bid	**147**	132	124	175	167	188
MP	Khargone	**148**	188	50	191	76	158
MH	Aurangabad	**149**	103	98	48	157	105
OD	Kandhamal	**150**	186	83	196	78	171
JH	Koderma	**151**	199	11	111	192	169
TS	Nirmal	**152**	46	205	159	7	170
JH	Jamtara	**153**	194	158	69	188	195
MH	Satara	**154**	70	111	91	59	91

State	District	MPP	SES	P&G	Infrastructure	Environment	SMAI
RJ	Karauli	**155**	201	65	203	198	201
MH	Jalgaon	**156**	175	183	34	79	156
MH	Nanded	**157**	137	133	62	153	154
OD	Baleshwar	**158**	128	93	145	143	152
MP	Hoshangabad	**159**	178	81	98	23	90
MH	Jalna	**160**	99	115	71	159	138
MH	Solapur	**161**	119	113	44	122	102
JH	Simdega	**162**	164	32	171	194	182
MH	Washim	**163**	112	165	144	138	183
TN	Tiruvallur	**164**	29	201	10	95	82
MH	Buldana	**165**	169	138	129	148	185
MH	Latur	**166**	126	155	99	126	168
TN	Erode	**167**	9	131	74	110	71
MH	Sangli	**168**	42	176	43	113	113
GJ	Mahisagar	**169**	105	106	96	60	110
CG	Mahasamund	**170**	18	66	146	172	106
GJ	Ahmedabad	**171**	64	4	13	135	20
GJ	Botad	**172**	71	103	84	47	78
RJ	Hanumangarh	**173**	111	143	138	173	186
TS	Jogulamba	**174**	95	203	127	17	181
MH	Nashik	**175**	131	112	18	100	75
RJ	Ganganagar	**176**	149	171	132	166	196
OD	Cuttack	**177**	163	100	56	123	117
MH	Dhule	**178**	187	128	119	96	174
MH	Hingoli	**179**	144	137	166	124	180
MP	Mandla	**180**	135	31	193	61	120
GJ	Anand	**181**	152	168	36	103	142
GJ	Narmada	**182**	72	44	136	5	49
GJ	Dohad	**183**	97	73	114	43	84
OD	Nabarangapur	**184**	198	145	152	72	187
OD	Jagatsinghpur	**185**	104	140	105	149	165
MH	Nandurbar	**186**	204	151	123	107	192
RJ	Churu	**187**	122	116	143	193	191
OD	Khordha	**188**	75	13	61	120	53
KA	Mandya	**189**	28	23	64	104	36
GJ	Patan	**190**	154	102	125	141	161
MP	Sheopur	**191**	207	82	206	84	199
MH	Ahmednagar	**192**	142	127	70	145	153
KA	Bidar	**193**	108	16	121	132	92
OD	Gajapati	**194**	184	84	177	15	129

State	District	MPP	SES	P&G	Infrastructure	Environment	SMAI
RJ	Baran	**195**	185	192	205	182	206
KA	Kodagu	**196**	15	7	79	10	15
OD	Kendrapara	**197**	147	97	140	128	159
MP	Sehore	**198**	179	39	149	144	145
OD	Nayagarh	**199**	150	71	135	55	116
OD	Baudh	**200**	168	79	179	67	151
OD	Puri	**201**	143	141	92	94	157
OD	Deogarh	**202**	82	25	195	44	96
OD	Bhadrak	**203**	161	19	54	125	77
CG	Bijapur	**204**	49	157	202	14	147
MP	Guna	**205**	197	30	182	142	172
MP	Shivpuri	**206**	205	67	199	158	194
MP	Vidisha	**207**	190	18	108	154	132

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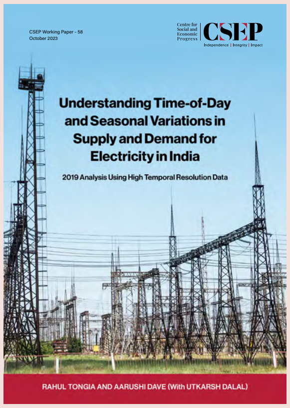
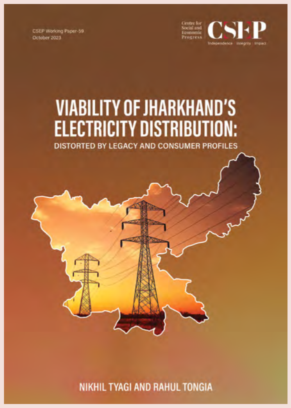
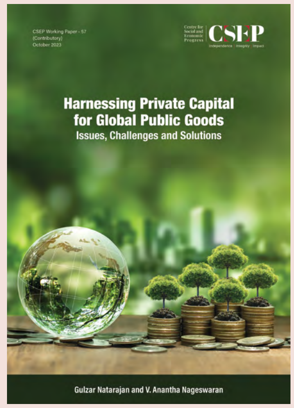
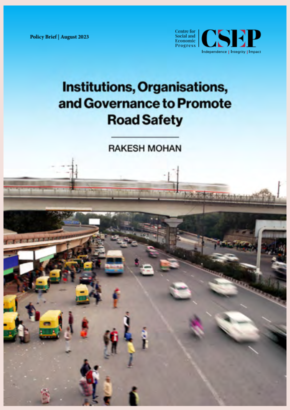
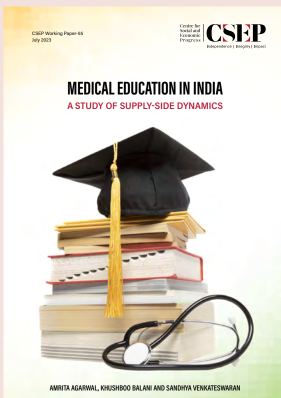
Other publications

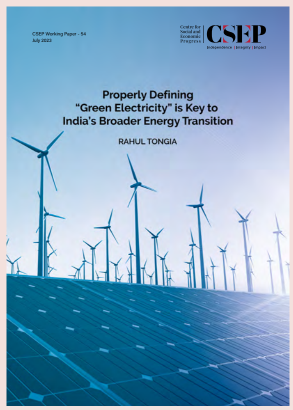


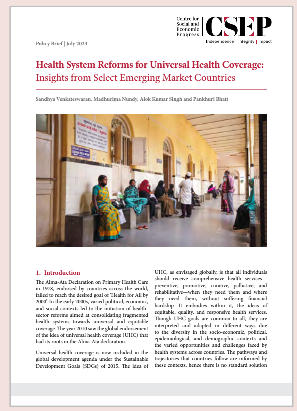


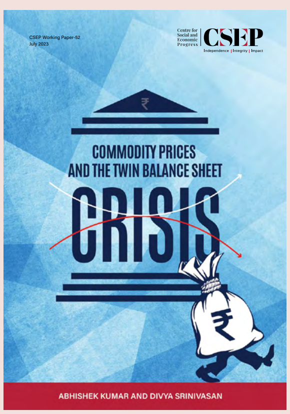


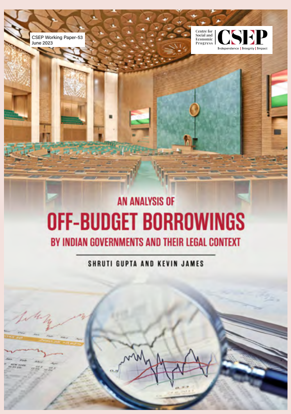


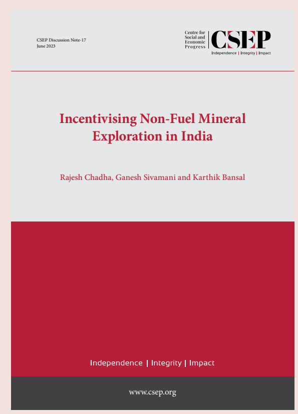


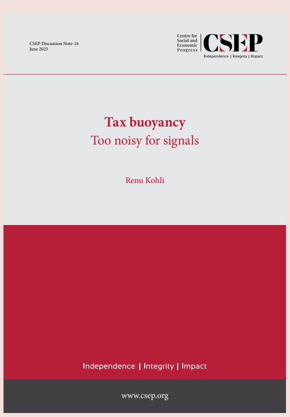


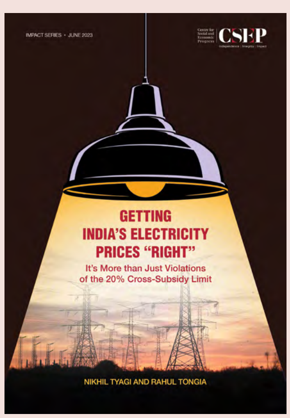


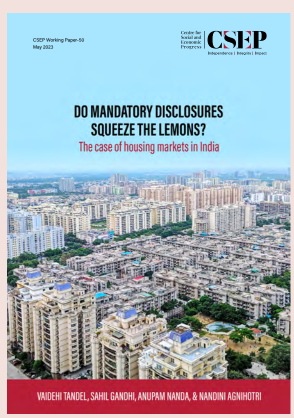


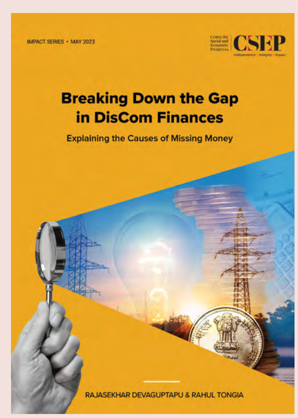












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