



iFOREST

INTERNATIONAL
FORUM
FOR ENVIRONMENT,
SUSTAINABILITY
& TECHNOLOGY

KORBA

PLANNING A JUST TRANSITION
FOR INDIA'S BIGGEST COAL AND
POWER DISTRICT

KORBA

**PLANNING A JUST TRANSITION
FOR INDIA'S BIGGEST COAL AND
POWER DISTRICT**

iFOREST | INTERNATIONAL
FORUM
FOR ENVIRONMENT,
SUSTAINABILITY
& TECHNOLOGY

Lead Researcher: Srestha Banerjee

Researchers: Chinmayi Shalya and Diana Ann Joseph

Acknowledgement: We are grateful to the following people of Chhattisgarh for their valuable assistance with the primary survey: Arti Das, Jyoti Shukla, Manish Jha, Pankhaju Das, Prem Sahu, Rajendra Gir, Samelal Suren and Sudhir Dewangan.

Cover design: Raj Kumar Singh

Design and Layout: Raj Kumar Singh

We would like to thank The Children's Investment Fund Foundation (CIFF) for their support in developing this study.



© 2022 International Forum for Environment, Sustainability & Technology

February 2022

ISBN: 978-81-949354-6-9

Material from this publication can be used, but with acknowledgement.

Published by:

Sustainability Innovation and Advisories Private Limited

G-60, Nizamuddin (West), Delhi - 110013

Printed at: Print Edge Inc.

Contents

<i>List of tables</i>	vii
<i>List of figures</i>	viii
<i>List of maps</i>	ix
<i>List of abbreviations</i>	x
Foreword	11
Summary for Stakeholders	13
Chapter 1: Introduction	20
1.1 Background	22
1.2 Objective and scope	22
1.3 Study approach	23
Chapter 2: Korba district profile	26
2.1 Administrative profile	28
2.2 Land use land cover	29
2.3 Demographic distribution	30
2.4 Key economic sectors	31
2.5 Employment status	37
2.6 Income	39
2.7 Environmental pollution	40
Chapter 3: The coal economy	42
3.1 Overview	44
3.2 Coal mining	45
3.3 Coal-based thermal power plants	53
3.4 Other coal related industries	55
Chapter 4: Jobs and livelihood dependence	58
4.1 Overview	60
4.2 Household income dependence	60
4.3 Worker profile	64
4.4 Coal industry and power plant workforce	66
Chapter 5: Social infrastructure and community resilience	74
5.1 Overview	76
5.2 Social infrastructure	76
5.3 Assets	83
5.4 District resilience assessment	84

Chapter 6: Planning a just transition for Korba	86
6.1 Context for just transition planning	88
6.2 Developing an inclusive planning mechanism	90
6.3 Timeframe for just transition	96
6.4 Skilling, reskilling and worker assistance	102
6.5 Economic diversification	107
6.6 Repurposing of land and infrastructure	117
6.7 Social and environmental investments	118
6.8 Revenue substitution	120
6.9 Financial resources for transition	121
6.10 Role of CIL and NTPC in just transition	125
Chapter 7: Conclusion	128
7.1 Introduction	130
7.2 Key considerations for just transition	130
References	135

List of tables

Chapter 2: Korba district profile

Table 1: Block-wise land use land cover	29
Table 2: Population distribution	30
Table 3: Block-wise demographic distribution	30
Table 4: Share of economic sectors in district GDP	31
Table 5: Crop production	32
Table 6: Proportion of rural households with landholdings	33
Table 7: Agriculture landholding size	34
Table 8: Block-wise area under forest	34
Table 9: Status of settlement of forest rights	36
Table 10: Fish production	36
Table 11: Industries in Korba	37
Table 12: Unemployment rate	38
Table 13: Demand for work under MGNREGS	39
Table 14: Distribution of ration cards	40

Chapter 3: The coal economy

Table 1: Coal resources in Korba and Hasdeo-Arand coalfields	45
Table 2: Operational mines	46
Table 3: Upcoming mines	46
Table 4: Profitability of operational coal mines	47
Table 5: Closed mines	47
Table 6: Contribution to Government exchequer by SECL	50
Table 7: Operational TPPs	53
Table 8: Non-operational TPPs	54
Table 9: Coal source of TPPs operational in Korba	54
Table 10: Coal washeries	56
Table 11: Mode of coal transportation by SECL	57

Chapter 4: Jobs and livelihood dependence

Table 1: Categorisation of formal and informal workers	66
Table 2: Formal employment in coal mines	67
Table 3: Total estimated employment in coal mines	67
Table 4: Formal employment in TPPs	69
Table 5: Estimated employment in TPPs	69
Table 6: Employment in truck operations	71
Table 7: Employment in coal washeries	71
Table 8: Total direct employment in coal mining and coal-dependent industries	72

Chapter 5: Social infrastructure and community resilience

Table 1: Status of primary healthcare facilities	77
Table 2: Gross Enrolment Ratio	79
Table 3: Various levels of schools	80
Table 4: Resilience assessment	84

Chapter 6: Planning a just transition for Korba

Table 1: Phase I coal mine closures	97
Table 2: Phase II coal mine closures	98
Table 3: Phase III coal mine closures	98
Table 4: Decadal coal production under CPS and NZ-2050 Scenario	100
Table 5: Phase I coal-based TPP closures	101
Table 6: Phase II coal-based TPP closures	102
Table 7: Transition scenario for formal workers of coal mines and TPPs	104
Table 8: Education and skill mapping of informal workers in the coal industry and TPPs	106
Table 9: Potential interventions in agriculture and allied activities	108
Table 10: Potential interventions for forest-based livelihoods	110
Table 11: Redevelopment and repurposing potential of OC coal mine areas	117
Table 12: Interventions in social infrastructure	119
Table 13: Revenue from coal at peak coal production in Korba	120
Table 14: Estimated direct finance for just transition in Korba	121
Table 15: Sectoral allocations under DMF	122
Table 16: Sectoral investments through CSR	123

Chapter 7: Conclusion

Table 1: Ramgarh and Korba comparative	131
--	-----

List of figures

Chapter 2: Korba district profile

Figure 1: Status of irrigation of agricultural land	33
Figure 2: Categories of workers	38

Chapter 4: Jobs and livelihood dependence

Figure 1: Sector-wise employment distribution	61
Figure 2: Spatial distribution of households based on primary income source	61
Figure 3: Distribution of household income	62
Figure 4: Block-wise work participation	64
Figure 5: Sector-wise distribution of workers	65
Figure 6: Income distribution of formal and informal coal workers	68
Figure 7: Income distribution of formal and informal TPP workers	70
Figure 8: Formal and informal direct employment in coal and coal-dependent industries	73

Chapter 5: Social infrastructure and community resilience

Figure 1: Type of healthcare facilities accessed	77
Figure 2: Education level of the primary earning member	78
Figure 3: Type of education facilities accessed	80
Figure 4: Access to clean drinking water	81
Figure 5: Primary fuel use in households	82

Chapter 6: Planning a just transition for Korba

Figure 1: Just transition planning matrix	89
Figure 2: Stakeholder engagement matrix for Korba	91

Figure 3: Closure impacts, needs and solutions	92
Figure 4: Coal mines closure under CPS	97
Figure 5: Coal mines closure under NZ-2050 Scenario	99
Figure 6: Coal-based TPP closure	100
Figure 7: Reduction in coal demand from TPP closure	101
Figure 8: Mine-wise proportion of workers between 40-60 years age	103
Figure 9: Proportion of workers between 40-60 years age in TPPs	103
Figure 10: Key employment generation schemes for informal workers and poor households	105
Figure 11: Estimated water demand in Korba	107
Figure 12: Renewable energy potential in Korba	113
Figure 13: Potential schemes for convergence	124

Chapter 7: Conclusion

Figure 1: Development intervention	132
--	-----

List of maps

Chapter 2: Korba district profile

Map 1: Administrative map of Korba	28
Map 2: Land use land cover	29

Chapter 3: The coal economy

Map 1: Coal production in Chhattisgarh	44
Map 2: Industries supported by coal from Korba in Chhattisgarh	44
Map 3: Korba coalfield	45
Map 4: Distribution of coal mines	49
Map 5: Distribution of TPPs	55

List of abbreviations

BALCO	Bharat Aluminium Company Limited	MW	Mega Watt
BAU	Business-as-Usual	NABARD	National Bank for Agriculture and Rural Development
BCM	Billion Cubic Metre	NFSA	National Food Security Act
BMS	Bharatiya Mazdoor Sangh	NGGB	Narwa, Garuwa, Ghurwa and Badi (scheme)
BPL	Below Poverty Line	NH	National Highway
CEA	Central Electricity Authority	NISE	National Institute of Solar Energy
CEPI	Comprehensive Environmental Pollution Index	NITI	National Institution for Transforming India
CF	Community Forest (rights)	NMET	National Mineral Exploration Trust
CFR	Community Forest Resource (rights)	NRLM	National Rural Livelihood Mission
CGST	Central Goods and Services Tax	NTFP	Non-Timber Forest Product
CGWB	Central Ground Water Board	NTPC	National Thermal Power Corporation
CHC	Community Health Centre	NULM	National Urban Livelihood Mission
CIL	Coal India Limited	NZ-2050	Net-Zero 2050 Scenario
COP	Conference of Parties	OB	Over Burden
CPA	Critically Polluted Area	OBC	Other Backward Class
CPCB	Central Pollution Control Board	OC	Open Cast
CPS	Current Policy Scenario	ODOP	One District One Product
CREDA	Chhattisgarh Renewable Energy Development Agency	PHC	Public Health Centre
CSPGCL	Chhattisgarh State Power Generation Company Limited	PHFI	Public Health Foundation of India
CSR	Corporate Social Responsibility	PM	Particulate Matter
DDT	Dividend Distribution Tax	PMJAY	Pradhan Mantri Jan Arogya Yojana
DFI	Development Finance Institution	PMKKKY	Pradhan Mantri Khanij Kshetra Kalyan Yojana
DLC	District Level Committee	PRI	Panchayati Raj Institution
DMF	District Mineral Foundation	PSU	Public Sector Undertaking
EC	Environmental Clearance	PV	Photo Voltaic
EPF	Employees' Provident Fund	PVTG	Particularly Vulnerable Tribal Group
FGD	Focus Group Discussion	RE	Renewable Energy
FPO	Farmer Producer Organisation	RTI	Right to Information
FRA	Forest Rights Act	SC	Scheduled Caste
GDP	Gross Domestic Product	SDG	Sustainable Development Goal
GER	Gross Enrolment Ratio	SDLC	Sub-Divisional Level Committee
GHG	Greenhouse Gas	SDS	Sustainable Development Scenario
GOI	Government of India	SECC	Socio-Economic Caste Census
GST	Goods and Services Tax	SECL	South-Eastern Coalfields Limited
GW	Giga Watt	SEZ	Special Economic Zone
GWh	GigaWatt hours	SGST	State Goods and Services Tax
ICDS	Integrated Child Development Services	SIDBI	Small Industries Development Bank of India
IDBI	Industrial Development Bank of India	SPCB	State Pollution Control Board
IFR	Individual Forest Rights	ST	Scheduled Tribe
IGST	Inter-state Goods and Services Tax	STP	Sewage Treatment Plant
INTUC	Indian National Trade Union Congress	STPS	Super Thermal Power Station
IPHS	Indian Public Health Standards	TPP	Thermal Power Plant
LPG	Liquefied Petroleum Gas	TPS	Thermal Power Station
MFP	Minor Forest Produce	UG	Under Ground
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act	UNDP	United Nations Development Programme
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme	UNFCCC	United Nations Framework Convention on Climate Change
MMT	Million Metric Tonnes	UPHC	Urban Public Health Centre
MTPA	Million Metric Tonnes Per Annum	US\$	United States Dollar
MPI	Multi-dimensional Poverty Index	VAT	Value Added Tax
MSP	Minimum Support Price	VRS	Voluntary Retirement Scheme

Foreword

In November 2021, at the Glasgow climate change conference—COP 26— the Government of India pledged to achieve net-zero emissions by 2070. The government also announced four energy and emission targets for 2030, including installing 500 GW renewable energy, meeting 50% of the country's energy requirement through renewables, lowering total projected carbon emissions by one billion tonnes between 2021 to 2030, and reducing the emission intensity of the country's GDP by 45% from 2005 levels.

Achieving these targets will require a systematic phase-down in fossil fuel production and consumption over three to four decades. In fact, to meet these targets, the coal consumption in the country – which is the single largest contributor to greenhouse gas emissions – will have to peak in the next ten years.

We, therefore, start 2022 not by debating whether or not India should continue to rely on fossil-fuel intensive industrial and economic systems, but by seeking answers for how best can we plan a fossil fuel transition that can secure net-positive social, economic, and environmental outcomes for all. Essentially, how do we plan and implement a just energy transition is the fundamental challenge facing the country and the world.

One of the key regions that will start experiencing the pangs of the energy transition early on will be the coal districts of Eastern and Central India, particularly in states like Chhattisgarh, Jharkhand, and Odisha. These are the top three states in terms of coal reserves and account for over 60% of the country's coal production. As a result, there is a significant dependence on coal mining, coal-based power, and other coal-dependent industries in these states for employment and income generation (direct and indirect), public revenue, and social welfare investments.

In some of the top coal districts, coal mining and related industrial activities contribute more than half of the district's GDP. Virtually everything revolves around coal in these 'mono-industry' districts – jobs, businesses, investments, and infrastructure. A coal-centric economic system has, in many ways, hindered the development of other economic sectors. So, how do these districts achieve a just energy transition? This is the critical question that this report seeks to answer.

The study of the Korba district of Chhattisgarh was undertaken to understand what just transition will mean and entail for India's top coal mining and coal-based power districts and how just transition planning can be approached for these districts.

Korba was chosen because it is currently India's top coal-producing district, accounting for over 16% of the country's coal production. It is also one of India's top coal-based power districts with more than 6 GW capacity. But the district is also one of the poorest in the country. And this is another challenge of energy transition in India: How do we plan a just transition in the poorest parts of the country where coal is the only source of growth and livelihoods?

The study of Korba shows that it is possible to plan and implement a just transition with proper governance mechanisms, inclusive decision-making processes, and through proper planning and investments. In fact, if we plan it well, just transition will not only help to realize energy transition and climate change goals, it will help to achieve equitable developmental outcomes as well.

On the other hand, if the transition away from coal is not well managed, it will push districts like Korba further into poverty. Besides, the blowback will have severe ramifications for the political economy, which can even put a brake on the energy transition itself. Therefore, a careful planning process and an inclusive governance mechanism for implementation are fundamental to a just transition.

The Korba study also shows the need for developing district-level plans. There is much variation among the coal districts regarding the nature and extent of coal dependence, their resilience, and potential for economic diversification and a low-carbon transition. Therefore, they will need a just transition plan to suit their local peculiarities. Thus, the framework for district-level just transition planning that the report offers is an important template for guiding just transition in other coal and power districts of the country.

Lastly, the Korba study emphasises the need to view just transition as a development intervention rather than a mere substitution of fossil fuels with renewables, and ensuring replacement jobs for the fossil fuel workers. This means it should be conceptualized and aligned with the development planning framework, including processes, inputs, outputs, outcomes and impacts.

Just transition will be long-drawn experimentation and learning process. Our hope is that this report will contribute to the timely and meaningful deliberation on the need and approaches for a just transition in India.

Chandra Bhushan

President & CEO

International Forum for
Environment, Sustainability &
Technology (iFOREST)

Summary for Stakeholders

The study of the Korba district of Chhattisgarh was undertaken to understand what a just transition will mean and entail for India's top coal mining and coal-based power districts, and how a just transition planning can be approached.

The study relies on an extensive primary survey involving 600 households, 21 focus group discussions (FGDs), and formal interviews with key functionaries and industry representatives at the district and state levels.

The household survey was undertaken to ascertain the income and livelihood dependence of the local community on coal, the district's worker profile, and the district's overall dependence on the coal economy for revenue, public amenities, and welfare. In addition, the FGDs and interviews were conducted to capture the opinion of various stakeholders about the closure of coal mines and coal-based power plants, the potential impact on jobs and the local economy, and the investments and support that the local community will need for a just transition.

The study also analysed a vast amount of data collected from coal and power companies, government departments, and academic institutions to complement observations of the primary survey and develop a framework for the just transition planning in Korba.

A. Key Findings

1. Korba will face just transition challenges much earlier than anticipated

Korba, India's biggest coal-producing district and one of the top coal-power producers, will start facing the implications of energy transition well before 2030. The district produces about 16% of India's coal and has 6,428 MW coal-based thermal power plants (TPPs) capacity. Overall, coal mining, thermal power, and coal-dependent industries account for over 60% of Korba's GDP.

Nearly 95% of Korba's coal comes from just three large open cast mines - Gevra, Kusmunda, and Dipka. Gevra and Kusmunda have a mine life of less than 20 years, and can be closed before 2040; Dipka will exhaust its resources by 2045.

The rest of the mines – two open cast and eight underground mines – account for the remaining 5% of production and are unprofitable and on the verge of closure.

The coal-based power production in Korba will soon face a decline. Nearly half of the thermal power units are over 30 years old and are slated to retire by 2027. Further, if we consider the life of power plants as 25 years, the remaining units can also be retired by 2040. Besides, the state government has also taken a decision not to install any new coal-based power plants.

Therefore, the next few years will be crucial for planning and implementing just transition measures in Korba.

2. One in five workers is directly dependent on the coal industry and coal-based power plants

The total number of people directly employed by the coal industry (including coal mines, coal washeries, fly ash brick units, and coal transport) and TPPs are at least 87,558. Half of them are formal employees of the companies and their contractors, and half are informal workers. Overall, one in every five workers in Korba depends on coal and power plants.

Korba also exemplifies the future of employment in the coal industry. The top three mines of Korba, which produces one-sixth of India's coal, formally employ just 12,317 people. An additional 15,700 people can be estimated to be engaged informally, making the total workforce about 28,000. If all mines in the country achieve the same workforce productivity level, then the total employment in coal mines to produce 1 billion tonnes of coal (target set by the government for 2024) will be just 230,000. In comparison, the public sector coal companies presently employ 350,000 people formally, and total employment in coal mining is estimated to be 2.6 million.

3. The coal-centric economy has hindered the growth and employment in other sectors

A coal-centric focus in Korba's economy has stymied the growth of other economic sectors, including agriculture, forestry, other industries, and the service sector.

For example, agriculture constitutes the primary source of income for a majority of households (nearly 36%) in the district, but the household income for most is less than ₹10,000 per month (US\$ 132). A significant reason for this is the poor development of irrigation in the district (88% of agriculture is rain-fed) and the limited development of agro-based industries.

Similarly, while Korba has more than 60% of the land area under forests and has several high-value non-timber forest products (NTFPs), the sector does not contribute to decent income opportunities for the tribal community. Likewise, the service sector is also poorly developed.

This has led to a limited opportunity of decent waged income and consequently a high proportion of non-workers within the working age group. The primary survey indicates that 54% of the people in the working age group are non-workers. The situation is far worse for women, as about 73% of the non-workers are women.

4. Korba is highly vulnerable to any unplanned closure of mines and industries due to poverty and poor development indicators

About two-thirds of the households in Korba have a monthly income of less than ₹10,000 (US\$ 132). Also, over 32% of the district's population are 'multidimensionally poor' with limited access to healthcare, education, and basic amenities, such as clean drinking water and clean energy for cooking. Due to poor development indicators, Korba has been prioritised for targeted development intervention under the aspirational districts programme of the Government of India (GOI).

Korba's economy, therefore, is highly vulnerable to sudden disruptions in the coal economy as the district has low coping capacity due to the absence of opportunities in other sectors.

B. Planning just transition for Korba

Eight factors will be essential for planning a just transition in Korba.

1. An inclusive mechanism for just transition planning

Just transition plan for the district must be developed by assessing the people's needs, adaptive capacity, mobility, and aspirations. Besides, an inclusive approach is also necessary to reconcile the needs of those benefitting from the coal economy with those who have a minimal stake in the present coal economy (such as the forest-dwelling tribal communities).

Considering the resources and capacity that will be necessary in the coming years to coordinate, plan and implement a just transition, the current district administration will not be able to facilitate it. Therefore, the government will need to consider an appropriate authority/body for coordinating planning and executing the process and develop a local support system to engage the community in planning and implementation.

2. The just transition timeframe should be aligned with net-zero pathway

The timeframe of closure of coal mines and coal-based power plants in Korba over the next decades, and a simultaneous transition plan for the district, have been explored under two scenarios, viz., the Current Policy Scenario (CPS) and the Net-Zero 2050 (NZ-2050) Scenario.

Current Policy Scenario

In CPS, which aligns with India's net-zero target of 2070, all the coal mines in Korba can be closed by 2050 and power plants by 2040 with least disruption.

In Phase I (2020-2030), a planned closure should be considered for the eight low-producing and unprofitable underground mines. Similarly, as per the Central Electricity Authority (CEA) recommendation, 10 units (2,940 MW capacity) operated by the National Thermal Power Corporation (NTPC), and the Chhattisgarh State Power Generation Company Limited (CSPGCL) should close down by 2027.

In Phase II (2030-2040), four mines with 126 MMT cumulative production capacity will exhaust their resources and can be closed. This will include two of the largest mines, Gevra and Kusmunda. All the remaining coal power plants of Korba will be more than 25 years old by 2040 and can be phased out.

In Phase III (2040-2050), the remaining five mines, including Dipka, with about 55 MMT annual production capacity, can be closed as they would also exhaust most of their reserves. The amount of coal production that will be foregone by closing all mines by 2050 would be 46 MMT or less than 1.5% of total coal production from now till 2050.

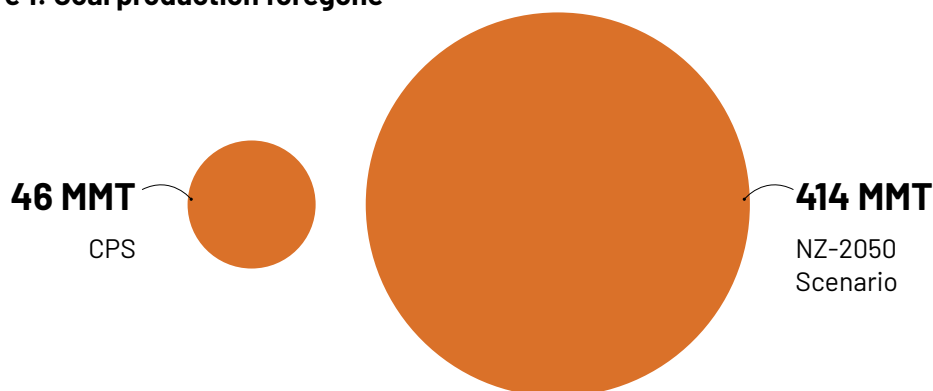
Net-Zero 2050 Scenario

In NZ-2050, which aligns with India reaching net-zero emissions by 2050, all the power plants in Korba can be closed by 2040 (similar to CPS), but many coal mines will have to be prematurely closed by 2040, foregoing more than 400 MMT of coal production.

In Phase I (2020-2030), similar to CPS, all the eight low-producing and unprofitable underground mines can be closed. Similarly, 10 TPP units (2,940 MW capacity) can be closed down by 2027.

In Phase II (2030-2040), all the remaining coal power plants of Korba will be more than 25 years old by 2040 and can be phased out. But many of the coal mines will have to be prematurely closed. While Gevra and Kusmunda will not get affected, Dipka and the upcoming mines will have to be closed before exhausting their resources. The coal production foregone under this scenario will be 414 MMT.

Figure 1: Coal production foregone



3. Securing retirement benefits and skilling of the workforce for new industries will be crucial for formal workers; for informal workers, government support and infrastructure investment will be essential

The age profile of the departmental employees of SECL, NTPC, and CSPGCL shows a high proportion of people above 40 years of age. While for SECL and NTPC about 70% of the departmental employees are above 40 years of age, for CSPGCL it is about 50%. For most of the employees of SECL, their retirement can be synchronised with the closure of mines. For NTPC and CSPGCL it will be challenging as half of their capacity is planned to be closed in the next five years.

Overall, a key issue for the formal employees in coal mining and thermal power operations will be securing pension funds (for current retirees and those in the future) and skilling the new workforce. To build a green economy, companies will have to start developing employee portfolios considering the skills they will need for the future.

For the informal workers, government livelihood generation schemes and generating employment through infrastructure investment will be crucial, as most are semi-skilled and unskilled. These workers will need to be supported through income generation schemes of the Centre and the state and will need to be re-employed through proper skill training. In addition, investments in building the new infrastructure and industries will also be vital for creating jobs.

The workers engaged in coal transportation will need particular attention in transition planning. The coal transportation sector employs at least 15,300 people in the district, which is only 15% less than the formal employment in coal mines. Moreover, the transportation sector itself will undergo a transition in the coming years, considering the increasing trend towards electrification of the fleet. Therefore, a transition plan will be required for the road transport sector, including the skilling of the service sector for electric and hydrogen vehicles.

4. Economic diversification should be planned to create a balanced contribution of the primary, secondary and tertiary sectors to the district GDP

A significant factor in just transition planning for Korba will be diversifying the district's economy and industrial activities. Overall, while the primary sector has a share of about 56.3% in the district's GDP, 50% is related to coal mining. The secondary sector has a share of 31%, and the tertiary sector has about 12.7%.

Therefore, Korba's economic diversification plan should aim to move away from the coal-centric economy progressively. The critical aspects of economic diversification in the district will be to boost the production and economic output of agriculture, forestry, and fishery sectors; support the development of low-carbon industries, including agro and food processing, NTFP processing, and renewable energy-based industries (such as solar); and improve income opportunities in the service sector through investments in education and skill development, strengthening the healthcare sector and developing the tourism industry.

The potential for all of these sectors remains high considering the district's existing resources. There are also policies and schemes of the Centre and the State Government (such as the state Industrial Policy, the Solar Energy Policy, the Agro and Food Processing Industries Policy, the *Narwa, Garuwa, Ghurwa and Badi* scheme, etc.) that can provide the necessary fiscal and non-fiscal incentives for their development, and also enhance the potential to deliver co-benefits of income generation and developmental outcomes.

5. Repurposing of land and infrastructure will be important for developing green industries, including renewable energy

A key requirement for industrial development will be the availability of land. As Korba is a Fifth Schedule (Schedule V) district, there are various restrictions on land transfer and land alienation under the Constitution of India, as well as state-specific land laws and revenue codes.

Therefore, reclaiming and repurposing the mining and industrial lands for productive economic use will be necessary. Currently, over 24,364 hectares (ha) of land is under coal mining (including closed mines) and coal-based TPPs. This will become over 27,600 ha within the next three years with the four upcoming mines.

Scientific closure and repurposing of the mining land, particularly of the opencast mines, hold significant potential for various economic activities. The post-closure plan for four opencast mines - Gevra, Dipka, Kusmunda, and Manikpur, shows that nearly 8,859 ha of land will be available for various investments and development of industries, including solar parks. The Industrial Policy of the State Government, along with the Special Economic Zone Policy and the Solar Energy Policy can provide the necessary impetus.

6. Responsible social and environmental investments will be necessary to reverse resource curse

Just transition is an opportunity to reverse the resource curse in Korba, like many other coal districts of India. The planning and investments should focus on augmenting social and physical infrastructure to achieve development goals and improve the district's environmental conditions.

Social infrastructure investments will be particularly needed for improving education access and outcomes, with a specific focus on women, improving the healthcare infrastructure and access, and improving access to basic amenities, such as clean water supply, cooking fuel, and energy. The target outcomes for each can be aligned to the respective sustainable development goals (SDGs) and considering national and international benchmarks.

Equally important will be measures for land remediation and pollution mitigation. This will involve scientific closure of coal mines through proper planning and oversight, including ecological restoration of mining areas and development of land for productive economic use; reclamation and redevelopment of industrial lands; and disposal of industrial structures and assets during the decommissioning of TPPs through appropriate practices of waste management, material recycling, ash management, among others.

7. Progressive planning will be required for revenue substitution

A critical issue for just transition will be the substitution of public revenue. For coal mining, the primary source of revenue for the states includes royalty and District Mineral Foundation (DMF). Additionally, the Central Government receives revenue from the coal cess (the GST Compensation Cess). At the peak coal production of 180 MMT, which will happen during 2025-2030, coal mines will contribute about ₹107 billion per year (US\$ 1.5 billion) as coal cess, royalty and DMF.

As coal mining activities will phase-down in the district over the next three decades, it will have implications for public revenue. Under CPS, the district will lose about ₹27.5 billion (nearly US\$ 0.4 billion) from coal phase-down in the next three decades. In NZ-2050 Scenario, the district will lose about ₹246 billion (nearly US\$ 3.4 billion) from coal phase-down in the next three decades.

However, the loss can be substituted through carefully planned economic diversification and industrial restructuring measures. Overall, revenue substitution must be planned early on, and a progressive plan needs to be developed considering the just transition timeframe.

Table 1: Coal revenue foregone

Components	CPS	NZ-2050
Royalty foregone (₹ billion)	6.8	60.7
DMF foregone (₹ billion)	2.2	19.6
Coal cess foregone (₹ billion)	18.5	165.6
Total revenue foregone (₹ billion)	27.5	246.2

8. Just Transition financing will not be a challenge for major coal districts if coal cess is used for transition financing

There are five types of resources that can be considered a significant source of investments in just transition. These include the DMF funds, the Corporate Social Responsibility (CSR) funds, the coal cess (currently the GST compensation cess), pooling of resources through the convergence of government schemes, and leveraging private sector investments.

The most immediate opportunity is with the DMF funds, and going ahead the coal cess can be the most critical green fund for a just transition, with a corpus of about ₹1.35 trillion (US\$18 billion). Overall, ₹1.5 trillion (US\$ 20.2 billion) can be available as direct finance for just transition over the next three decades in Korba by just pooling DMF, coal cess, and CSR funds.

Table 2: Finances available for just transition until 2050

Sources of financing	CPS	NZ-2050
DMF (₹ billion)	160.4	143
Coal cess (₹ billion)	1,354.9	1,207.6
CSR (₹ billion)	6	6
Total direct finance for just transition (₹ billion)	1,521.3	1,356.6

C. Key policy and planning considerations

As India's energy transition progresses, just transition will assume a central position in climate change and development policy discourse in the coming years. Considering global experiences of just transition, the reality of coal districts of India, and the present study of Korba, there are three key considerations for just transition for coal-dominant districts of India.

1. Just transition will require district-specific, as well as regional planning

The coal districts in India vary widely in terms of the scale of mining operations, the presence of coal-based power plants, and other coal-dependent industries. The extent and nature of coal dependence also differ with respect to the workers (formal and informal), income opportunities, and other indirect dependence. Therefore, a district-specific assessment will be necessary while developing just transition plans. The regional implications of the energy transition should also be considered, as many of India's top coal districts are the epicentres for fuel supply to adjoining regions and support their industrial activities.

2. The transition should be designed and planned as a development intervention

Just transition in India, should be considered as a development intervention, taking into account five key components:

- i. Inputs, which will include aspects of governance, development of policies, plans and instituting regulatory reforms to support a just transition, and financing.
- ii. Processes, which will include development of diverse coalition of various actors and stakeholders, development of effective and transparent implementation and communication strategy, and establishment of local support system.
- iii. Outputs, will include a restructured economy and industries, repurposed land and infrastructure for low-carbon industries, reskilled and newly skilled workers for the green economy, substitution of public revenue, and responsible social and environmental investments for a better quality of life.

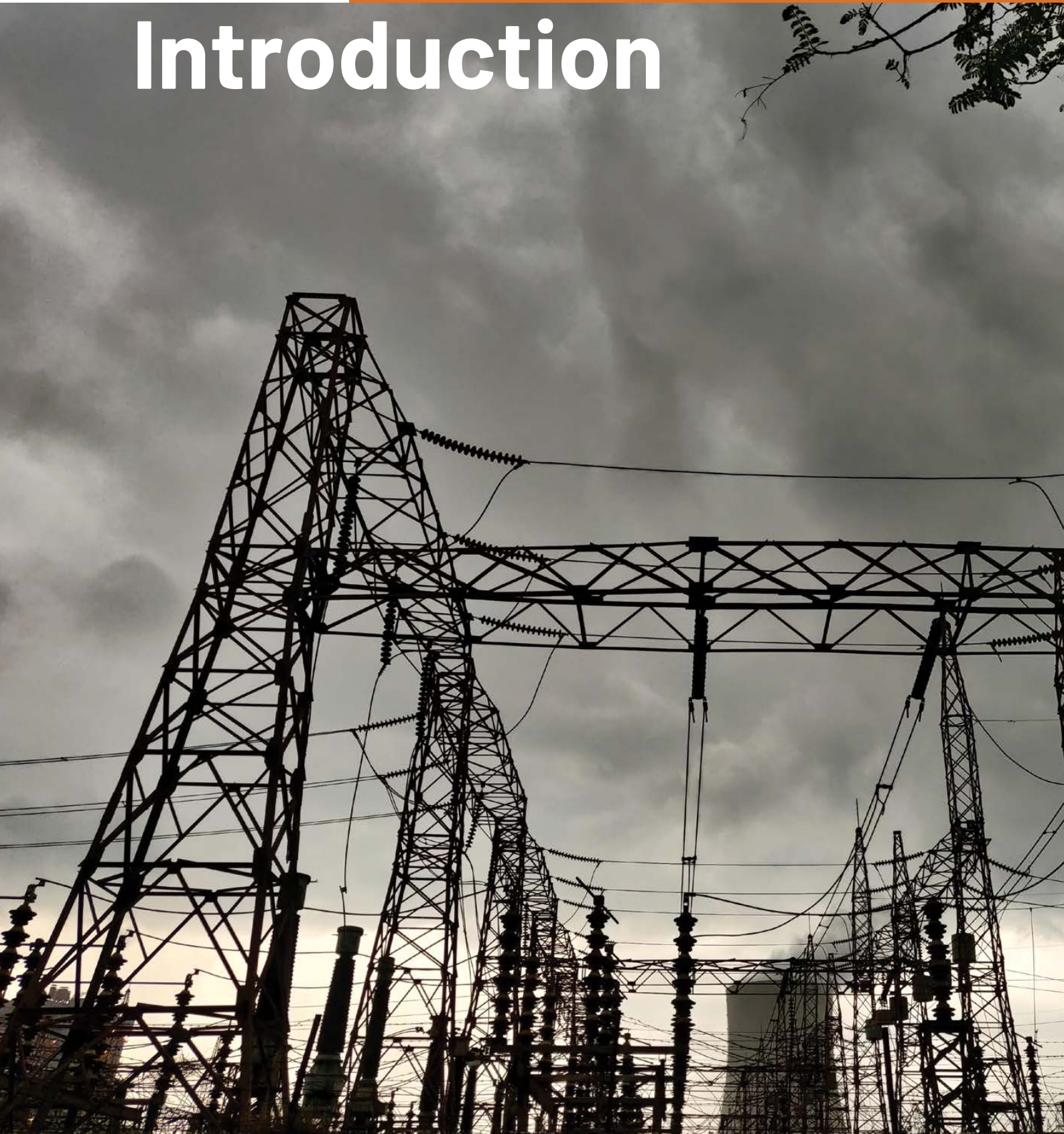
-
- iv. Outcomes, which in essence will include net-positive environmental, social and economic outcomes.
 - v. Impacts, for development intervention that are long-term and sustainable.

3. Planning must start early to provide sufficient time for the transition

Just transition planning must start early to build stakeholder consensus and minimise the scope of economic and social disruption. Given the diversity and expanse of the coal districts, India needs to start the just transition planning process at the earliest. In fact, a just transition plan must be in place for the districts much before the coal mines and power plants start closing down.

Chapter 1

Introduction





Chinmayi Shalya/iFOREST

- Enhancement of renewable energy capacity, and emission reduction targets of the GOI as set for 2030, means that India's coal production will have to peak in the next 10 years.
- Coal mining and coal-based power sector, along their supply chain, will start experiencing major disruptions within the next decade.
- Commencement of just transition planning is necessary for the coal districts, balancing interests of environment, economy, workers and local community.
- The Glasgow Climate Pact has emphasised on just transition as a mechanism for eradication of poverty, creation of decent work and quality jobs, and supporting pathways for sustainable development.
- The Korba study proposes a template for planning just transition that is strategic, purposeful and inclusive.

1.1 Background

Just transition today lies at the heart of the climate change discourse. As the call for an accelerated action on decarbonising the economy is growing, the emphasis on ensuring social, economic and environmental justice through the decarbonisation pathway is also becoming increasingly strong.

The climate conference in Glasgow—COP26—has laid a renewed emphasis on just transition. The Glasgow climate pact, while calling upon parties to accelerate the transition towards low-emission energy systems through a combination of instruments (including technology, government policies and a plan to phase-down coal power and inefficient fossil fuel subsidies), has also insisted upon the need to support a just transition in the process. It also stresses that a just transition must ensure eradication of poverty, creation of decent work and quality jobs, and support pathways for sustainable development.¹

Many countries have started working on a just transition through national level policies, as well as place-based interventions. They are putting in place dedicated institutional mechanisms to coordinate, plan, implement and monitor just transition.²

For India, policy and planning initiative for a just transition is an urgent necessity. The Government of India (GOI) has pledged to reach net-zero emissions by 2070. It has also announced four ambitious energy targets for 2030. These include, an installed renewable energy capacity (RE) of 500 GW, meeting 50% of the country's energy requirement through renewables, reducing total projected carbon emissions by one billion tonnes between 2021 to 2030, and reducing the carbon intensity of the country's Gross Domestic Product (GDP) by 45% from 2005 levels (up from the 33% to 35% target set in 2015).³ Achieving the targets will mean that India's coal production will have to peak in the next 10 years, along with the decline in the share of coal-based power production.

India's coal regions will therefore experience major disruptions in the coming decades from the energy transition. These will include impacts on workers and local communities dependent directly and indirectly on the coal mining and coal-based power sectors, Government revenue earnings and welfare investments, among others. The disparity in India's emerging energy geography can further worsen the problem, as today's coal producing states will not be renewable superpowers, with large-scale RE potential identified in the western and southern states.⁴ Therefore, the coal states and districts will need alternative investments, economic diversification and progressive revenue substitution planning, all of which need to start at the earliest.

1.2 Objective and scope

Planning a place-based intervention will be extremely important for ensuring a just transition in India's coal mining and coal-based power districts and states. A place-based understanding and approach has two merits. First, it allows to develop a strategic approach through an understanding of resources, assets and capacities of individuals and the region concerned. Secondly, it allows stakeholders to be part of the transition process through a trusted relationship, leading to meaningful and inclusive development.⁵

For example, the old coal mining regions of Eastern India with legacy mines, such as in the state of Jharkhand, have unique issues for planning a transition, which are evidently distinct from the coal mining and coal power hubs of Chhattisgarh or Odisha. In Jharkhand, there are thousands of people who earn a living by gathering coal manually and selling it in local markets day in and day out. These people are a common sight in top coal mining districts such as Dhanbad, Hazaribagh, Ramgarh, and Chatra. An empirical study in Ramgarh district of Jharkhand—where one in four households depend on coal for an income—showed that gathering and selling coal is the primary source of income for about two-thirds of coal-dependent households.⁶ A major reason for this dependence is years of dispossession and deprivation of local communities and extremely limited income opportunities in other economic sectors in the district. However, in many of the coal districts of Chhattisgarh, Odisha, Maharashtra, or Telangana such sight is a rarity. This is due to a number of factors, including relatively better opportunities in other economic sectors, lesser prevalence of widespread deprivation, and lesser number of abandoned mines from which coal can be gathered (as compared to old coal mining districts).

This report, therefore, focuses on developing an understanding and planning approach for just transition in India's top coal mining and top coal-based power districts, considering the fact that these are two of the most important sectors which are likely to experience disruptive changes in the next 10-15 years (besides the automotive sectors).⁷ The report focusses on Korba district of Chhattisgarh for developing a just transition planning framework given the critical position of the coal-mining and coal-based power sector in the district's socio-economic fabric.

Korba is currently the top coal producing district of India, as well as one of the country's power generation hubs. However, at the same time, the district has many low producing and unprofitable underground mines (50% of the total mines), many of the large coal mines are nearing their end of life within the next 15-20 years, and the State Government has taken a position to not add further to the coal-based power capacity.⁸ Therefore, a study of the district and its coal economy provides an ideal opportunity to understand the just transition issues for both coal mining and coal-based power plants, as well as how plans can be developed to enable a just transition in the coming decades. The district's overall demographic and socio-economic profile, as well as environmental and ecological conditions, also creates the appropriate backdrop to evaluate questions of just transition and to develop a planning framework to ensure such transition.

1.3 Study approach

The Korba study is based on a combination primary and secondary research. The primary survey forms the basis of understanding some of the fundamental questions that are pertinent for planning a just transition. These include:

- Coal dependency of the district with respect to income, public amenities and social welfare.
- Worker distribution in the district and workers' profile in the coal mining and coal-based power industries.
- The potential impacts of coal mine and coal-based power plant closure.
- The vulnerability (and resilience) of the workers and the district in the face of transition.
- Identifying aspirations and opportunities of income substitution, and economic diversification.

The primary research has relied on the following three mechanisms:

- Household survey covering 600 households in Korba district (see *Box: Sample distribution*)
- Focus group discussions (FGDs) conducted with various stakeholder groups in Korba district.
- Individual interviews conducted with key actors, including public representatives, state and district administrators, industry heads and union leaders.

Overall, the primary research has helped to capture the viewpoints of a large group of stakeholders, which is an important component of developing a just transition plan based on an inclusive process.

The secondary research involved literature review, analysis of government data, review of industry data (particularly of coal mining and coal-based power sectors) and review of scholarly and scientific reports. The data and analysis forms the basis of assessment for the following:

- Coal mining and coal-based power industry scenario.
- Socio-economic profile of the district, including demographic distribution, economic and developmental status, opportunities in primary, secondary and tertiary sectors, issues of environmental pollution, etc.
- Scope and resources for economic diversification and industrial restructuring, revenue substitution and investments to support a just transition.

Based on the evaluation of the challenges and opportunities, a planning framework for the district is proposed. The framework also provides guidance for undertaking district-specific interventions in India's top coal mining and power districts.

Sample distribution

A total number of 600 households were selected for the primary survey. The sample size was determined by considering the estimated district population (as of 2021), and taking a 95% confidence level and 2% confidence interval, for a statistically significant representation. The households for the primary survey were chosen through a process of stratified random sampling to minimise the possibility of clustering and selection bias.

Four spatial strata were considered to determine the sampling points which included locations:

- Within 0-3 kilometres (km) radius from a mine (or cluster of mines) where most mining-related operations are happening (and also where power plants are located) and can be considered to have the most direct with such activities;
- Within 3-10 km radius, which may be considered to have high to moderate dependence on coal mining and coal-dependent sectors;
- Within 10-20 km radius, which may be considered to have low relation with coal mining and allied sectors; and
- Beyond 20 km radius, which may be considered to have insignificant dependence on coal mining and allied sectors.

The spatial categorisation has been derived from the classification broadly used by Pradhan Mantri Khanij Kshetra Kalyan Yojana to identify directly and indirectly mining-affected areas, and is being considered by some of the top mining districts in India.⁹

A specific number of households were drawn from each geographical area considering the population density, the proportion of urban and rural population of respective areas and also the caste distribution. For example, given the high proportion of industrial activities and other associated opportunities within 0-3 km radius of the mines and the high proportion of urban population, a relatively higher number of urban households were selected within this radius. Conversely, considering that areas beyond 10 km radius from the mines have a high proportion of rural population, the number of rural households in the sampling set is higher than the number of urban households. Similarly, considering that the district is entirely a Scheduled Area,¹⁰ with a high proportion of Scheduled Tribe (ST) population (over 42%), special attention was also given to the representation of various groups (and especially STs) in the sample.

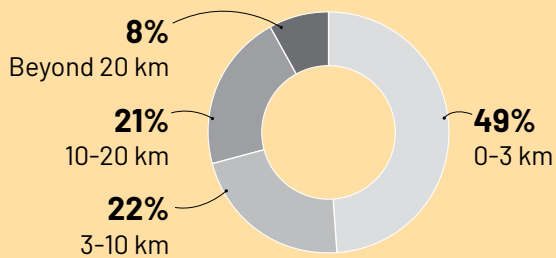


FGD with women from a tribal community in Korba/Diana Ann Joseph, iFOREST

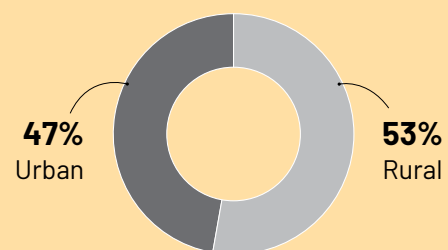
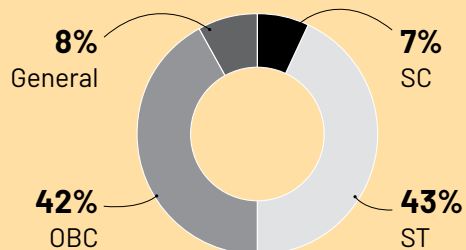
Locations of household survey



Household distribution

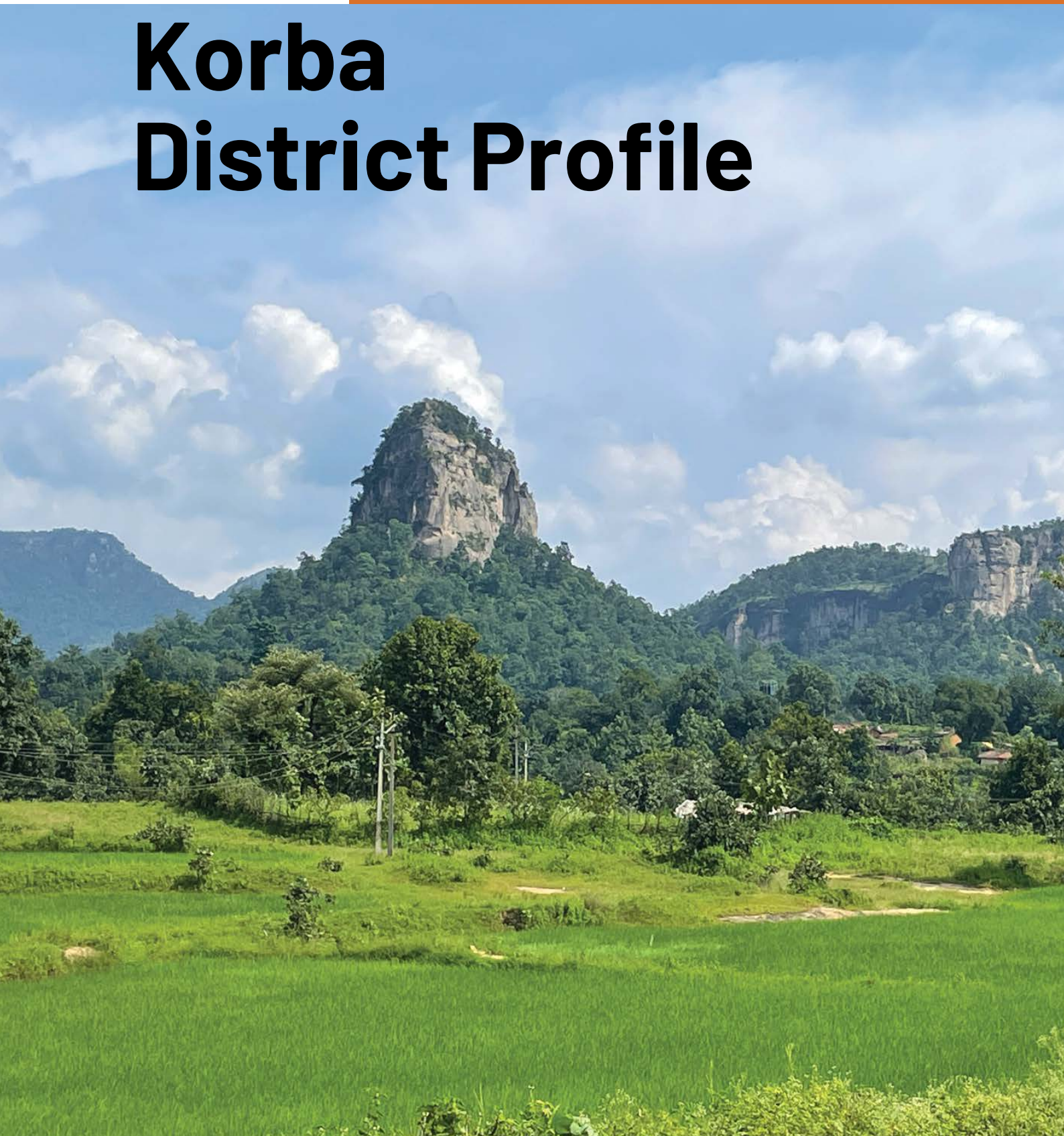


Demographic mix



Chapter 2

Korba District Profile





Korba/ Chinmayi Shalya, iFOREST

- Korba is a Schedule V district with 41% ST population.
- 66% of the district's geographical area is under forest, despite it being India's top coal mining district.
- 50% of Korba's GDP comes from mining and quarrying, largely coal mining. Mining and manufacturing combined contributes to about 61% of the GDP.
- While resource rich, Korba has more than 41% BPL population. Over 91% of rural households has the highest earning member with less than ₹5,000 (US\$ 66) monthly income.
- The district remains a 'severely polluted area' as per pollution index of the CPCB, largely due to air and water pollution from mining and coal-based power plants.

2.1 Administrative profile

Korba district was carved out of Bilaspur in 1998. Located in the northern part of the state of Chhattisgarh, the district shares boundaries with Bilaspur in the west, Janjgir-Champa in the south, Raigarh in the east, Koriya in the north and Surguja in the north-east.¹ The district is divided into five administrative blocks (also tehsils), namely, Katghora, Korba, Kartala, Pali and Poundi Uproda. These blocks have 390 gram panchayats and 769 villages.² With respect to urban administrative units, the district has one municipal corporation (Korba), two nagar palika parishads (Dipka and Katghora) and two nagar panchayats (Churrikala and Pali).³

The main river flowing through the district is Hasdeo and its tributaries, Gagechorai, Tan and Ahiran. River Mand flows along the eastern boundary of the district.⁴

Map 1: Administrative map of Korba



Source: Adopted from District Census Handbook, 2011

2.2 Land use land cover

Korba is spread across an area of 714,544 ha (7,145.44 sq km), comprising 5% of the state's geographical area (13,519,200 ha).⁵ The district is highly forested with 66% (471,530 ha) of the total area being forestland. After forests, farmland accounts for about 19.7% of the district's area.⁶

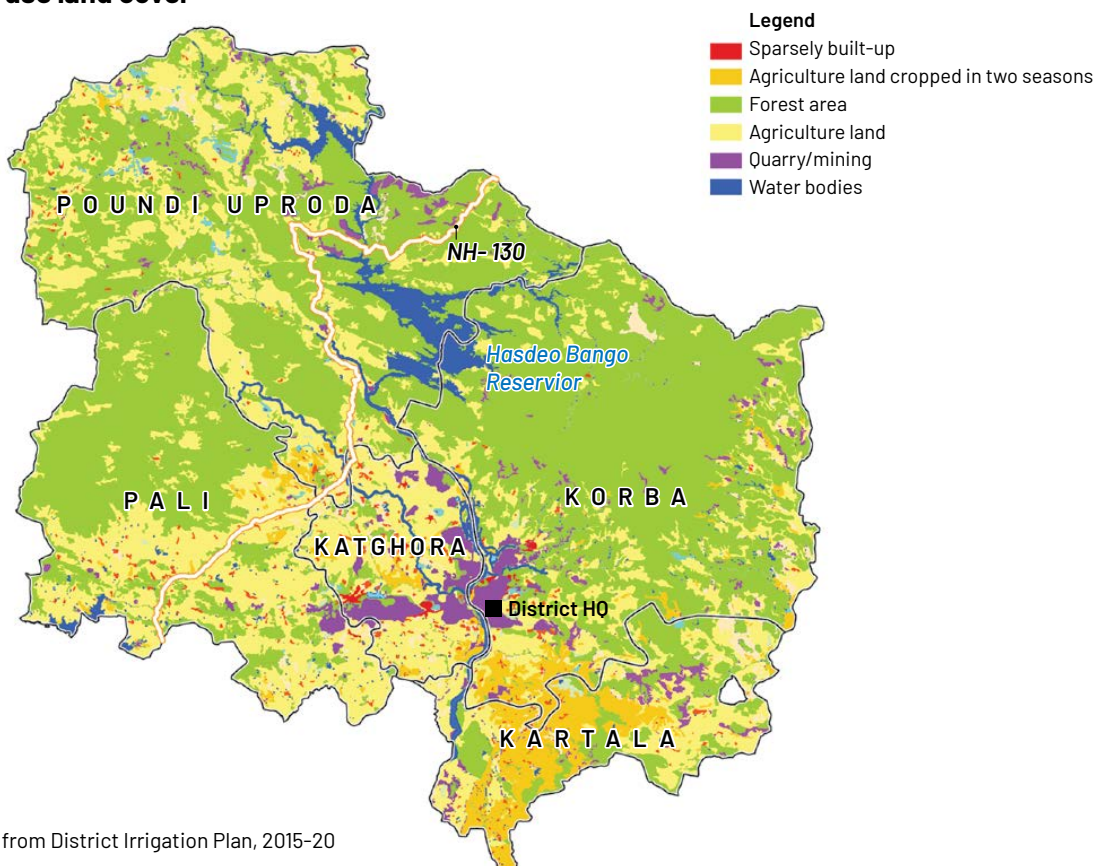
About 8.3% of the geographical area is classified as "wasteland" which is essentially "degraded land which can be brought under vegetative cover with reasonable effort and which is currently underutilised and land which is deteriorating for lack of appropriate water and soil management or on account of natural causes."⁷ This includes shrubs, scrubs, marshlands, barren/rock, abandoned shifting cultivation, etc.⁸ The land area classified as "other uses" includes the land leased for mining activities in the district.

Table 1: Block-wise land use land cover

Block	Total geographical area (ha)	Gross cropped area (%)	Area under forest (%)	Area under wasteland (%)	Area under other uses (%)
Korba	204,001	10.8	79.7	4.0	5.9
Kartala	77,999	37.5	37.6	10.5	16.9
Pali	150,482	23	62.7	10.5	6.0
Katghora	47,181	42.7	21.7	18.8	18.4
Poundi Uroda	234,881	14.8	74.5	7.8	4.2
Total	714,544	19.7	66.0	8.3	7.4

Source: District Irrigation Plan, 2015-20

Map 2: Land use land cover



Source: Adopted from District Irrigation Plan, 2015-20

2.3 Demographic distribution

The total population of Korba (as per Census 2011) was 1.2 million, which constitutes nearly 4.7% of the state's population. As per projections for 2021, the district's population is estimated to be about 1.36 million.⁹ Overall, as per projected estimates, 40% of the district's population is urban and 60% is rural.

The population density of Korba is estimated to be 191 persons per square kilometer (sq km), which is significantly low compared to India average (423.9 persons per sq km). This is due to vast stretches of rural and forested areas in the district. Within the urban precincts of the Korba municipality, the population density is substantially higher. In fact, Korba block has nearly 30% of the district's population, as it includes the densely populated municipality area.

Korba is also a Schedule V district, as per the Constitution of India, Article 244 (1)¹⁰ and as declared by Chhattisgarh state.¹¹ About 41% of Korba's population is ST, which comprises tribal groups, such as *Birhor* tribes and *Pahadi Korwas*, who are identified as 'special backward tribes' or particularly vulnerable tribal groups (PVTGs). The PVTGs constitute about 1% of the district's total tribal population and most of them (70%) reside in Korba block. Other tribes in the district include Gond, Raj Gond, Kanwar, Bhayana, etc.¹²

Table 2: Population distribution

Parameters	2011	2021 (Projected)
Total population (million)	1.2	1.3
Male population (%)	50.8	50.8
Female population (%)	49.2	49.2
Rural population (%)	63	60.3
Urban population (%)	37	39.7
SC population (%)	10.3	10.3
ST population (%)	40.9	40.9
Total no. of households	280,073	317,676*
Population density (persons/sq km)**	189	191

Source: Census of India for 2011; Total population in 2021 is based on projection by Directorate of Economics and Statistics, Government of Chhattisgarh.

* Household number is calculated taking household size to be 4.3, as per average estimates from 2011 Census;

** Population density has been calculated by dividing the total population of Korba in 2021 by Korba's total area (in sq km)

Table 3: Block-wise demographic distribution

Block	Total population (million)*	Rural (%)	Urban (%)	SC (%)	ST (%)
Korba	0.41	36.0	64.0	12.4	28.9
Katghora	0.3	32.7	67.0	12.5	23.9
Pali	0.22	97.2	3	8.7	52.9
Poundi Uproda	0.21	100	0	3.9	72.9
Kartala	0.16	100	0	11.2	49.1

*Block-wise population has been calculated assuming that the proportion of each block's population and other demographics - rural, urban, SC and ST population - in the district's total population has remained the same as in 2011; Rural, urban, SC, ST proportions as noted in the district statistical handbook; Base population for calculation as projected by Directorate of Economics and Statistics, Government of Chhattisgarh.

2.4 Key economic sectors

The key sectors in Korba's economy and their respective contributions can be ascertained through a review of the district's GDP. While the last GDP figures for Korba are from 2007 (as per official records), feedback from officials at the state and district indicate that the economic scenario mostly remains unchanged.

The economy of Korba is largely dependent upon the primary sector (over 56% share in GDP), which is dominated by coal mining (about 50%). The secondary sector's contribution is about 31%, while the service sector contributes only 12.7% to the GDP.

Table 4: Share of economic sectors in district GDP

Sector	Share in district GDP (%)
Primary sector	56.3
Agriculture	4.8
Forestry	0.5
Fishery	0.6
Mining and quarrying	50.4
Secondary sector	31
Manufacturing	10.3
Construction	4.5
Electricity, gas, water	16.2
Tertiary/ Service sector	12.7

Source: Directorate of Economics and Statistics, Government of Chhattisgarh.
(While data is of 2007, as per official feedback the situation remains largely unchanged).

2.4.1 Primary sector

As noted, the two dominant economic activities in the primary sector are mining and agriculture. However, considering the potential of resources, this section outlines the status of forest and fisheries as well in the district.

Coal mining

Korba is the biggest coal producing district in India accounting for over 16% of the country's coal production in 2020-21.¹³ Also, about 74% of Chhattisgarh's coal comes from Korba, which is currently the country's top coal producing state.¹⁴

The district has 13 operational coal mines of which eight are underground (UG) mines and five are open cast (OC). Further, there are four mines in the pipeline which are likely to open between 2022 to 2025 (see Section 3.2 *Coal mining*, page 45).

Two of India's biggest coalfields, Korba and Hasdeo Arand, which collectively have 17,358 MMT geological resources, are in the district.¹⁵ The western part of the Korba coalfields covers the Korba and Katghora blocks, where most mines are located (see Chapter 3, *Map 3: Korba coalfields*, page 45). This is also the part which has high potential in terms of power grade coal availability.¹⁶ The Hasdeo-Arand coalfield covers the Pundi Uprada block, which is largely rural and forested.

Agriculture

About 19.7% of the total geographical area in Korba (about 140,765 ha) comes under agricultural land (gross cropped area). The district's land is suitable for a wide range of crops including rice, legumes such as black gram, horse gram, lentils, oilseeds, maize, etc.¹⁷ Rice, urad, maize and horse gram are the most cultivated crops. The crop yield in Korba, however, is fairly low when compared with high yielding states like Punjab, Haryana and Andhra Pradesh (less than half of these states).¹⁸

Table 5: Crop production

Crop	Season	Area (Hectare)	Production (Tonnes)	Yield (Tonnes/Hectare)
Rice	Kharif	109,307	126,495	1.16
Urad	Kharif and Rabi	3,179	949	0.3
Arhar/Tur	Kharif	1,175	520	0.44
Horse-gram	Kharif	3,880	1,364	0.35
Maize	Kharif	3,355	6,095	1.82
Rapeseed and Mustard	Rabi	1,347	507	0.38
Sesamum	Kharif	1,418	390	0.28
Others	All year/ Kharif/ Rabi	4,526	4,552	-

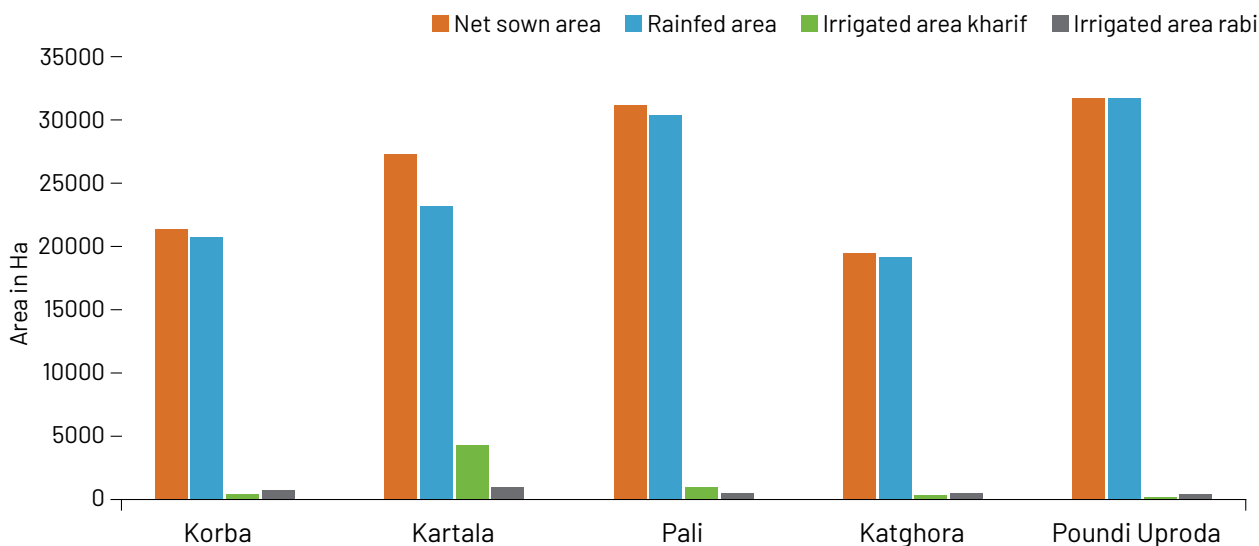
Source: Ministry of Agriculture and Farmers Welfare, 2019



Agricultural workers in paddy field, Katghora block. Chinmayi Shalya/iFOREST

Agriculture in the district is largely rain-fed. Only about 4.4% of the area under agriculture is irrigated. There is limited irrigation during both the kharif and rabi seasons. This affects year-round yield and intercropping in the region, for which irrigation is considered to be an essential input factor.¹⁹

Figure 1: Status of irrigation of agricultural land



Source: District Irrigation Plan, 2015-20

Agriculture is the source of livelihood for a majority in the district, with about 64% of the district's total workers reliant on it as cultivators or agricultural labourers.²⁰ While on an average 40% of rural households have agricultural landholdings, most of them are marginal (below 1 ha) and small (1 to 2 ha). The proportion of marginal landholdings is in fact about 64.5%.²¹

As ground observations suggest, in most cases, farmers with such small land holdings earn very little from agriculture and use it for self-sustenance. Poor irrigation and low cropping in the rabi season (non-monsoon), coupled with small landholdings, translate into poor incomes (as also found by the primary survey).

Overall, the status of agriculture in the district suggests that there is opportunity to improve agricultural productivity to improve the sector's potential through a number of interventions. The detail of interventions is discussed in Chapter 6.

Table 6: Proportion of rural households with landholdings

Block	Households with landholding (%)
Katghora	36%
Poundi Uproda	50%
Pali	43%
Korba	29.5%
Kartala	45%

Source: Socio-economic Caste Census, 2011

Table 7: Agriculture landholding size

Size of land holdings	Number	Land holding proportion (%)
Below 0.5 hectare	52,614	42.57
0.5 to 1 hectare	27,042	21.88
Total marginal	79,656	64.45
1-2 hectare	24,716	20.00
Total small	24,716	20.00
2-3 hectare	9,686	7.84
3-4 hectare	3,987	3.23
Total semi-medium	13,673	11.06
4-5 hectare	2,215	1.79
5-7.5 hectare	2,166	1.75
7.5-10 hectare	689	0.56
Total medium	5,070	4.10
10-20 hectare	441	0.36
20 hectare and above	36	0.03
Total large	477	0.39
Total holdings	123,592	

Source: Agricultural Census, 2015-16

Forest

Among India's coal districts, the proportion of forestland in Korba is the highest, constituting about 66% of the district's geographical area (471,530 ha). Of the total forest area, 60% is reserve forest and 40% is revenue forest. The forest in Korba is largely sal forest, and is categorized as dry deciduous.²²

Korba and Poundi Uproda blocks, which have about 79% and 72% area under forest respectively, also have a sizable tribal population. The tribals rely on forest-based produce for self-consumption as well as income. Some of the forest-based produce in Korba includes *tendu* leaves (*Diaspyros melanoxylon*), *mahua* flowers and seeds (*Madhuca indica*), *char* seeds (*Shorea robusta*), *lac* (a resinous secretion by *Kerria lacca* species of insect), tamarind (*Tamarindus indica*), honey, *harra behera* (*Terminalia bellirica*), date, *chiraunji* seeds (*Buchanania lanzan*), etc., which are categorised as non-timber forest product (NTFP).²³

Table 8: Block-wise area under forest

Block	Total area under forest (ha)	Proportion of land area under forest (%)	Proportion of tribal population (%)
Korba	162,579	79.7	25.5
Katghora	10,223	21.7	29.9
Pali	94,401	62.7	52.9
Kartala	29,301	37.6	49
Poundi Uproda	175,026	74.5	72.9

Source: District Irrigation Plan, 2015-20; Census of India, 2011

Collection and processing of *tendu* leaves constitute a key source of income as it is the most organised NTFP. Its collection and sale are supported and promoted by the Chhattisgarh Government. In 2020, ₹395 million (US\$ 5 million) was paid to 79 *Van Dhan Samitis* (village cooperatives) across the forested areas in Korba for collection



A tribal family in Poudi Uproda block. Chinmayi Shalya/iFOREST

and procurement of tendu leaves.²⁴ The tendu leaf gatherers are also covered under certain social security schemes, such as life insurance schemes in case of death.²⁵

Overall, the State Government supports 38 minor forest produce (MFP) under the minimum support price (MSP) scheme. Some of the high value MFPs found in Korba district include lac, which, depending on variety have a price between ₹200-300/kg (US\$ 2.6-3.9/kg), honey priced at ₹225/kg (US\$ 2.9/kg), tamarind priced at ₹69/kg (US\$ 0.9/kg) and chiraunji at ₹126/kg (US\$ 1.9/kg). However, other than tendu and to some extent lac, the collection, processing and marketing of other forest produce remain suboptimal. To address this, the State Government has been promoting micro-enterprises. The district has nine forest-based micro-enterprises for lac cultivation, chiraunji, mahua and forest-herb medicines.²⁶

Besides support through State Government schemes, there are 12 *Van Dhan Kendras* (forest resource centres), which have been established under the Central Government's *Van Dhan* scheme.²⁷ The scheme is implemented in districts with availability of MFPs and significant forest dwelling tribal population, and aims to improve the income of the tribal communities through value addition to the MFPs.²⁸ There are a total of about 4,000 beneficiaries attached to these centres through tribal self-help groups in Korba. Also, there are about 12 processing units in the district around these centres which employ about 1,300 people.²⁹ However, at the time of this research, only five centres were found to be functional.

Tasar silk production is another activity that the district is known for. Tasar rearing is traditionally practised by tribal communities, usually residing around the forest fringes. In 2015-16, the district was identified among the key production clusters in Chhattisgarh for tasar.³⁰ The district has 49 farm centres and about 1,837 ha of area under tasar rearing. A seed multiplication and training centre for tasar is also located in the district's Pali block. However, currently, tasar is not included as a potential investment area by the Central Silk Board.³¹

A key factor for enhancement of the forest potential is settlement of rights of the forest-dependent communities. One of the important rights recognised under the Forest Rights Act (FRA, 2006) is community forest resource rights (CFR rights) which allows forest dependent communities to manage their forests for sustainable use. While the Government of Chhattisgarh has been at the forefront of granting forest rights under the FRA, there still remain significant gaps with respect to the claims made.

For example, until June 2021, 102,123 claims for individual forest rights (IFR) were filed in Korba (including both forest divisions), of which 50% were given title deeds. For community forest rights (CF rights), out of the 2,113 claims filed, 62% have been given titles. With respect to CFR rights, 135 titles were given.³² Overall, the total area of forestland for which titles have been distributed is 171,349 ha (which is 36% of total area under forest).

Interactions with local groups suggest that many claims get rejected due to poor documentation and there is currently no structural support to help local communities file the claims properly.

Overall, the availability of forestland and status of forest products in the district suggest that the forestry sector holds very significant potential to boost and diversify the local economy. It can also help to provide workers a secure and 'culturally appropriate' livelihood (many of them being tribals), which they are familiar with. The interventions are discussed further in Chapter 6 (see Section 6.5.1 *Boosting agriculture, forestry and fisheries, page 107*).

Table 9: Status of settlement of forest rights

Claims	IFR	CF rights	CFR rights
Claims filed at gram sabha level	102,123	2,113	Not provided
Claims recommended by Sub divisional level committee (SDLC) to District level committee (DLC)	102,123	1,319	Not provided
Claims approved by DLC and title deeds distributed	51,374	1,319	135
Forest land for which titles distributed (ha)	27,551.3	50,776.7	93,020.8

Source: Department of Tribal and Scheduled Caste, Chhattisgarh, May 2021

Fisheries

Fisheries is emerging as an important sector in Chhattisgarh. About 77% of Chhattisgarh's fish production comes from the northern districts of the state.³³

While Korba falls in north Chhattisgarh, the fish production from the district is the lowest in the region, about 2.5% of the state's total production target. The main reason for this is the poor status of the fish federation development in the district, as indicated by the latest data and official interactions.

Table 10: Fish production (metric tonnes): 2020-21

	Irrigation Tank		Ponds and tanks		Rivers		Fish federation		Total	
	Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement
Korba	252	252	13,940	13,941	30	30.3	1,062	13.6	15,284	14,237.4
Chhattisgarh	16,335.5	15,820.2	536,348	553,993.7	4,426	4,481.1	4,957	2,729.8	562,066.5	577,024.9

Source: Department of Fisheries, Government of Chhattisgarh, 2021

2.4.2 Secondary sector

The secondary sector in Korba is dominated by the coal-based power industry owing to the large-scale coal production in the district. Like coal mining, it is the biggest power generation hub constituting about 23.6% of the state's total installed capacity.

Korba has 11 operational thermal power plants (TPPs) with a total installed capacity of 6,428 MW. Apart from these, the district has captive TPP, operated by the Bharat Aluminium Company Limited (BALCO) for its aluminium plant.³⁴

The largest operators in the district are National Thermal Power Corporation (NTPC Limited), the Central Government PSU, and Chhattisgarh State Power Generation Company Limited (CSPGCL), the State Government undertaking (see Chapter 3, Section 3.3 Coal based thermal power plants, page 53).

Due to the presence of coal mining and coal-based thermal power plants, Korba also has a number of coal washeries and fly ash brick units. There are five operational coal washeries in Korba, mainly located in Katghora, in the vicinity of the district's biggest coal mines. These five washeries have a cumulative processing capacity of 43.6 MMTPA (see Chapter 3, Section 3.4.1 Coal washeries, page 55).³⁵

There are about 20 registered fly ash brick units operating in Korba.³⁶ However, the scale of fly ash brick operation is much bigger considering the number of unregistered operations. About 65 unregistered units are likely to be operating as per the district's industry centre.

The other major industry in Korba is the aluminium plant operated by BALCO. The integrated aluminium complex in Korba is one of the two operational units of the company.³⁷ Besides, Korba also has 376 small and medium scale industrial units (as of 2021). Among these, food processing is a major one.³⁸

Table 11: Industries in Korba

Industry type	Number of units/plants
Large scale	
Aluminium plant	1
Thermal power plants	11*
Medium and small scale	
Coal washeries**	5
Food processing	72
Fly ash bricks	20
Electricals	12
Steel furniture	14
Engineering works	31
Chemicals	4
Explosives	1
Others	219

Source: District Industry Department, 2021; *Excluding captive power plant; **Coal washery details as per Coal Controller's Office, 2020-21.

2.5 Employment status

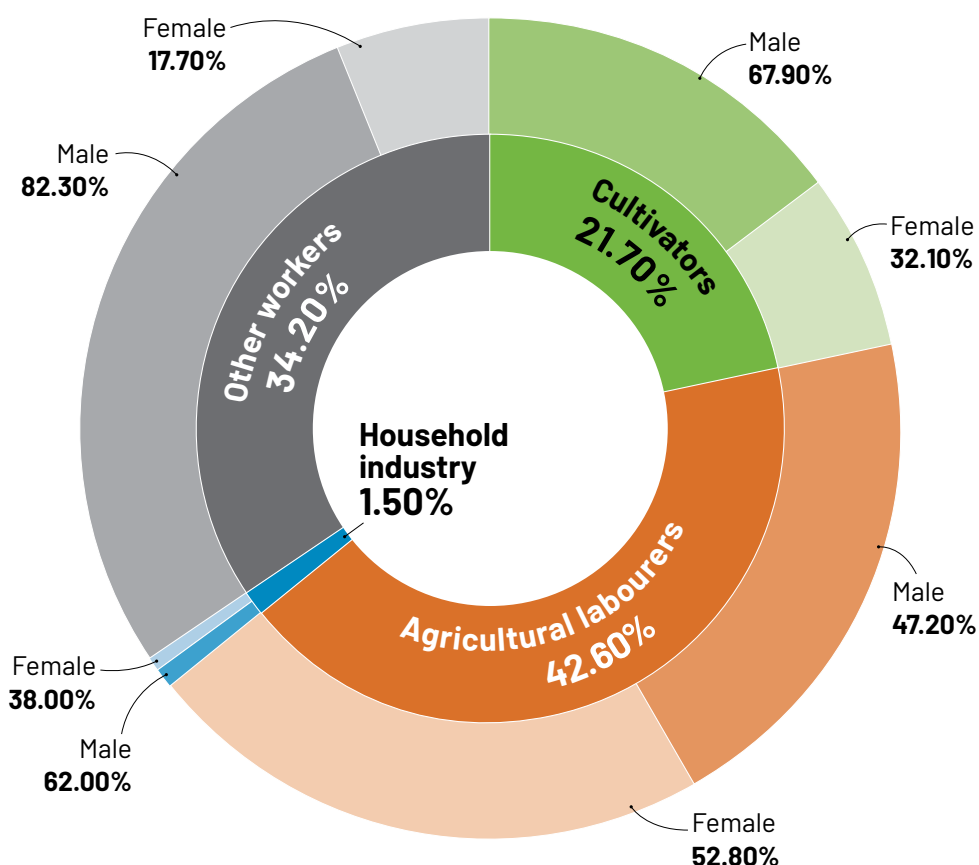
The overall employment status in Korba has been ascertained on the basis of Census of India (2011) and the unemployment rate of the district. At the time of this research, no comprehensive updated information on labour was available (post Census 2011) from the state or the district.

Overall, only 43% of people in the district are 'workers', which is less than the state average of nearly 48%. Of this, 29% are main workers (those having employment for more than six months in a year) and 14% are marginal workers.³⁹

The share of women in the workforce is much lower than men. Among the workers, only 36% is female as opposed to 64% males. The women workers further largely fall in the 'marginal' category (with less than six months of work in a year), most of them being agricultural labourers or engaged in other labour work.⁴⁰

Among the main workers, most people are engaged in the agricultural sector which accounts for over 64% of the workers (agricultural labourers 42.6% and cultivators 21.7%). The district also has over 34% of 'other workers' who are likely to be employed in the mining sector, other industries, service sector, other public and private jobs, etc.⁴¹

Figure 2: Categories of workers



Source: Census of India, 2011

As per 2018 estimates, the unemployment rate in Korba was 6.07%. This is nearly twice the state average of 3.28% (Chhattisgarh's unemployment rate is half of the national rate). Moreover unemployment rate in urban areas (8.4%) is much higher than the rural areas (4.7%). There is also a clear gender disparity with the female unemployment rate in the district more than double the district's average.⁴²

Table 12: Unemployment rate (%)

	Rural	Urban	Male	Female	Total
Korba	4.7	8.4	3.23	12.73	6.07
Chhattisgarh	2.45	7.48	3.27	3.28	3.28

Source: Korba District Handbook, 2021; Data for 2017-18

The district's lack of decent employment opportunities is also evident from proxy indicators, such as the high proportion of people who are reliant on the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). In 2020-21, a total of 131,016 households, which is about 39% of the district's total households, sought work under MGNREGS. The lack of opportunity is more evident in rural areas, as over 70% of the households seeking work under MGNREGS are rural.



Automobile workers in Korba block/Diana Ann Joseph, iFOREST

Table 13: Demand for work under MGNREGS

Year	Households which demanded employment	Households provided employment	Proportion of households provided with work (%)
2016-17	81,337	61,666	75.8
2017-18	100,364	78,886	78.6
2018-19	91,955	79,254	86.2
2019-20	86,476	72,986	84.4
2020-21	131,016	98,407	75.1

Source: MNREGS MIS 2016-17 to 2020-21

2.6 Income

Despite the presence of coal mining and thermal power industries, Korba has a high incidence of poverty. Three indicators - below poverty line (BPL) population, rural household earnings, and the proportion of people reliant on Government subsidies (ration card type) demonstrate this.

For example, about 41.5% of Korba's population lives below the poverty line.⁴³ While there are no differential BPL estimates for urban and rural population, the socio-economic caste census (SECC, 2011), and ration card distribution provide an indication. The SECC records that in 91.3% rural households, the highest earning member earns less than ₹5,000 (US\$ 66) per month.

The analysis of ration card distribution also substantiates the high percentage of poor people in the district. The latest data (2021) shows that over 85% of the households fall under the priority household (low income) and the Antodaya (poorest of the poor) category, as per specifications of the National Food Security Act (NFSA), 2013.⁴⁴ In fact, low income is pervasive in all blocks, including in Korba and Katghora, where the coal mines and TPPs are concentrated.

Table 14: Distribution of ration cards

Block	Total number of ration cards	Antodaya households (%)	Priority households (%)	Destitute (%)	Disabled (%)	Above poverty line (%)
Korba	120,900	16.0	64.3	0.7	0.1	18.9
Katghora	38,071	15.4	62.6	0.4	0.1	20.7
Kartala	38,924	25.7	66.7	1.6	0.02	5.9
Pali	49,214	18.2	73.0	0.6	0.02	8.0
Poundi Uproda	45,982	20.8	74.3	0.4	0.01	4.4
Total	293,091	18.3	67.5	0.8	0.1	13.3

Source: Food, Public Distribution and Consumer Protection Department, Chhattisgarh, 2021

2.7 Environmental pollution

In 2010, Korba was identified by the Central Pollution Control Board (CPCB) as a critically polluted area (CPA) considering high levels of air, water and soil pollution. While over the years there has been some improvement, the pollution problem continues to be severe.⁴⁵ As per the latest estimates of the CPCB, the Comprehensive Environmental Pollution Index (CEPI) of Korba is 69.11,⁴⁶ which 'technically' makes Korba a 'severely polluted area' (industrial clusters with CEPI score of 70 and above are identified as CPAs, and those with CEPI score between 60 to 70 are categorized as severely polluted areas).⁴⁷

Extensive coal mining activities and presence of a large number of TPPs are key contributors to air, water and soil pollution. For example, scientific assessments (IIT Bombay) on sources of air pollution in Korba have noted that coal mining contributed to nearly 55% of PM10 pollution (along with coal and firewood burning), while TPPs contributed nearly 44%. The rest was due to vehicular emissions and other activities. With respect to PM2.5, coal mining, and coal and firewood burning were found to be contributing 94% of the emissions.⁴⁸

However, pollution monitoring is limited in the district, including in industrial areas. For example, while air pollution is a severe problem, there are only three pollution monitoring stations under the National Ambient Air Quality Monitoring Programme.⁴⁹ This is one-third of the minimum number of ambient air quality monitoring stations that must be there in Korba considering its population. The guidelines of the CPCB stipulate that for areas having a population between one to five million, there must be at least eight monitoring stations.⁵⁰

Not just monitoring, implementation of pollution abatement measures and action plans is also unsatisfactory. In 2019, Korba town was among the 132 cities which were identified as "non-attainment" cities under the National Clean Air Programme as the environment action plan was not implemented.⁵¹

The status is also evident from other scientific studies conducted in the area. A recent study (2020) by the State Health Resource Centre (SHRC), which works with the Health and Family Welfare Department of the State Government, found air quality in Korba town to be poor. The study included seven monitoring sites in Korba town which were chosen based on recommendations of the citizens. The study recorded high levels of PM2.5 pollution in all locations, ranging from 186.2 ug/m³ to 549.9 ug/m³, which was nine times more than the prescribed ambient air quality standards of the CPCB.⁵²

Besides air, there are also challenges of water pollution. As per the Chhattisgarh Environmental Conservation Board, there are two main sources of water pollution in the district: industrial fly ash discharge by the TPPs and frequent incidences of ash pond overflow, and the discharge of untreated domestic wastewater, particularly from the townships.⁵³



Extensive coal mining and presence of many TPPs are key contributors to air, water pollution/Diana Ann Joseph, iFOREST

With respect to TPPs, it is estimated that the industry generates over 20 million tonnes of fly ash annually.⁵⁴ There are periodic reports in the media of incidences of fly ash pond breach polluting water and land in the district.⁵⁵ As all the ash ponds are situated near natural streams such as Dengur Nallah, Belgiri Nallah, Jharia Nallah which ultimately joins the Hasdeo river, the poor handling and discharge of fly ash pollutes these water bodies.⁵⁶ Besides, scientific studies have also pointed out pollution of the Hasdeo river resulting from industrial discharges, including concentrations of heavy metals, such as manganese and lead. While the river water is used to supply potable water in the municipalities, the studies concluded the water to be unfit for drinking without treatment.⁵⁷

Ground water studies conducted in Korba block also showed pollution by fluoride, nitrate and phosphate at many locations. Iron and manganese in groundwater was also found to be well above the norms for drinking water.⁵⁸

Overall, the pollution burdens in the district have affected the poor and the rich equally. While near the mines and the industrial clusters people have more well paying jobs and businesses (*discussed in detail in Chapter 4*), the pollution is inescapable. However, the poor bear a disproportionate burden of the pollution because of their limited capacity to afford healthcare and the impact of pollution on their livelihoods (particularly affecting agriculture). Therefore, environmental justice is an integral part of a just transition in Korba.

Chapter 3

The Coal Economy





Chinmayi Shalya, iFOREST

- Korba produces about 117 MMT of coal annually from 13 operational mines, which is 16.4% of India's total production.
- Three mines, Gevra, Kusmunda, Dipka, accounts for more than 95% of the total production and are profitable.
- All of the eight UG mines in Korba are unprofitable because of their low production and high operational costs.
- Korba is also a top power producer with 26 power units of 6,428 MW combined capacity.
- 10 coal-based power units of 2,940 MW cumulative capacity are identified for retirement by 2027 under the National Electricity Plan (2018).

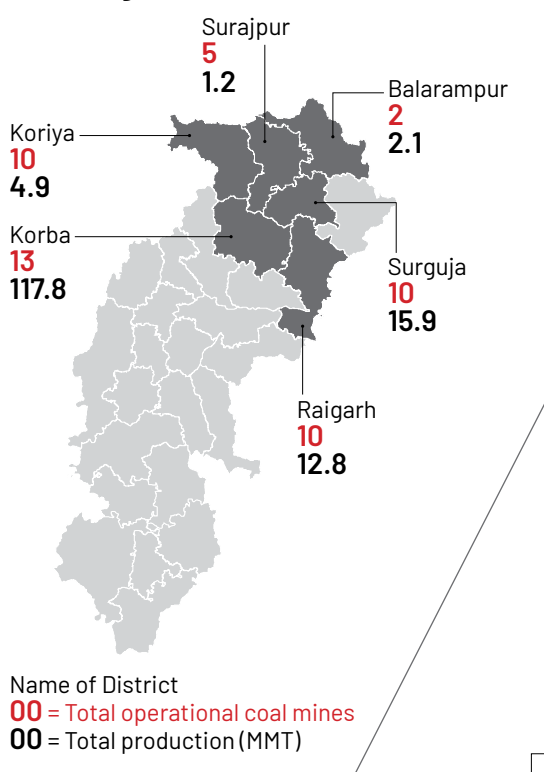
3.1 Overview

Home to three of India’s largest coal mines—Gevra, Dipka and Kusunda—Korba is currently the largest coal producing district of India, accounting for over 16.4% of the country’s coal production.¹ Besides, there is also a high concentration of coal-based thermal power plants (TPPs) in the district.

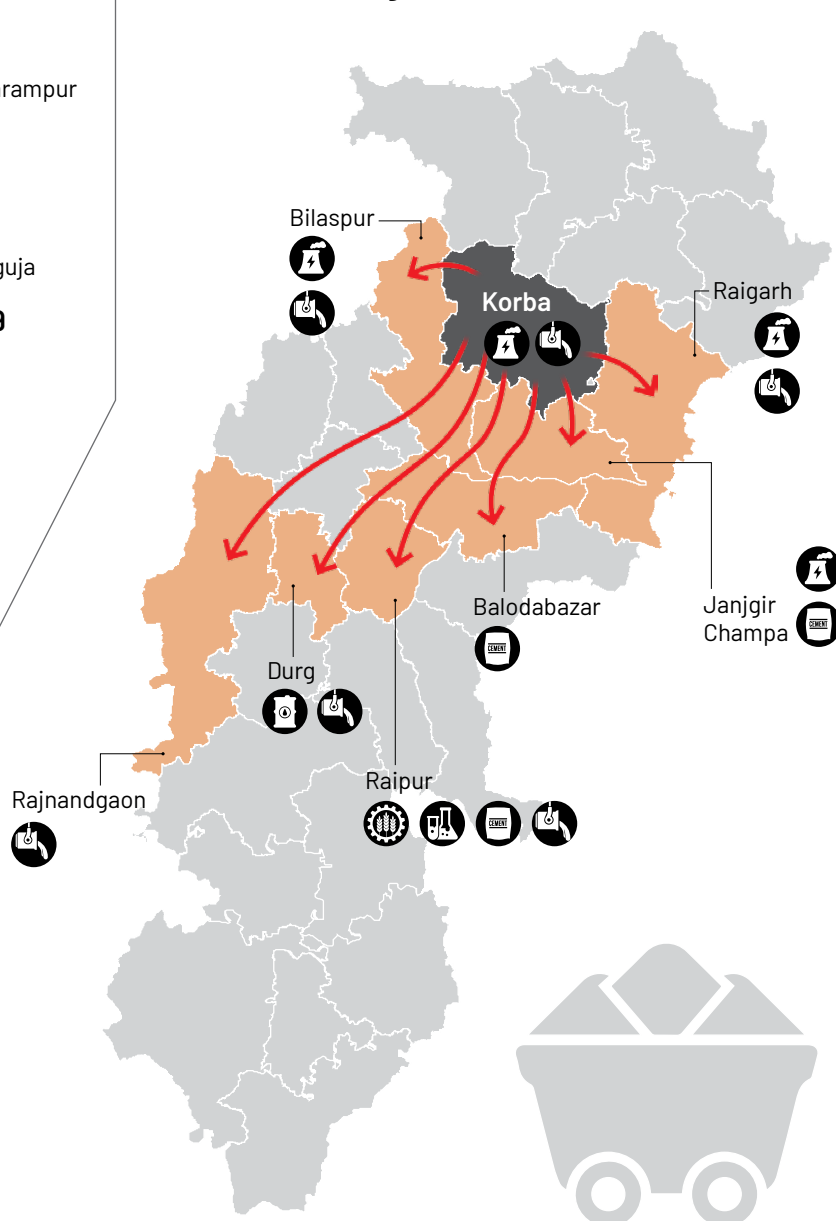
The presence of large coal mines also makes the district a key one in Chhattisgarh’s industrial landscape. With respect to coal mining, Korba accounts for nearly 74% of Chhattisgarh’s coal production, which is currently the top coal producing state in India (158.4 MMT in 2020-21).

The coal from Korba also supports a number of industries in the state. Among these the major ones are, TPPs that are operational in the district and other parts of the state, such as neighbouring Bilaspur and Janjgir-Champa, steel and sponge iron units in Raipur, Raigarh, Bilaspur, Durg and Rajnandgaon, and cement units in Janjgir-Champa, Balodabazar and Raipur.

Map 1: Coal production in Chhattisgarh



Map 2: Industries supported by coal from Korba in Chhattisgarh



3.2 Coal mining

Coal mining in Korba started in the 1960s.² The availability of 'thick seam/quarriable' power grade coal mining zone (comprising grade E, F and G grade coal), soon made it an attractive area for coal extraction.³

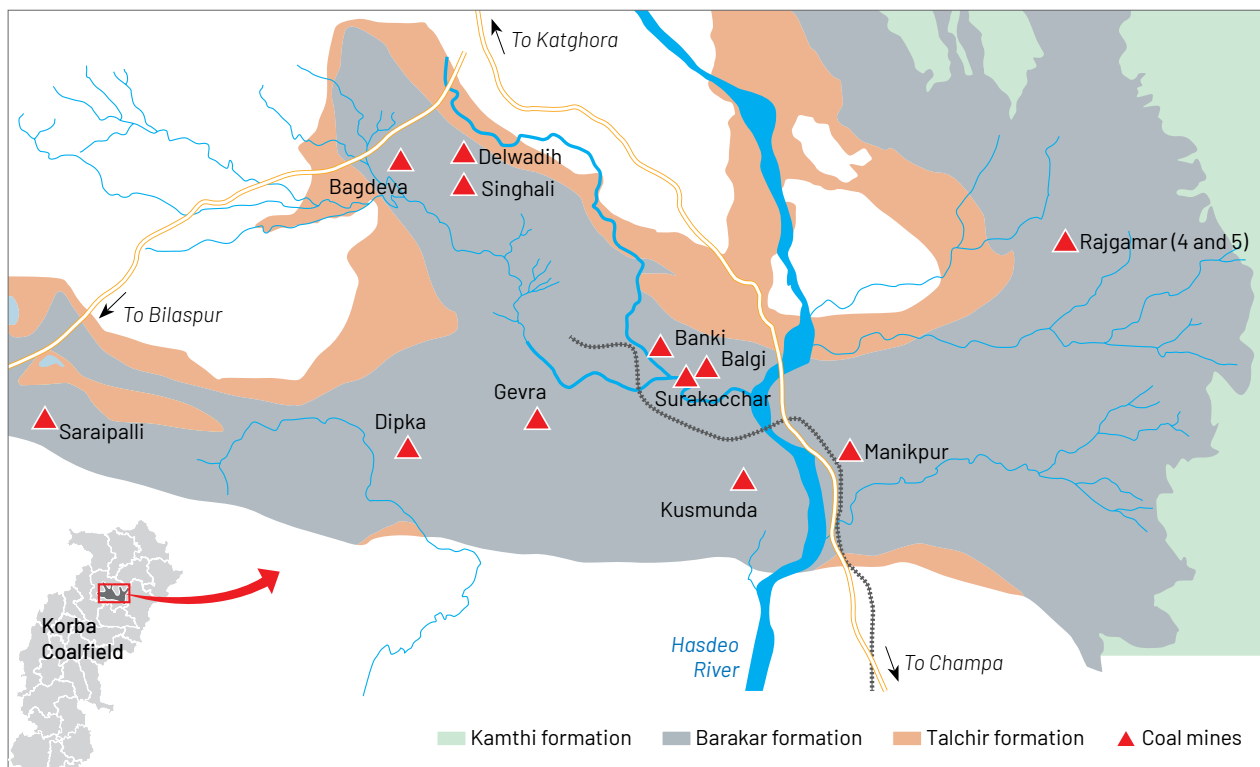
There are two key coalfields located within the administrative boundaries of the district, namely, Korba and Hasdeo-Arand. Most of the mines in Korba lie in Korba coalfields. The total resources in these two coalfields are about 17,358 MMT.

Table 1: Coal resources in Korba and Hasdeo-Arand coalfields (MMT)

Coalfields	Proved	Indicated	Inferred	Total
Korba coalfield	5,877.2	5,783.7	168.02	11,829
Hasdeo-Arand coalfield	2,032.3	3,273.4	223.12	5,528.8
Total	7,909.5	9,057.1	391.14	17,357.8
Chhattisgarh total	21,446.3	36,259.6	2,201.9	59,907.7

Source: Indian Minerals Yearbook, Indian Bureau of Mines, 2019-20

Map 3: Korba coalfield



Source: As adopted from CMPDI

3.2.1 Production and operation status

With large scale mining operations, Korba produced about 117.5 MMT of coal in 2020-21. In 2019-20, the production was 120.5 MMT.⁴

There are a total of 13 operational coal mines, five opencast (OC) and eight underground (UG), all of which are owned by the public sector undertaking (PSU) South Eastern Coalfields Limited (SECL), a subsidiary of Coal India Limited (CIL). Out of these, three mines, Gevra, Dipka and Kusmunda, account for nearly 95% of the total coal production. The eight UG mines account for less than 2% of the total production.⁵

Table 2: Operational mines (2020-2021)

Name of mine	Block	Type of operation	Production capacity (MMT/year)	Actual production (MMT)	Lease Area (ha)
Gevra	Katghora	OC	49	40	4,184.5
Dipka	Katghora	OC	35	33.53	1,999.3
Kusmunda	Katghora	OC	50	37.26	1,655.8
Manikpur	Korba	OC	4.9	4.9	1,018.9
Saraipalli	Pali	OC	1.4	0.05	279
Delwadih	Katghora	UG	0.33	0.18	743
Singhali	Katghora	UG	0.42	0.23	862.3
Bagdeva	Katghora	UG	0.76	0.41	502.6
Surakacchar	Katghora	UG	0.45	0.23	1,045.9
Balgi	Katghora	UG	0.6	0.12	1,026.0
Rajgamar (4 and 5)	Korba	UG	0.45	0.07	3,486.6
Raniatari	Poundi Uproda	UG	0.48	0.51*	389.5
Vijay West	Poundi Uproda	UG	0.5		438.1
Total			144.4	117.5	17,631.4

Source: District Mines Department, Korba, 2021; Mine lease area from Environmental Clearance letters and EC related reports

*Data on production have been provided together for Raniatari and Vijay West

There are further plans for expansion of mining activities in Korba in the next three years.⁶ Proposals for planned expansions are under consideration for Gevra (70 MMT capacity)⁷ and Dipka mines (40 MMT capacity).⁸ Besides, there are four upcoming projects with a cumulative production capacity of 14.5 MMT per year.

Table 3: Upcoming mines

Name of mine	Agency	Lease area (ha)	Production capacity (MMT/year)	Expected time for starting
Gidhimuri and Paturia	Chhattisgarh Mineral Development Corporation Limited	1,751.9	5.6	2025
Madanpur South	Andhra Pradesh Mineral Corporation Limited	712.1	5.4	June 2020 (delayed)
Ambika OC	SECL	141.9	1	October 2022
Kartali OC	SECL	722.2	2.5	October 2025

Source: District Mines Department, Korba, 2021

All UG operations in Korba are unprofitable,⁹ given their low production, large man power requirement, and consequently high cost of coal production. Only the OC operations remain profitable, particularly the large mines.

Table 4: Profitability of operational coal mines

Name of mine	Production Cost (₹/MT)	Financial performance
Kusmunda (OC)	536.7	Profitable
Gevra (OC)	445.0	Profitable
Dipka (OC)	525.4	Profitable
Manikpur (OC)	809	Profitable
Saraipalli (OC)	Not available	Not available
Surakacchar (UG)	8,014	Unprofitable
Balgi (UG)	12,950	Unprofitable
Rajgamar (4 and 5)(UG)	15,089	Unprofitable
Delwadih (UG)	8,054	Unprofitable
Singhali (UG)	5,908	Unprofitable
Bagdeva (UG)	3,764	Unprofitable
Raniatari (UG)	Not available	Not available
Vijay West (UG)	Not available	Not available

Source: SECL, 2021

While SECL has till date not taken any decision on closure of mines in the district due to reasons of unprofitability, the case of Chotia mines operated by BALCO indicates that such closures can happen. The Chotia mine has been shut 'temporarily' since December 2019 due to high operational costs. The company is likely to surrender the mine lease to the government, following which it may be re-auctioned (see Box: *Unplanned "temporary" closure of Chotia mine*).¹⁰

In fact, the prospects of closure of the unprofitable mines is not unfounded. Various reports¹¹ have suggested that CIL has been considering closing many of its mining operations that are low-producing and unprofitable.¹²

Another coal mine in the district, Banki, also remains 'temporarily' closed. While there is no scope of resuming operation in this mine as coal has been exhausted, neither the mine has been declared as 'closed', nor is there any clear plan for a planned closure.

Table 5: Closed mines

Name	Block	Operation type	Lease Area (ha)	Reason for closure	Status
Banki	Katghora	UG	2,968.1	Coal resource exhausted; No scope for resuming operations	Temporarily closed
Chotia BALCO	Poundi Uproda	OC cum UG	1,179.8	High cost of operation	Temporarily closed

Source: District Mines Department, 2021; Lease area as per Korba District Survey Report, 2016; Reason for closure as provided by the State Mineral Resources Department.

Unplanned “temporary” closure of Chotia mine

The “temporary” closure of the Chotia mine in Pounding Uproda block demonstrates a case of unplanned closure due to unprofitability, and the consequent effect on local communities. After operating for 17 years, and changing hands between companies, the coal mine is now temporarily closed.

In 2003, Chotia coal block was allotted to Prakash Industries Private Limited, a private integrated steel and power company, for UG mining operations and to supply coal to its integrated steel plant in neighboring Janjgir Champa district.¹³ A decade later, the allotment of the coal mine was cancelled by the Supreme Court (along with 203 other coal blocks) due to reasons of irregularity in the allocation of mining leases - the Coal Gate scam.¹⁴

The coal mine was re-auctioned to BALCO in 2015 for captive use to meet the coal requirement for its 600 MW TPP located in Korba.¹⁵ Five years down the line (in 2020), BALCO stopped the operations citing high cost of production of coal. As per state Mineral Resources Department, the coal mine was auctioned to BALCO for ₹3,025 (US\$ 40) per tonne production, during the first rounds of coal block auction, when the bids went high. Over the years, the bids for similar blocks have nearly halved to ₹1,400 (US\$ 18.5) on an average.¹⁶ BALCO is now sourcing coal from Gevra and Kusmunda mines.

During its operational years, Chotia had 673 employees. Of these, 154 people were employed by the company. About 121 of them were locals who were given jobs in lieu of their land and trained for jobs such as dumper operations, driving, cleaning, etc. The mining operations were outsourced to a Dhanbad based company, Dhansar Engineering works, which brought in 398 employees from Jharkhand to work at Chotia.

With the opening of the coal mine, many changes happened in the area. Prakash Industries set up a health centre with a doctor and paramedics. With the health centre, the first medical shop came up in the market. Earlier, for basic medicines, people relied on the short-in-supply public health centres or had to travel about 40-60 km to Katghora and Korba. Many other shops also came up in the marketplace - clothes, groceries, small eateries - mostly catering to the coal mine workers.

With the closure, which also coincided with the Covid-19 pandemic, the income of the local market took a hit. All shop owners suffered a loss, including the auto parts shops. The workers were let go after giving them a voluntary retirement package of ₹0.8 million (US\$ 10,000) each.¹⁷

The local workers are demanding that the mine be opened again as they had already lost their land and have no avenues but to work as agricultural labourers. Women in the area reported a spike in alcohol abuse and instances of domestic violence. “Nowhere will you see so many men roaming free during the day on streets, like here” one of them remarked. The PRI members said that with no avenues for assured income, and loss of land to the mine, those employed in the mine earlier are unable to find remunerative livelihood and are spending out of the VRS money which should ideally have been a security for the family.

The closure of Chotia mines is indicative of the local disruptions that unplanned closure can cause in the region. It also underscores the need for diversification of the local economy for better livelihood opportunities.

3.2.2 Spatial distribution

Most of the mining operations in Korba are concentrated in Katghora block, which is predominantly a rural area. In Katghora, 14,987.5 ha of land area is under mining (considering operational and closed mines), which is nearly 32% of the block's geographical area. The other block with a significant amount of area under mining is Korba, which shares the boundary with most of the mines in Katghora. The mines in Korba block are largely concentrated in the vicinity of the municipal area.

Overall, about 21,779 ha of land is under mining in the district (considering operational and closed mines), which is about 3% of the district's total geographical area. Of this about 1,652 ha has been reclaimed through progressive closure.¹⁸ The primary reclamation activity that has happened in the mines is backfilling and plantation.¹⁹

Map 4: Distribution of coal mines



3.2.3 Revenue contribution

Coal mining holds much significance when it comes to revenue contribution in Korba and in Chhattisgarh. The biggest revenue source of the state from coal mining is royalty and for the district, it is District Mineral Foundation (DMF) fund. Overall, about 6.6% of the total revenue (tax and non-tax) of the State Government comes from coal mining.²⁰

As a review of SECL annual report (2020-21) shows that the company contributed ₹109.5 billion (US\$ 1.44 billion) to the Government exchequer, out of which ₹45.4 billion (US\$ 0.6 billion) was towards the State Government.

With respect to Korba, considering that the district accounts for nearly 74% of Chhattisgarh's coal production (almost all of it coming from SECL operations), SECL contributed ₹6.7 billion (US\$ 80 million) in DMF funds in 2020-21. On an average, the district receives ₹5.5 billion (US\$ 75 million) in DMF every year.²¹

Table 6: Contribution to Government exchequer by SECL (2020-21)

Heads	Contribution (₹ billion)
Royalty	21.1
State -Sales Tax / VAT /Entry Tax/Commercial Tax	0.04
IGST+ GST compensation cess	50.8
CGST	2.7
SGST	2.6
DMF	6.7
NMET	0.42
Cess/Other Taxes	15
Other direct taxes (Advance tax, Self-assessment tax, DDT, etc.)	10
Total	109.5

Source: SECL annual reports and accounts, 2020-21

Besides royalty and DMF, coal companies also make welfare contributions through Corporate Social Responsibility (CSR) funds.²² However, this is relatively small compared to DMF contributions that the district receives. As per the District Industry Department, in 2020-21, ₹204 million (US\$ 2.6 million) was sanctioned as CSR investments in Korba by SECL.



Primary school renovation with DMF funds, Korba/Chinmaya Shalya, iFOREST

From where 16% of India's coal comes

Three of India's biggest coal mines are located in Korba, which collectively account for one-sixth of the country's coal production. The profile of these mines are outlined below.

Gevra

Currently India's largest coal mine, Gevra is spread across an area of over 4,184 ha in Katghora block. In 2020-21, the mine produced about 40 MMT of G-11 grade coal. With the latest environmental clearance nod in May 2021, the mine has a production capacity of 49 MMT.²³ It is further slated for expansion to 70 MMT.²⁴ Gevra is also being considered a key mine to shore up coal production in near future²⁵ due to its profitable operations owing to a low cost of production of ₹445 per MT.

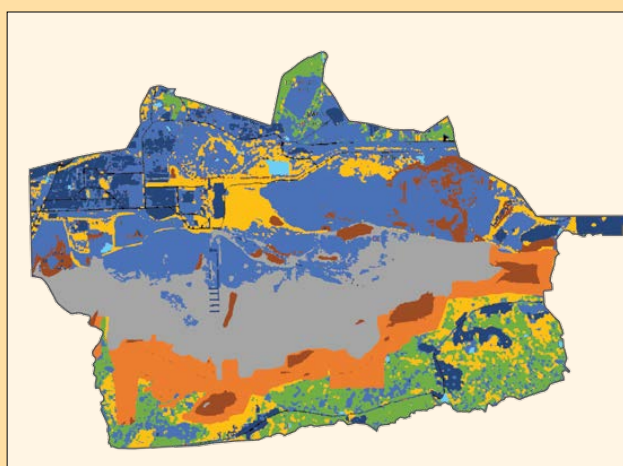
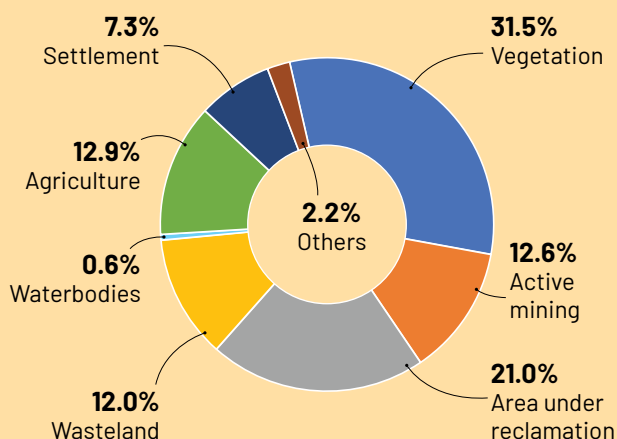
About 80% of coal produced by Gevra is currently used for power generation in TPPs across the country. Of this, 30% is used for the 2,600 MW TPP operated by NTPC in Korba. Other key TPPs that source coal from Gevra mines include CSPGCL TPPs in Korba and Janjgir Champa, and TPPs in Madhya Pradesh.²⁶ Coal from Gevra is also used by various iron and steel, and cement units located in Chhattisgarh.²⁷

The coal from the mine is transported through both rail and road. As per information of SECL (2021), about 40% of the coal is transported through rail and about 25% through road. The remainder is transported to NTPC directly.²⁸

In terms of employment, the total departmental manpower of Gevra is 2,760, as per information shared by SECL in 2021. Additionally, the mine employs about 2,222 contractual workers for various tasks within the mine as well as in the residential township (see Section 4.4, Coal industry and power plant workforce, page 66).²⁹

Currently Gevra mine is in the process of progressive closure with 20% of the area currently under reclamation. The reclamation activities being carried out are largely backfilling and plantation.³⁰ As per post-closure land use plan, the total area will however have a variety of other activities. These include, water body (659.2 ha), reclaimed internal overburden (OB) dump area (1,378 ha), reclaimed external OB dump area (480 ha), built-up area including buildings (1,237.4 ha), safety zone (418 ha), etc.³¹

Current land use in Gevra (% of total lease area)



Source: Central Mine Planning and Design Institute, 2020

Kusmunda

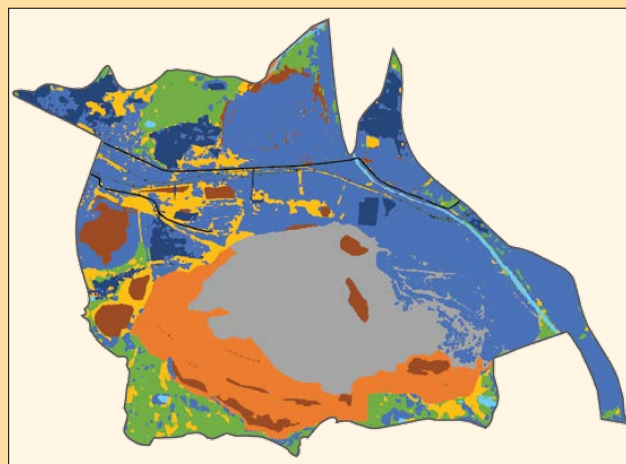
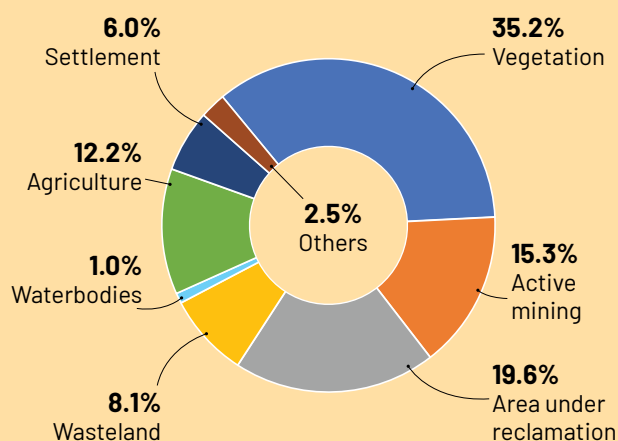
Kusmunda is the second largest profitable mine of SECL in Korba producing G-11 grade of coal. It produced 37.26 MMT of coal in 2020-21 at a cost of production of ₹536.7 per MT. However, with respect to capacity, it is currently the biggest in Korba with a capacity of 50 MMT per year. The mine is spread across an area of 1,655.8 ha in Katghora block.

As per latest estimates, the total departmental manpower of the Kusmunda is 2,359. Besides, there are 2,238 people who are contractually employed for work within the coal mine premises as well as residential colonies (see Section 4.4, Coal industry and power plant workforce, page 66).³²

Coal produced from Kusmunda is used to meet the coal requirement of TPPs operated by the CSPGCL in Korba district. About 36% of coal is transported directly to the CSPGCL plants. The rest 64% is transported by road and railways to various TPPs and coal-dependent industries in other districts of Chhattisgarh, Punjab, Odisha, Rajasthan, Madhya Pradesh, Maharashtra and Uttar Pradesh.³³

Kusmunda mine is also in the process of progressive closure with 20% of the area currently under reclamation. The main reclamation activities being carried out are backfilling and plantation. As per post-closure land use plan, the total area will however have a variety of other activities. These include, water body (348.9 ha), reclaimed internal OB dump area (611.8 ha), reclaimed external OB dump area (198.1 ha), built-up area including buildings (393.6 ha), safety zone (82.8 ha), etc.³⁴

Current land use in Kusmunda (% of total lease area)



Source: Central Mine Planning and Design Institute, 2020

Dipka

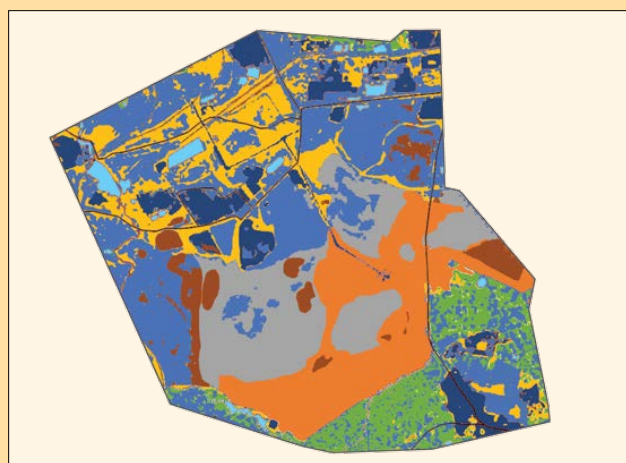
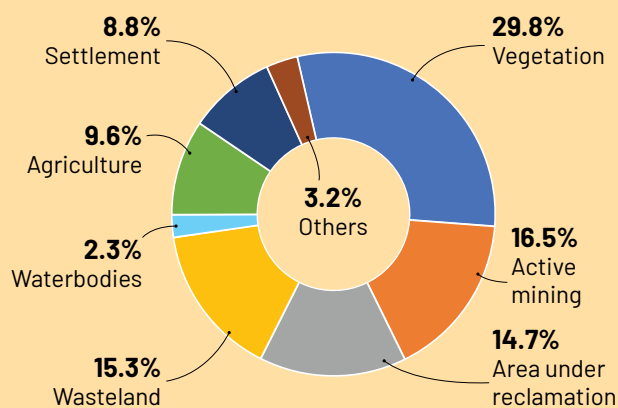
Dipka is the third largest profitable mine for SECL in Korba and is spread across an area of 1,999 ha in Katghora block. The mine produced over 33.5 MMT of coal in 2020-21 at ₹525.6 per MT cost of production. The grade of coal produced in Dipka is G-10, G-11. It is slated for a capacity expansion to 40 MMT per year, up from current 35 MMT. The expansion will include an additional land area of 1,096.9 ha.³⁵

The coal produced from Dipka is a key source of fuel for NTPC's 2,980 MW supercritical TPP in Bilaspur, with about 32% of the mine's coal being supplied directly to the plant. About 29.6% of Dipka's coal is transported to various other TPPs and iron and steel units in Chhattisgarh and other states, such as Madhya Pradesh and Rajasthan. Besides, 37% of coal is dispatched to coal washeries in the region, the end use of which could not be established from information provided by company officials.³⁶

As per latest estimates of SECL (2021), the departmental manpower of Dipka is 1,580. Besides, it is estimated that around 1,158 people are contractually employed for various tasks in the mine as well as in the residential areas (see Section 4.4, Coal industry and power plant workforce, page 66).³⁷

Dipka is also in the process of progressive mine reclamation with 14.7% of the area currently being reclaimed. The main reclamation activities being carried out are backfilling and plantation. As per post-closure land use plan, the total area will however have a variety of other activities. These include, water body (222 ha), reclaimed internal OB dump area (780 ha), reclaimed external OB dump area (206 ha), built-up area including buildings (633.8 ha), safety zone (130.5 ha), etc.³⁸

Current land use in Dipka (% of total lease area)



Source: Central Mine Planning and Design Institute, 2020

3.3 Coal-based thermal power plants

Korba is the power producing hub of Chhattisgarh, with the highest number of coal-based TPPs in the state being situated in the district and also having the highest installed capacity. The district is among the top five thermal power producing districts in the country.³⁹

3.3.1 Capacity and operation status

Korba has 11 operational TPPs (grid connected) with 26 units and a total installed capacity of 6,428 MW. The largest operators in the district are National Thermal Power Corporation (NTPC Limited), and Chhattisgarh State Power Generation Company Limited (CSPGCL). BALCO, apart from captive units to run its aluminium plants, has two grid-connected units with cumulative installed capacity of 600 MW.⁴⁰ The power plants generated 46,583 Gigawatt hours (GWh) of electricity in 2020-21.⁴¹ The plants collectively consume about 30.4 MMT of coal per year, about one-fourth of Korba's total coal production.⁴²

Table 7: Operational TPPs (2020-21)

Owner	Name of TPP	Unit No.	Installed capacity (MW)	Net generation (GWh)	Total coal consumption (million tonnes)	Area (ha)																																																																																																				
CSPGCL	DSPM TPS	1	250	3,336.80	2.7	200																																																																																																				
		2	250				CSPGCL	Korba West TPS/ Hasdeo TPP	1	210	9,379.20	6.2	938	2	210	3	210	4	210	5	500	Lanco Amarkantak Power Limited	Pathadi TPP	1	300	4,568.80	2.3	485.2	2	300	ACB (India) Limited	Kasaipalli TPP**	1	135	1,404.50	1.1	12.14	2	135	ACB (India) Limited	Chakabura TPP**	2	30	204.4	0.1	8.96	Spectrum Coal and Power Limited	Ratija TPS**	1	50	483.7	0.4	30	2	50	S V Power Private Limited	SVPL TPP***	1	63	0	0	26	ACB (India) Limited	Swastik Korba TPP***	1	25	0	0	20.23	Maruti Clean Coal & Power Limited	Bandakhar TPP	1	300	2,090.90	1.7	181.7	Bharat Aluminium Company Limited	BALCO TPS*	1	300	3,781.60	2.2	143.7	2	300	NTPC	Korba STPS	1	200	21,332.60	13.7	539.5	2	200	3	200	4	500	5	500	6	500	7	500	Total	
CSPGCL	Korba West TPS/ Hasdeo TPP	1	210	9,379.20	6.2	938																																																																																																				
		2	210																																																																																																							
		3	210																																																																																																							
		4	210																																																																																																							
		5	500																																																																																																							
Lanco Amarkantak Power Limited	Pathadi TPP	1	300	4,568.80	2.3	485.2																																																																																																				
		2	300																																																																																																							
ACB (India) Limited	Kasaipalli TPP**	1	135	1,404.50	1.1	12.14																																																																																																				
		2	135																																																																																																							
ACB (India) Limited	Chakabura TPP**	2	30	204.4	0.1	8.96																																																																																																				
Spectrum Coal and Power Limited	Ratija TPS**	1	50	483.7	0.4	30																																																																																																				
		2	50																																																																																																							
S V Power Private Limited	SVPL TPP***	1	63	0	0	26																																																																																																				
ACB (India) Limited	Swastik Korba TPP***	1	25	0	0	20.23																																																																																																				
Maruti Clean Coal & Power Limited	Bandakhar TPP	1	300	2,090.90	1.7	181.7																																																																																																				
Bharat Aluminium Company Limited	BALCO TPS*	1	300	3,781.60	2.2	143.7																																																																																																				
		2	300																																																																																																							
NTPC	Korba STPS	1	200	21,332.60	13.7	539.5																																																																																																				
		2	200																																																																																																							
		3	200																																																																																																							
		4	500																																																																																																							
		5	500																																																																																																							
		6	500																																																																																																							
		7	500																																																																																																							
Total			6,428	46,583	30.4	2,585																																																																																																				

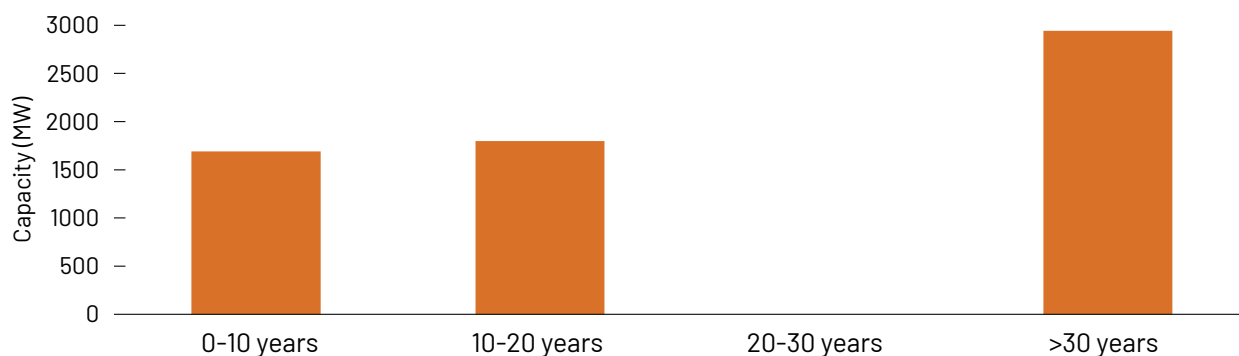
Source: CEA, 2021; Area as per Environment clearance letters; Total power generation as per CEA (2020-21); Coal consumption, CEA (2019-20).

(*) Balco has also installed captive power plants for its aluminium plant; (**) Coal consumption has been calculated by the thumb rule;

(***) no net generation reported in the last three financial years.

Nearly half of the power capacity in the district is related to units that are above 30 years of age. About 26% is below 10 years.

Figure 1: Age profile of TPPs



Currently three TPPs have stopped operations in the district (since 2020), one owned by CSPGCL and two owned by private companies. However, several other TPPs in the district are slated for retirement by 2027 as per the National Electricity Plan (2018).⁴³ These include, four units of Korba West thermal power station (TPS) operated by CSPGCL, and six units of Korba STPS (super thermal power station) operated by NTPC, which collectively accounts for 2,940 MW installed capacity or about half of the existing capacity.

Table 8: Non-operational TPPs

Owner	Name of TPP	Unit No.	Capacity (MW)	Area (ha)
CSPGCL	KORBA-III TPS/ Korba east TPP	1	120	55
		2	120	
Vandana Energy & Steel Private Limited	Katghora TPP	1	35	195
Vandana Vidyut Limited	Salora TPP	1	135	264

Source: CSPGCL and District Industry Department, 2021

3.3.2 Spatial distribution

All of the TPPs operational in the district source coal from the mines located in Korba and Katghora blocks. Some of the smaller operations also use coal from the washery rejects.

Table 9: Coal source of TPPs operational in Korba

Owner	Name of TPP	Source of coal
CSPGCL	DSPM TPS	Kusmunda mine
CSPGCL	Korba West TPS/ Hasdeo TPP	Kusmunda mine
Lanco Amarkantak Power Limited	Pathadi TPP	Korba coalfields
ACB (India) Limited	Kasaipalli TPP	ACB coal washery rejects
ACB (India) Limited	Chakabura TPP	ACB coal washery rejects
Spectrum Coal and Power Limited	Ratija TPS	Dipka and Gevra mines
S V Power Private Limited	SVPL TPP	Information not available
ACB (India) Limited	Swastik Korba TPP	Dipka, Gevra, Kusmunda mines
Maruti Clean Coal & Power Limited	Bandakhar TPP	Coal washery rejects from the same company washery
Bharat Aluminium Company Limited	BALCO TPS	Gevra and Kusmunda mines
NTPC	Korba STPS	Gevra coal mine

Source: Environment clearance letters of respective TPPs and company websites

Considering their coal source, the TPPs in the district are distributed in three blocks, Korba, Katghora and Pali. Most of the TPPs in Korba block are located within close distance from the municipality area, or around its border in Katghora block.

Map 5: Distribution of TPPs



Source: Based on information of CEA, 2021

3.4 Other coal related industries

Besides coal mining and coal-based TPPs, there are a number of coal-allied industries in Korba which need to be considered for a just transition. The two most important ones are coal-washeries and fly ash brick units. Besides, the transportation business in the district is also largely related to coal.

3.4.1 Coal washeries

Korba has five operational coal-washeries, with a cumulative processing capacity of 43.6 MMT per year.⁴⁴ All the washeries are operated by Aryan Coal Benefication India Limited, a private company with its main office in Haryana. The washeries are all located in Katghora block and are in proximity to Gevra, Kusmunda and Dipka mines.⁴⁵

Table 10: Coal washeries

Name of washery	Block	Raw coal capacity (MTPA)
Chakabura	Katghora	7.5
Dipka	Katghora	14
Gevra	Katghora	6.3
Binjhri	Katghora	4.8
Ratija	Katghora	11
Total		43.6

Source: Provisional coal statistics, Coal Controller's Office, 2020-2021

3.4.2 Fly ash brick units

There are 20 fly-ash brick units in Korba spread across Katghora, Kartala and Poundi Uproda blocks. There are also an estimated 65 non-registered units operating in the district. The mandate to utilise fly ash generated by the TPPs, for "eco-friendly purposes", including for bricks, by the GOI,⁴⁶ has led to the establishment of these units in the district.

In Korba, there are no red clay brick units as per records of the State Pollution Control Board (SPCB) or the District Industry Department.



A worker at a fly ash brick unit in Korba/ Chinmayi Shalya, iFOREST.

3.4.3 Transport

The transport industry, particularly related to coal, is an important one in Korba, considering the employment scenario. As per SECL, a significant amount of coal is transported through trucks to TPPs and other industries in various districts of Chhattisgarh. Overall, for SECL in 2020-21, more than 40 MMT of coal – about one-third of total coal production – was dispatched by road.⁴⁷

The truck transport business in the district is privately owned and run. As per local estimates, at least 10,000 trucks in Korba transport coal on rotational basis, out of which about 4,000 ply daily. As per the feedback of the mining department of the district, these trucks on an average transport about 30 MMT of coal per year. The details on the transport sector is discussed in Chapter 4 (see Chapter 4, Section 4.4.3 Coal transport, page 70).

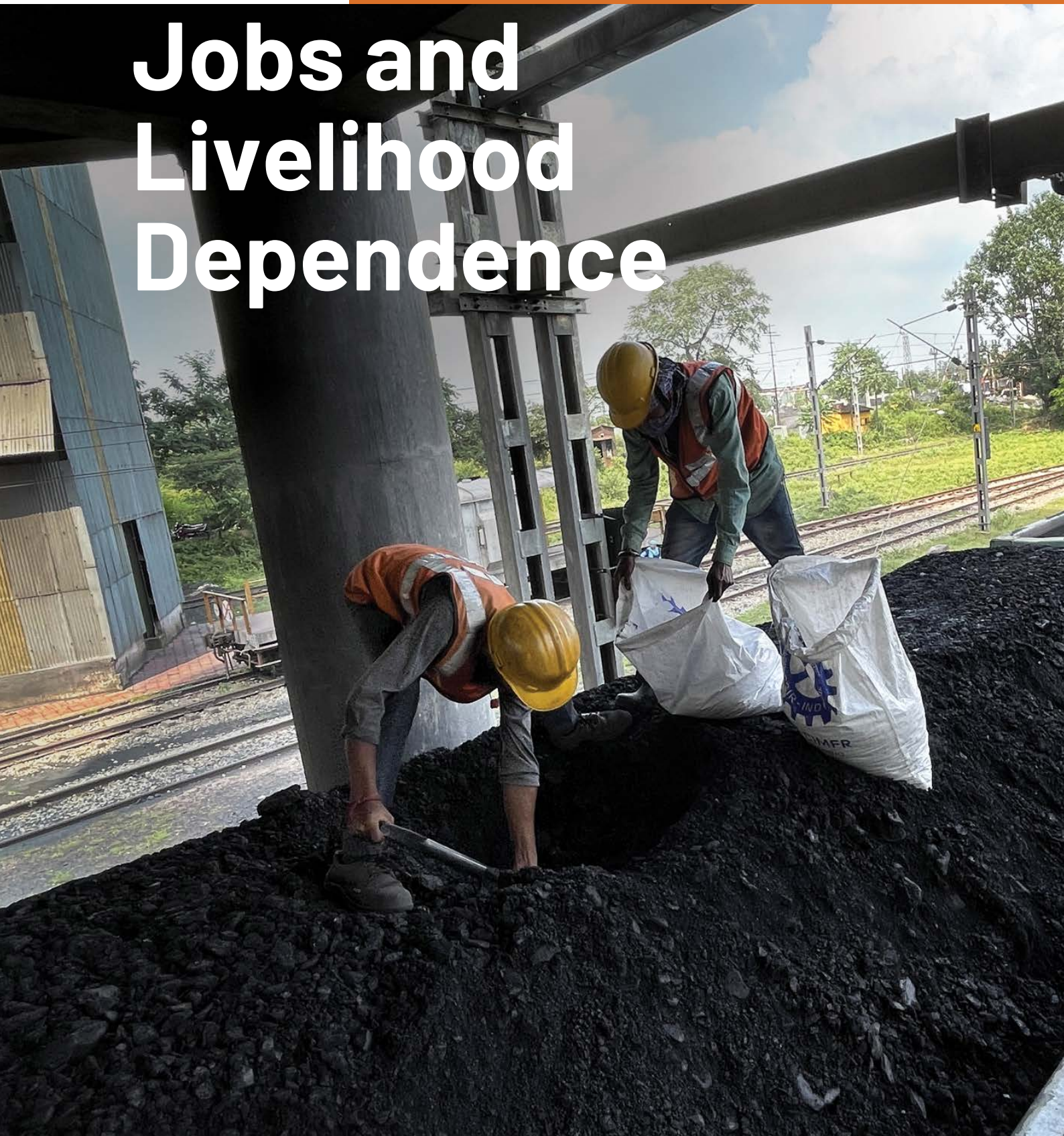
Table 11: Mode of coal transportation by SECL

Total offtake (MMT) 2020-21	Dispatch mode (MMT)					
	Rail	Road	MGR	Belt	Consumer's own wagon	Local transport and colliery use
138.77	64.96	40.37	25.03	6.68	1.73	NA

Source: SECL Annual reports and accounts 2020-21

Chapter 4

Jobs and Livelihood Dependence





Coal samplers at work in a Korba siding/
Chinmayi Shalya, iFOREST

- Agriculture is the single largest source of primary income, as 35.5% of households in Korba depend on it.
- The coal mining industry and coal-based power plants are the primary income source for about 17% households in Korba.
- One in five workers in Korba are employed formally or informally by coal mines, coal washeries, coal transport, power plants and fly ash brick units.
- Korba has a lesser challenge of informal coal mining workers as compared to old coal regions with legacy mining activities and large number of abandoned mines.
- Transition of coal transport sector has emerged as an important issue as a large number of workers, mostly informal, are engaged in coal transport sector.

4.1 Overview

The dependence on coal is a multifaceted issue for India's coal districts considering the direct and indirect dependence for income (in coal mining, coal-based power, transport, and other industrial sectors that are dependent of coal), the infrastructure and welfare investments of the companies, the variety and complexity of coal workers and the perceived dependence that stems from the mono-industry nature of most of the coal districts.

To ascertain the dependence of households in Korba district on coal and to profile the workforce dependent on coal mining, coal-based power plants and other industries and economic sectors related to coal, the survey of 600 households was undertaken. The household survey was necessary as there is no official data on the extent and nature of dependence (except for the formal workers employed in mines and industries).

The survey has generated two sets of data:

- Household income dependence based on the source of primary income; and,
- Worker profile within the working age-group, with a specific focus on the workers related to coal-mining, coal-based TPPs and other coal dependent industries.

4.2 Household income dependence

The assessment of household income dependence provides an understanding of the following:

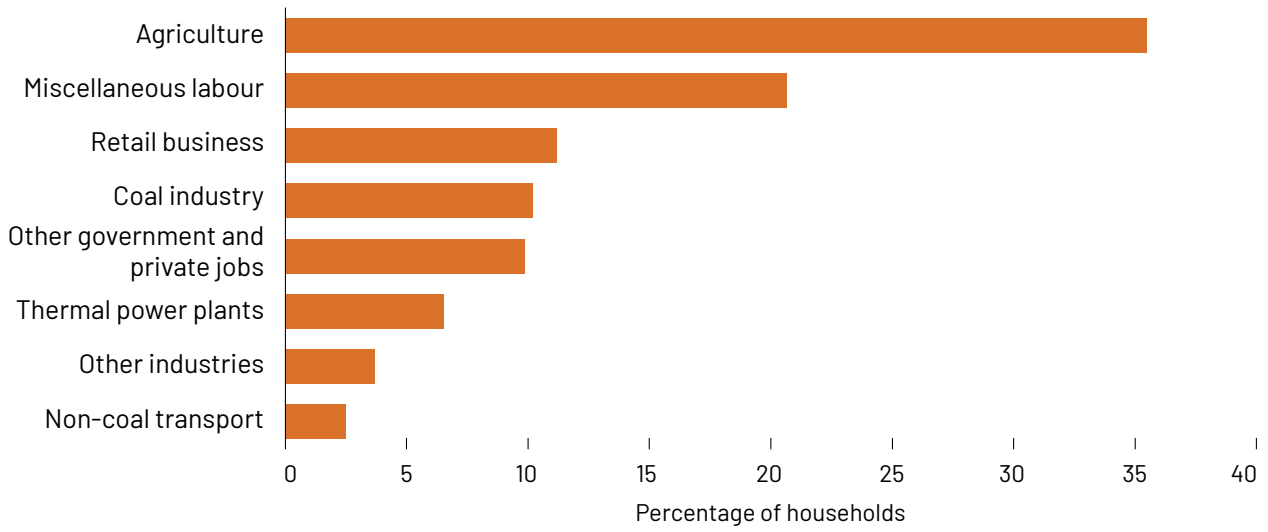
- Contribution of various sectors in providing primary source of income; and,
- Dependence on coal mining, coal-based TPPs and other coal dependent industries.

4.2.1 Primary income source

While coal mining and coal-based industries dominate Korba's GDP, in terms of employment, the agriculture sector is the primary income source for a majority of households.

- About 35.5% of households derive their primary income from agriculture. Among this, for 26.5% of the households agricultural labour is the primary source of income, whereas 9% of the households are cultivators.
- Overall, 16.7% of households depend on the coal industry (which includes coal mining, coal transport and coal washery) and coal-based TPP as their primary income source. For 10.2% of households, the coal industry is the primary source of income and for 6.5% households it is coal-based TPPs.
- Among the 10.2% households dependent on the coal industry, about 82% are engaged in coal mining related activities, 15% are drivers and are engaged in transportation of coal and 3% are engaged in coal washeries.
- Of the households dependent on the coal industry for income, about 44% are formally engaged, 48% are informal and about 8% rely on pension. Among those dependent on TPPs, 46% are formal, 49% are informal and 5% rely on pension.
- A significantly high proportion of the surveyed households, about 13.5%, rely on casual labour such as construction, loaders in shops, warehouses, etc. as their primary source of income. Another significant source is retail business, on which 11% households were found to be dependent.

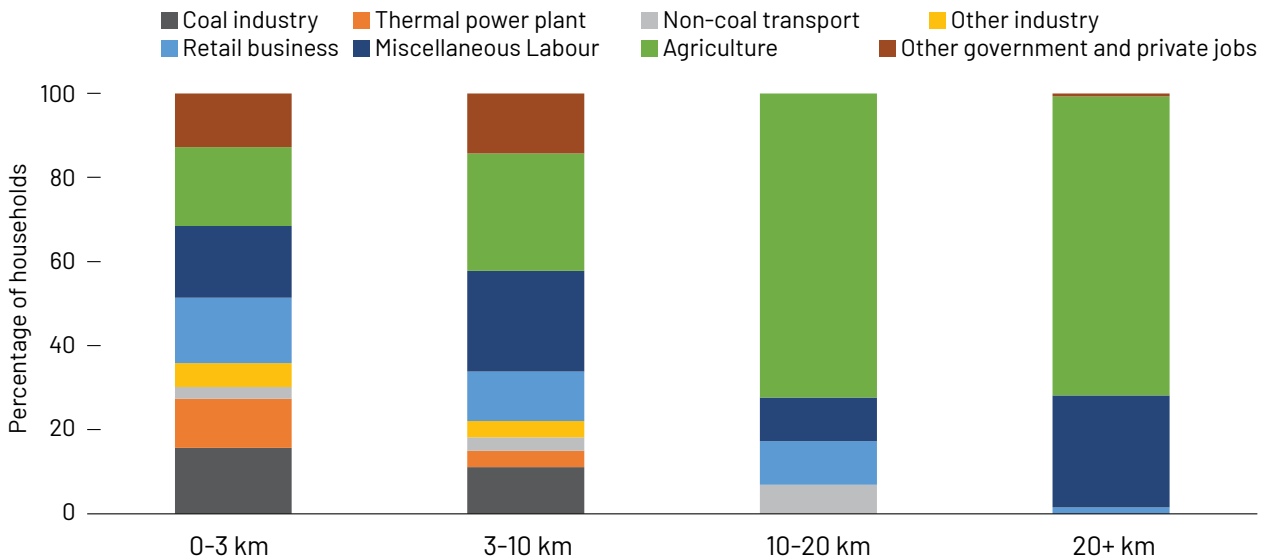
Figure 1: Sector-wise employment distribution



With respect to spatial distribution, the assessment shows that:

- Households dependent on the coal industry are concentrated within a 0-10 km radius of the mines and TPP cluster. For TPPs, the dependent households are concentrated within a 0-3 km radius.
- The work opportunities in other government and private jobs are also concentrated within the 10 km radius. This is also because the Korba municipality, as well as mines and TPPs and their offices are located within this area.
- The proportion of households dependent on agriculture are largely concentrated beyond the 10 km radius.
- Households which depend on miscellaneous labour work (excluding agricultural labour) are spread across the district.

Figure 2: Spatial distribution of households based on primary income source



4.2.2 Income status

The survey results show that most of the households belong to the low-income category across the district.

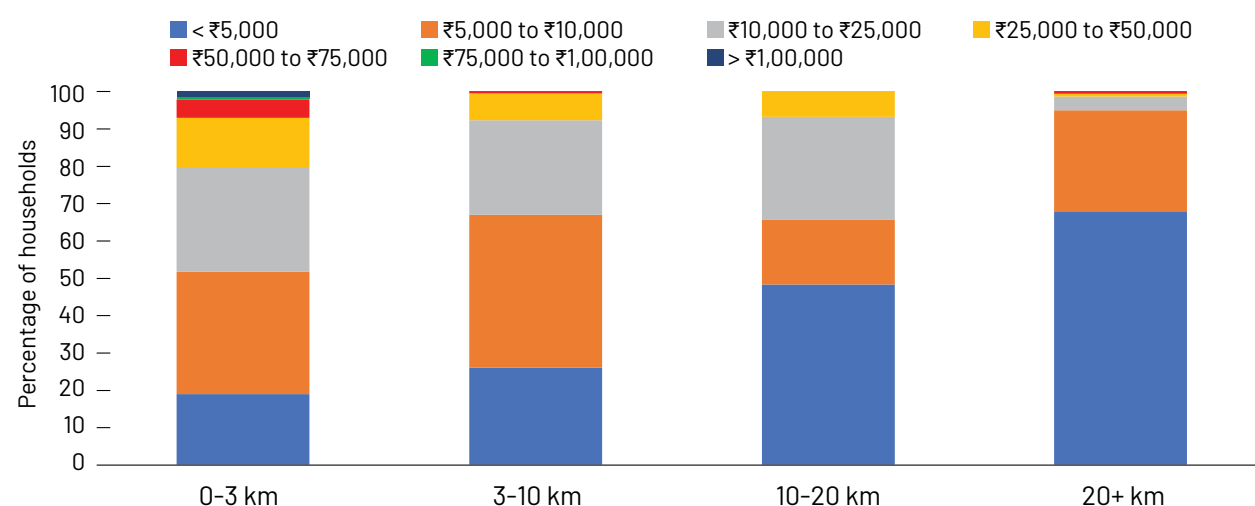
- Over 65% of the households have a monthly income below ₹10,000 (US\$ 132).
- A meagre 4% of households have an income over ₹50,000 per month (US\$ 660).

There is a distinct spatial disparity with respect to income distribution, which also aligns with better income opportunities.

- Households with a higher income are largely concentrated within 0-10 km from the coal mines and TPPs. The primary income source of these households is coal industry, TPPs, and other government and private jobs.
- The proportion of low-income households increases with increasing distance from the mines and TPPs. Beyond a 20 km radius nearly 67.6% households earn below ₹5,000 (US\$ 66) per month, and a negligible 0.7% have a monthly income of over ₹50,000 per month (US\$ 660).

The findings match closely with Government data, which indicate low income among households, particularly in the rural parts of the district. According to the Socio-economic Caste Census, 2011, in 91.3% of the households, the highest earning member earns less than ₹5,000 (US\$ 66) per month. There is also high demand for work under minimum income support schemes, as nearly 39% of the district household sought employment under MGNREGS in 2020-21, with 70% of them being rural households.

Figure 3: Distribution of household income



The household assessment in Korba brings out the economic irony that exists in many of India's coal mining districts. While Korba produces over 16% of country's coal currently, only about 10.2% of the surveyed households were found to be relying on the coal industry as their primary income source. However, a coal-centric economy has stymied the growth and scope of decent employment in other sectors. The district's economic landscape is, therefore, dominated by low-income households engaged in informal labour, be it in agriculture, construction, retail businesses or other miscellaneous activities.

Many of these activities, however, are considered to be indirectly related to the presence of the coal industry. Therefore, a sense of perceived dependence is evident among people residing in the vicinity of the coal mines and power plants. Overall, 60% of the households feel that the closure of coal mines or the power plants will affect them economically.

The survey also brings out a clear spatial disparity in income opportunities in the district. Most of the better paying work is concentrated within a radius of 10 km. Beyond that distance, marginal agricultural work, low-income forest-based livelihoods, and informal labour are the mainstays.

A key concern for Korba is, in fact, the forestry sector. With 66% of the geographical area under forest, including a high proportion in the mining blocks, none of the households were found to be relying on it as their primary income source. Low-income from forest-based livelihoods has compelled these people to work as casual labourers in various sectors, including in construction, agriculture, as well as coal mining (see *Box: Income dependence on forest*).

Income dependence on forests

About 66% of Korba's geographical area is under forest. The district also has a high proportion of tribal population (over 40%) who depend on forests for income. While no household reported forest-related livelihood as a primary income, there is a considerable dependence on seasonal income from forests.

- About 44% of the households derive some income from forest produce usually at specific times of the year.
- More than half of these households (56%) are concentrated beyond the 10 km radius in the rural parts of the district. The remainder are within a 10 km radius.

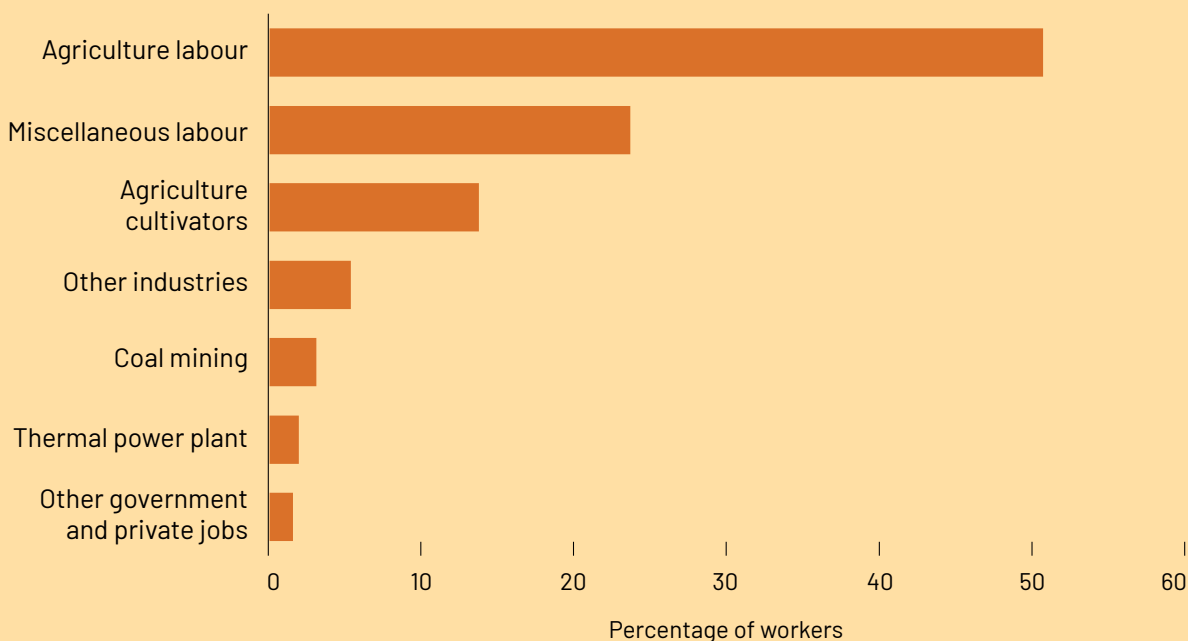
The analysis of income from forest produce brings out the low levels of income and unorganized nature of the sector. For example:

- 36% of the respondents could not specify their income in monetary terms, indicating prevalence of barter system or low earning from forests.
- 64% households who specified their income, were engaged in collection of tendu leaves, which is the only government promoted forest produce. Some among these households also collected mahua flowers alongside tendu leaves.
- Among the households who reported income from forests, 92% earn less than ₹5,000 (US\$ 66) on an average per month, during the collection and processing season. These are also the households which typically collect only one forest produce.
- A small proportion (8%) of households reported a monthly income above ₹10,000 (US\$ 132). They are engaged in forest produce based micro-enterprises.

Due to the low income and seasonal nature of forest-based livelihoods, all the respondent households depend on other activity as the source of primary income. A majority of them (over 50%), depend on agricultural labour. Another 24% earn primary income as non-agricultural labourers, predominantly in construction work.

The survey findings also corroborate the observations from secondary data, which shows that despite high forest area in the district, the resource potential is largely untapped, consequently leading to low incomes.

Primary income source of households relying on forest-based livelihoods



4.3 Worker profile

The worker profile of Korba has been assessed based on the number of people falling within the age group of 15-59 years among the surveyed households. This age group is recognised as the 'working-age group' as per the Census of India.¹

There were 2,093 people who fell in this age group (out of 3,007 total population in the 600 households). In the working age group, 49% were male and 51% female.

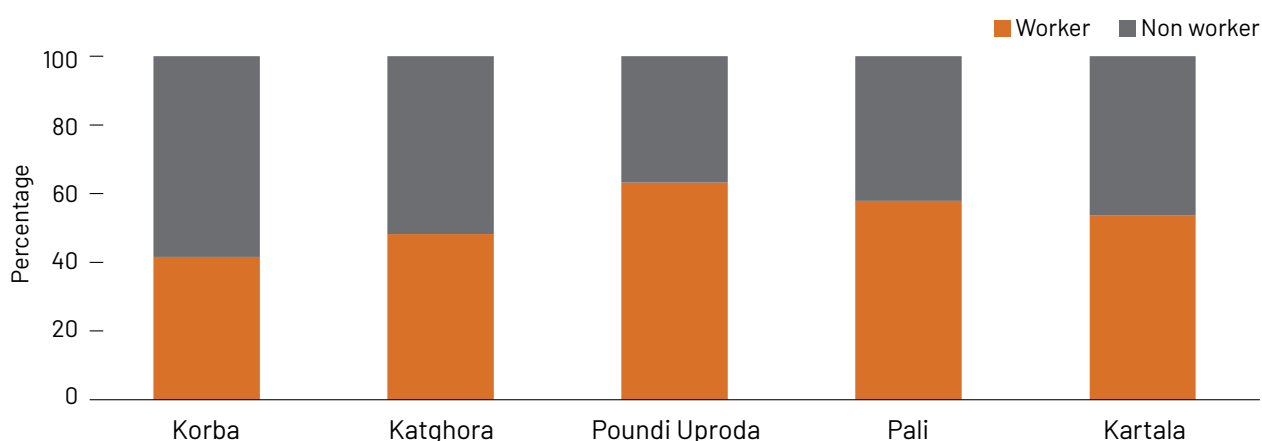
However, it is to be noted that since the worker assessment is based on the household survey, migrant workers and floating populations could not be captured in the scope of the survey. This has created limitations in the assessment of the road transport sector workers, many of whom, particularly the drivers, are migrants. To fill this gap, a separate assessment of the transportation sector, specifically road transport, has been done through a detailed investigation of the truck industry in the district.

4.3.1 Work participation

The survey results show that the proportion of non-workers in the working-age group is higher than workers.

- About 46% of the people are workers and 54% are non-workers.
- There is also a skewed gender distribution among the workers and non-workers. Of the total workers only 22% are women, while of the total non-workers 73% are women.
- With respect to spatial distribution, while all the blocks in the district have a high proportion of non-working population, the two blocks with concentration of coal mines and TPPs, Korba and Katghora, have the highest proportion of non-workers.
- The rural blocks reported a lower proportion of non-workers. This can be attributed to the fact that in agrarian and forested regions, family members are collectively engaged in agricultural work, as well as in collection of forest produce.

Figure 4: Block-wise work participation



The proportion of workers and non-workers is also validated by the worker data of Census 2011. As per the Census data, there are 43% workers in Korba, including main and marginal workers.²



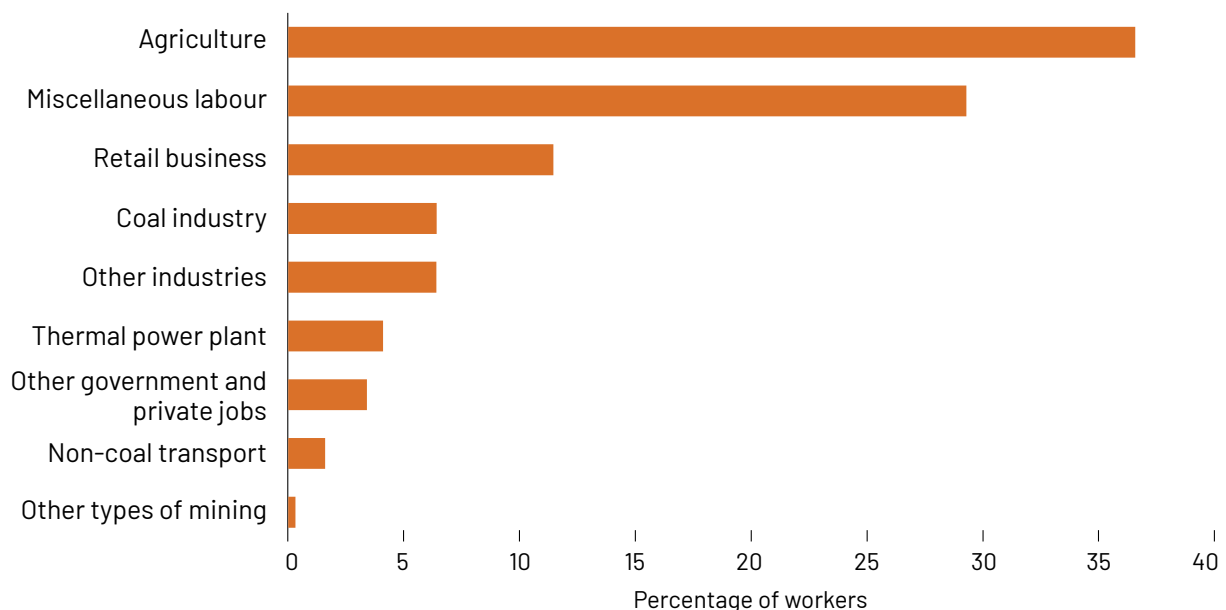
Bhoongaadi Organic Farmer's Producer Company, Chhattisgarh/ Akash Badave

4.3.2 Worker distribution

The worker distribution is fairly similar to the distribution of households based on their primary income source.

- Overall, among the workers, the highest proportion (37%) are engaged in agriculture, either as cultivators or agricultural labourers. Many of these workers also seasonally collect forest produce to supplement their income.
- There is a very high proportion of casual labourers engaged in miscellaneous work (such as, civil works, construction activities, loading and unloading at shops and godowns, etc.), and mostly employed on a daily wage basis. This constitutes over 29% of the workers. They are also employed as daily wagers by the coal industry and the TPPs.
- About 6.4% of the workers are engaged in the coal industry (including coal mining, coal transport and coal washery workers) and 4.1% in the TPPs.
- About 11.5% are engaged in retail businesses.
- Besides, there are a varied proportion of workers engaged in other government and private jobs, non-coal transport, other industries, etc.

Figure 5: Sector-wise distribution of workers



4.4 Coal industry and power plant workforce

The assessment of the coal mining industry and coal-based TPP workers takes into account both formal and informal workers. The criteria, on the basis of which the formal and informal categorisation has been done, is provided below. The classification criteria are based on the definition provided by the Labour Bureau, Government of India (2015).³

Table 1: Categorisation of formal and informal workers

Category	Description
Formal workers	Workers with salary and benefits working with coal, power and other coal-based companies.
	Workers with salary and benefits working with private contractors of coal, power and other coal-based companies.
Informal workers	Workers, working in coal, power, coal transport and other coal-based industries, without any employment and social security benefits provided by the employers, and are unorganised.

4.4.1 Coal mining

As the assessment of household income dependence showed, there is significant dependence on coal mining for income in Korba. The worker assessment provides further understanding on the nature of such dependence, the earnings of various categories, etc.

The worker profile shows that:

- The proportion of formal workers in coal mining is 44%. Those employed through private contractors were found to be working as machine operators, technicians, accountants, etc.
- The proportion of informal workers is about 56%, who are engaged in various kinds of activities. The highest proportion of this is miscellaneous labour work, such as moving equipment, helping in loading and unloading, civil works in company run facilities, etc.
- Most of the informal workers are engaged through sub-contractors (not directly through SECL contracts), and do not have any social security benefits. In case of coal washeries, which are largely privately owned, the informal workers also receive wages only.



Coal samplers at a coal mine in Korba/Chinmayi Shalya, iFOREST

As per SECL, coal mines in Korba formally employ around 18,385 people. Of these, about 65% are departmental employees of SECL. The remaining 35% are contractual employees.⁴ The contractual employees include workers with a variety of skill sets. They are primarily employed for two kinds of works - mines management jobs which include all the work required in the premises of the mines (as per Mines Act 1952), and various other civic and maintenance work in SECL facilities.⁵ The contractual work for mine management is perennial in nature and typically of longer duration (two to three years), with renewals happening as necessary.⁶ All contractual workers are covered under Employees' Provident Fund (EPF).⁷

There is also very short-term contract work provided by SECL (typically for less than one month), which is not accounted for in the labour information provided by the company.⁸ Observations by labour unions and workers further suggest that these can be of more than one month duration as well, depending on the kind of work. However, the number of labourers engaged through such contracts is not available.

Table 2: Formal employment in coal mines

Name of mine	Total departmental manpower	Contractual manpower	Total
Kusmunda	2,359	2,238	4,597
Gevra	2,760	2,222	4,982
Dipka	1,580	1,158	2,738
Manikpur	438	564	1,002
Saraipalli	70	138	208
Surakacchar (as per RTI)	819	22	841
Balgi (as per RTI)	529	8	537
Rajgamar 4&5	521	9	530
Delwadih	600	9	609
Singhali	710	40	750
Bagdeva	920	29	949
Raniatari	550	0	550
Total	11,936	6,449	18,385

Source: SECL, 2021

By extrapolating the household survey data and analysing the employment data provided by SECL, it is estimated that at least 41,784 workers are employed in mining.

Table 3: Total estimated employment in coal mines

Serial no.	Employment type	No. of employees
1	Coal mining	41,784
1.1	Formal employment	18,385
a.	In SECL	11,936
b.	By contractors	6,449
1.2	Informal employment*	23,399

*The informal workers have been calculated keeping the proportion of the informal workers in the primary survey findings as a benchmark.

With respect to income, there is a clear disparity between formal and informal workers. While wages vary depending on employee grade, education and skills, in general, formal workers are relatively well-paid. For example:

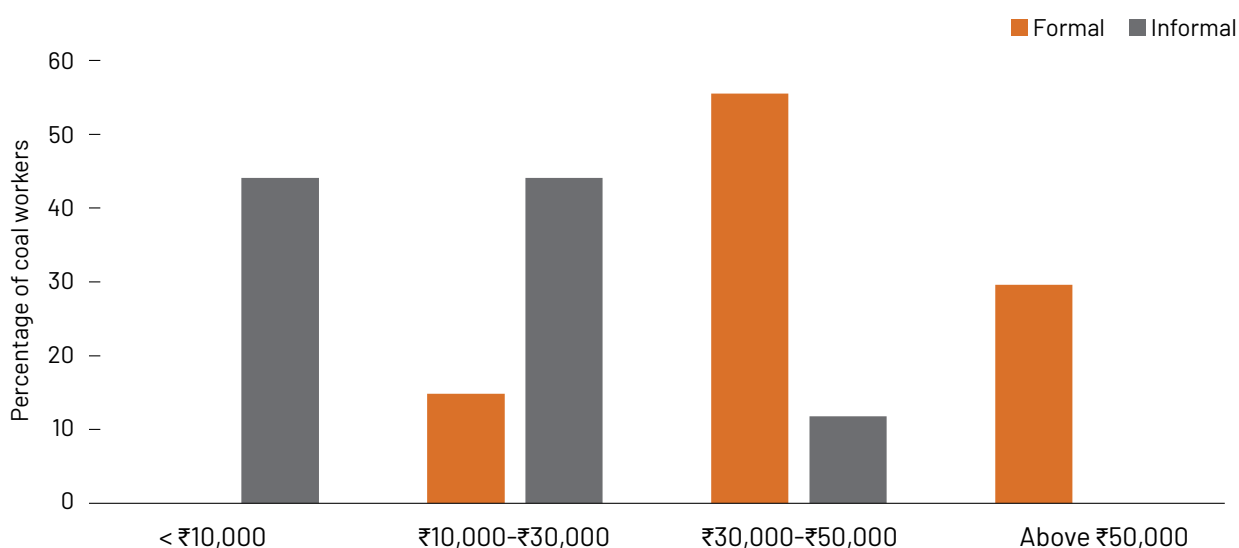
- About 56% of the formal workers earn between ₹30,000- 50,000 (US\$ 395-660) per month. A majority of them work as technical staff and as various equipment operators in the mines.
- About 30% earn above ₹50,000 per month. These include the technical staff, accountants, clerks, etc. It is to be noted that above ₹50,000 included higher salary ranges; however, respondents were uncomfortable to divulge exact amounts.

In contrast, the earnings of informal workers are much lower.

- About 44% of informal workers have a monthly income below ₹10,000 (US\$ 132).
- The drivers and those employed as equipment operators have relatively better wages of ₹20,000 (US\$ 264) as average monthly income.

This discrepancy in income between formal and informal workers is also largely due to the local dynamics around coal mining work. While as per SECL policy, all contractual workers are entitled to either minimum wages set by the Central Government, or wages determined by CIL (which are higher than minimum wages),⁹ most workers are compelled to give a cut from the wages to the contractors. This is an “unwritten rule” and workers who do not comply are not retained by the contractors. The labourers contracted for coal mining activities, as well as labour union representatives, reported this during interviews and discussions.

Figure 6: Income distribution of formal and informal coal workers



It can be noted that the proportion of informal workers in Korba is lower than in many of India’s old coal mining regions, such as Jharkhand, due to the highly mechanised nature of mining-related activities. Activities such as loading and unloading of coal in trucks, which are otherwise the most labour-intensive, are entirely mechanised in Chhattisgarh. Besides, coal gatherers and sellers (a big proportion of the subsistence coal economy in states like Jharkhand) are practically absent.

4.4.2 Coal-based thermal power plants

The workers distribution shows that about 4.1% of the total workers are engaged in the TPPs operated both by public and private entities in Korba. A detailed assessment of the TPP workers shows that:

- Over 46% of the workers are formal. This includes 33% permanent employees with TPP companies and 13% employed through private contractors.
- About 54% of the workers are informal, engaged in miscellaneous labour work, mechanical and maintenance work, driving, etc.

As per official estimates of the District Industry Department and data provided by NTPC and CSPGCL, the TPPs in Korba formally employ about 9,100 people. Nearly 55% of them work in Korba STPS, operated by NTPC and Korba West TPS, operated by CGPGCL.

No estimates of the contractual manpower or informal workers engaged in the TPPs are available from the companies. The NTPC, in an RTI response, stated that the "number of contractors employed and number of employees engaged by the contractor varies on a day-to-day basis. Also, NTPC does not have any say on the number of employees engaged by the contractors, as the same is being done by the contractor at his end as per need of work."¹⁰

Table 4: Formal employment in TPPs

Name of the unit	Total manpower
Korba Super Thermal Power Station	2,090
Korba West TPS/ Hasdeo thermal power plant (including expansion unit)	2,956
DSPM TPS	445
Chakabura TPS	825
Pathadi TPP	676
SVPL TPP	400
Ratija TPP	145
Bandakhar TPP	225
Balco TPS	709
ACB Kasaipalli	600
Swastik Korba TPP	35
Total	9,106

Source: District Industry Department, 2021

By extrapolating the household survey data and analysing the employment data provided by the district and the TPPs, it is estimated that at least 27,594 workers are employed in TPPs.

Table 5: Estimated employment in TPPs

Serial no.	Employment type	No. of employees
1	Coal-based TPPs	27,594
1.1	Formal employment	12,693
a.	In companies	9,106
b.	By contractors*	3,587
1.2	Informal employment*	14,901

*The contractors and informal workers have been calculated keeping the proportion of the informal workers in primary survey findings as a benchmark

With respect to income, there is also a huge discrepancy between formal and informal workers. As the assessment shows, formally employed workers in TPPs are among the best paid workers in Korba.

- About 39% of the formal workers earn above ₹50,000 (US\$ 660) per month. Among them, the plant assistants and supervisors (technical staff) reported a monthly income above ₹75,000 (US\$ 989).
- About 28% workers earn between ₹30,000-50,000 (US\$ 395- 660) per month. This includes mostly mechanical equipment operators.
- In contrast, the wages of informal workers are much lower. Over 33% of them earn below ₹10,000 (US\$ 132) per month, and the rest between ₹10,000-30,000 (US\$ 132-395).

Figure 7: Income distribution of formal and informal TPP workers



4.4.3 Coal transport

The coal transportation sector is a key industry in Korba considering that nearly one-third of SECL’s coal is dispatched through road (see Section 3.4.3 Transport, page 57). It also creates significant indirect employment, particularly around the coal mining and industrial areas, through local businesses.

The areas adjoining the coal mines and urban centres of Korba are a hub of small and big transporters, primarily truck owners, auto-part shops and mechanics. While there is no clear estimate of people employed in the truck transport sector, as it is privately owned and run, an estimate was derived from information provided by the truck association in the district.¹¹

As per the Korba Truck and Trailer Owner Association, an organisation of the district’s truck operators with 1,000 members, there are at least 10,000 trucks (big and small) that are used for transporting coal. On a daily basis, about 4,000 trucks carry coal to power plants, steel plants, cement plants, etc., within Korba or to other locations in Chhattisgarh.¹²

There are about 12,000 drivers, some of them working on a shift basis. Helpers are typically employed by the truck owners for longer trips. Besides, there is usually one supervisor and one mechanic per 10 trucks. Cleaners are employed as per the size of the truck fleet. Usually, owners with more than five trucks employ cleaners. Considering all of these, it can be estimated that the truck industry in Korba employs about 15,366 people. These are apart from the people who own the truck businesses. Therefore, collectively there are nearly 16,366 people involved in coal transportation in the district.¹³



Mechanic at a truck transport company in Korba/ Chinmayi Shalya, iFOREST

Table 6: Employment in truck operations

Truck movements	Trucks	Drivers	Helpers	Supervisor (1/10 trucks)	Mechanic (1/10 truck)	Cleaner (as per fleet size)
Internal in mines	2,000	4,000*	0	200	200	-
Within Korba or a distance of 35 km from the mines	4,000	4,000	0	400	400	-
Within Chhattisgarh other districts	3,000	3,000	300	300	300	-
Out of state	1,000	1,000	1,000	100	100	-
Total	10,000	12,000	1,300	1,000	1,000	66

Source: Estimates as provided by Korba Truck and Trailer Association; *Operating in shifts of 8-10 hours each.

4.4.4 Coal washery

There are five operational coal washeries in Korba operated by a private company, Aryan Coal Beneficiations Private Limited. As per official estimates, the washeries employ about 1,219 people. While the washeries also have informal workers, no estimation of that was available from the company or the District Industry Department.

Table 7: Employment in coal washeries

Name of washery	Raw coal capacity (MMTPA)	Manpower
Chakabura	7.5	85
Dipka*	14	345
Gevra**	16.25	400
Binjhri*	4.8	118
Ratija*	11	271

Source: Coal Directory of India, 2019-2020; District Industry Centre, 2021; Manpower estimates from environment clearance letters; for (*) manpower estimated through an employment factor approach; (**) As per the proposed expansion of the washery from 6 MMTPA to 16 MMTPA.

4.4.5 Fly ash brick units

There are 85 fly ash brick units (20 registered and 65 unregistered units) in Korba spread across Katghora, Kartala and Pundi Uproda blocks.¹⁴ As per official estimates of the District Industry Department (2021), on an average a fly ash unit employs seven people formally.¹⁵ Therefore, it can be estimated that about 595 people are formally employed in these units (140 people in the registered and 455 in the unregistered units). The nature of employment is seasonal, as the units remain closed during the monsoon season.

4.4.6 Total direct dependence on coal

Extrapolating the data from the household survey, and combining it with the transport survey, employment records of the companies and the information of the District Industry Department, the total number of people employed formally or informally by the coal industry and TPPs in Korba can be estimated to be at least 87,558. This means that one in five workers in Korba are employed, formally or informally, by the coal industry and the TPPs.

About 61% of all workers directly dependent on coal are informally employed, while 39% have formal employment. Informal employment is extremely high in the coal transport sector where about 90% of the workers are informal. In coal washeries and fly ash brick units, the proportion of informal workers is also equally high (considering that 76% of the fly ash brick units are unregistered).

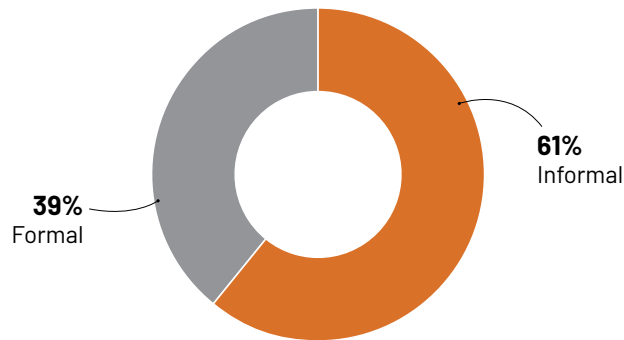
Table 8: Total direct employment in coal mining and coal-dependent industries

Industry	No. of employees
Coal mining	41,784
Coal-based thermal power	27,594
Road transport	16,366
Coal washery	1,219
Fly ash brick	595
Total	87,558



Workers at railway siding at Gevra coal mine, Korba/ Diana Anne Joseph, IFOREST

Figure 8: Formal and informal direct employment in coal and coal-dependent industries



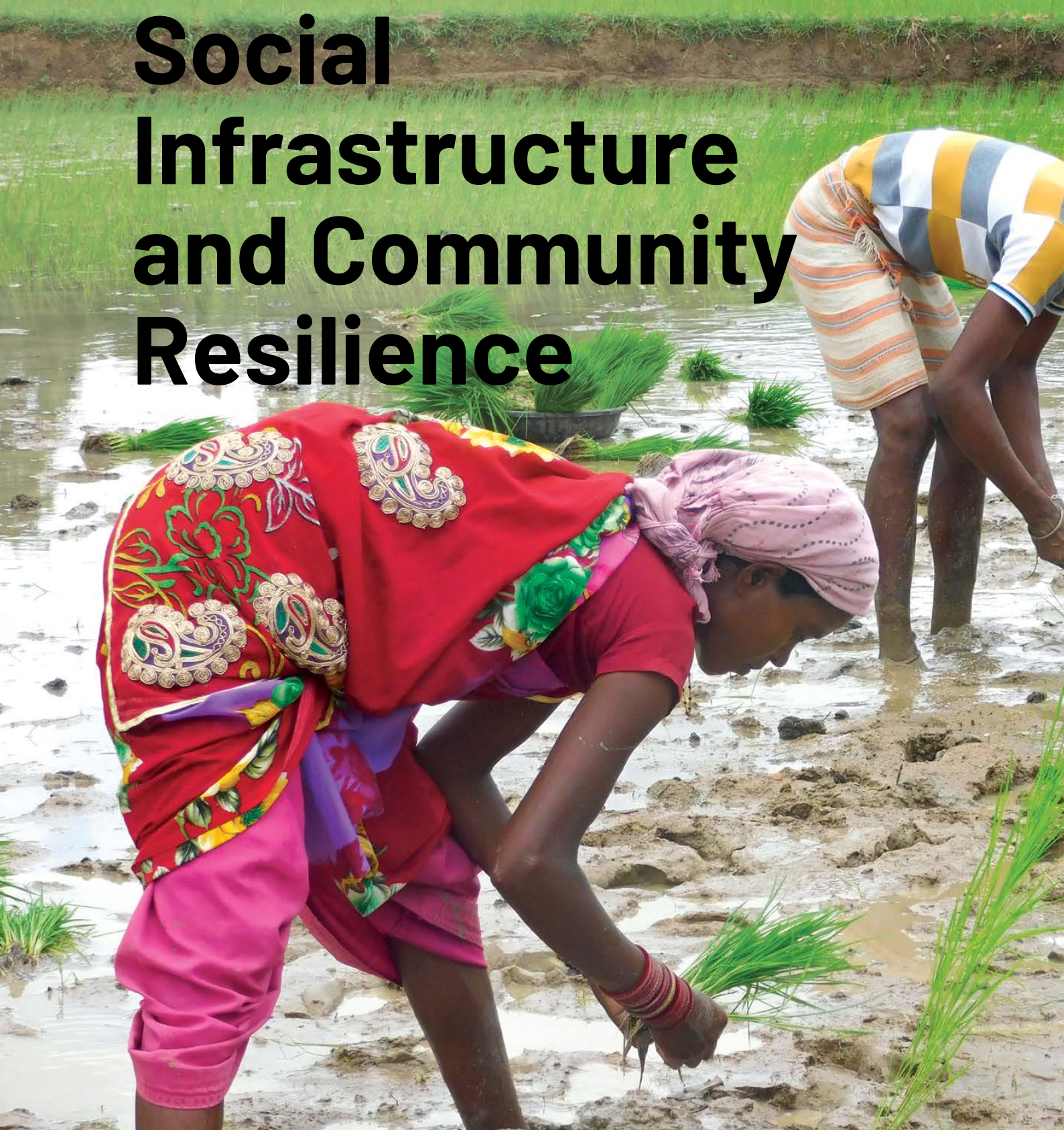
The worker assessment overall suggests that there is a high proportion of non-workers in the district, especially in the coal mining and industrial blocks, such as Korba and Katghora. Even among the workers, a majority of them are engaged as casual labour, including in agriculture, industries, mining, construction and other sectors.

With respect to the nature of the workforce, specifically related to coal mining and the TPPs, the challenge with the informal workers is less pronounced as compared to the old coal regions of India (particularly related to coal mining), such as Jharkhand, as there are no coal gatherers and sellers. The proportion of formal and informal workers is almost equal in the coal sector.

Overall, diversification of economic opportunities, creation of decent jobs with welfare benefits, formalisation of the workforce, and development of an educated and skilled workforce, will be some of the key considerations of just transition planning in Korba.

Chapter 5

Social Infrastructure and Community Resilience





Transplantation of paddy seedlings/
Ashutosh Nanda, Pradan

- Korba is an aspirational district under the aspirational districts programme of the GOI for targeted development intervention.
- 32% of Korba's population is multi-dimensionally poor, lacking access to proper healthcare, education and basic amenities.
- Most people are dependent on government facilities and welfare schemes for healthcare, education, basic amenities.
- Education is poor beyond tenth standard; Gross enrolment ratio in higher secondary level is 59%.
- Firewood is the main cooking fuel used by 44% of the households; about 17% use coal as primary cooking fuel.
- Only 21% people have access to treated tap water supply.

5.1 Overview

Access to social and physical infrastructure is a determining factor for the well-being of communities and their ability to adapt to economic, social, and environmental disruptions.¹ Therefore, planning a just transition for Korba necessitates an understanding of the status of social infrastructure in the district. It is also important to understand the direct dependence of the local community on the social infrastructure and services provided by the coal mining and power companies.

The status of infrastructure and its access has been evaluated based on the primary survey and complementing them with secondary data obtained from government sources. The mixed evaluation approach helps to develop a comprehensive understanding of the status, as well as the interventions that will be necessary while planning a just transition.

5.2 Social infrastructure

The status of social infrastructure and its access in Korba have been evaluated considering the following indicators:

- Health (including child development);
- Education; and,
- Access to basic amenities, including access to clean drinking water, clean cooking fuel and electricity.

These indicators are considered to be vital for the well-being of people in addition to their income level. National and international agencies have taken them into consideration while evaluating the overall developmental status of a population. A key one in this regard is the multidimensional poverty index (MPI), as considered by the United Nations Development Programme (UNDP) and the NITI Aayog (GOI), for evaluating the developmental status of the states and districts of India.²

As per the MPI (2021), nearly 32% of Korba's population is multi-dimensionally poor, i.e., lacks adequate access to services and amenities such as healthcare (including child development), education, cooking fuel, clean drinking water, electricity, etc.³ Given the deficits, Korba has also been identified as one of the 112 aspirational districts⁴ under the aspirational districts programme of the GOI for targeted development intervention.⁵

5.2.1 Health

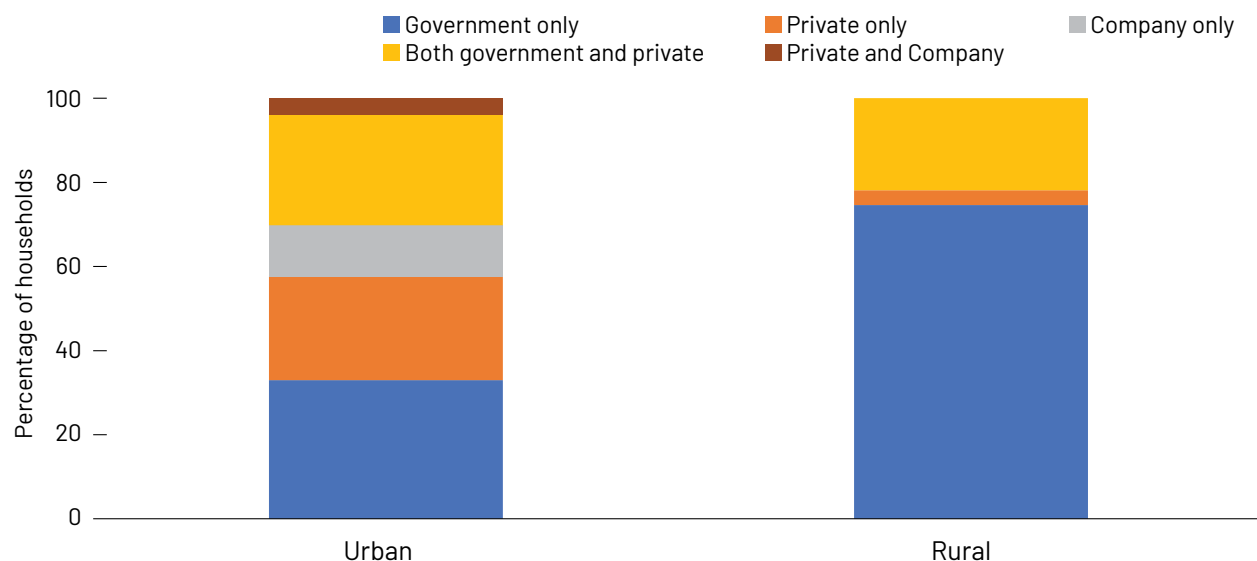
The status of health has been analysed with respect to three parameters:

- Type of healthcare facilities used by the respondent household, including their access;
- Health insurance coverage; and,
- Status of child nutrition.

Healthcare facilities

- Overall, there is high dependence on government run healthcare facilities in the district. About 55% of the households rely only on such facilities for treatment.
- The dependence on government facilities is higher among people residing in the rural areas. About 75% of the rural households rely on government supported primary healthcare facilities and hospitals. In contrast, households in the urban areas rely on a combination of both government and private healthcare facilities.
- About 6% of households rely on healthcare facilities provided by the coal and power sector PSUs.⁶ These respondents are the departmental employees of the companies and are covered under employee welfare benefits.

Figure 1: Type of healthcare facilities accessed



Given the high reliance of the local community on public healthcare facilities, the adequacy and ability of these facilities to deliver services becomes critical. An analysis of the district's healthcare facilities, however, shows a considerable deficit in primary healthcare services when compared to the minimum requirement stipulated by the Indian Public Health Standards (IPHS) under the National Health Mission.⁷

According to the IPHS, there should be at least one primary health centre (PHC) per 30,000 people and one community health centre (CHC) per 120,000 people in rural areas. For hilly and tribal areas, the requirement is one PHC per 20,000 people and one CHC per 80,000 people. For urban areas, the standard provided by the National Urban Health Mission stipulates that there should be one UPHC per 50,000-60,000 people.

Considering this, there is a deficit in PHCs and particularly CHCs in many blocks of the district. For example, barring Katghora, in all other blocks the CHCs are serving nearly twice their capacities. In terms of availability of staff at these facilities, official data shows that the CHCs have a massive shortage of specialist doctors. Against 33 sanctioned positions, only one specialist doctor is currently in position. There is also a 30% shortage of female healthcare staff in PHCs who are instrumental in ensuring institutional births and better healthcare for women.⁸

The government supported primary healthcare infrastructure is also important considering the limited access of people to private clinics, as well as those supported by the PSUs. For example, while Korba has a number of private clinics, they are highly concentrated in urban areas, particularly in Korba municipality. Mining and power companies also run seven hospitals and four dispensaries around the municipal area, which are limited to their employees.⁹

Table 1: Status of primary healthcare facilities

Block	No. of PHCs	Average no. of persons served per PHC	PHCs serving over IPHS capacity standards	No. of CHCs	Average no. of persons served per CHC	CHCs serving over IPHS capacity standards*
Korba (Urban)	5	53,507	1.8 times	0	No CHC	No CHC
Korba (Rural)	7	21,498	Adequate capacity	1	150,489	1.3 times
Poundi Uproda	11	19,436	Adequate capacity	1	213,793	1.8 times
Katghora (Urban)	0	No PHC	No UPHC	1	230,650	1.9 times
Katghora (Rural)	4	28,401	Adequate capacity	1	113,604	Adequate capacity
Pali	6	37,499	1.2 times	1	224,995	1.9 times
Kartala	7	23,575	Adequate capacity	1	165,023	1.4 times

Source: Assessment based on data of District Health Department, Korba, 2021; *The health facility deficits are likely to be higher in the district's tribal and forested regions, as IPHS standards stipulate a greater number of healthcare facilities here to ensure access.¹⁰

Health insurance coverage

Health insurance coverage in Korba is largely reliant on government schemes. Two of the most important schemes are the Pradhan Mantri Jan Arogya Yojana (PMJAY) of the Central Government and the Dr. Khubchand Baghel Health Assistance Scheme of the State Government. The PMJAY covers up to a sum of ₹0.5 million (US\$ 6,603) for eligible families to avail services at an empanelled hospital, public or private. About 22 healthcare facilities (government and private) are empanelled under PMJAY in Korba.¹¹ The State Government scheme covers all citizens of the state who are not eligible for insurance under the PMJAY but have a state ration card.¹²

As per the district health department (2021), overall, 291,576 families are enrolled under both the schemes, which constitute over 90% of the district's total households.¹³ However, the household survey indicates the insurance coverage to be much lower. Only 55% of the households reported having health insurance coverage. The reason for this variance seems to be lack of awareness in poor households regarding the insurance and the benefits they can avail under it.

Child nutrition

Besides healthcare, access to proper nutrition is also considered a key health determinant, particularly for children. Though the primary survey was not able to capture nutrition deficits in Korba, official data shows a high proportion of stunted (35%) and underweight (28%) children below the age of five years.¹⁴ The data clearly indicates the gaps in nutrition service delivery through the Integrated Child Development Services (ICDS), and poor levels of income among local communities that have a bearing on child development.

5.2.2 Education

The assessment of educational status and infrastructure has been done on the basis of three parameters:

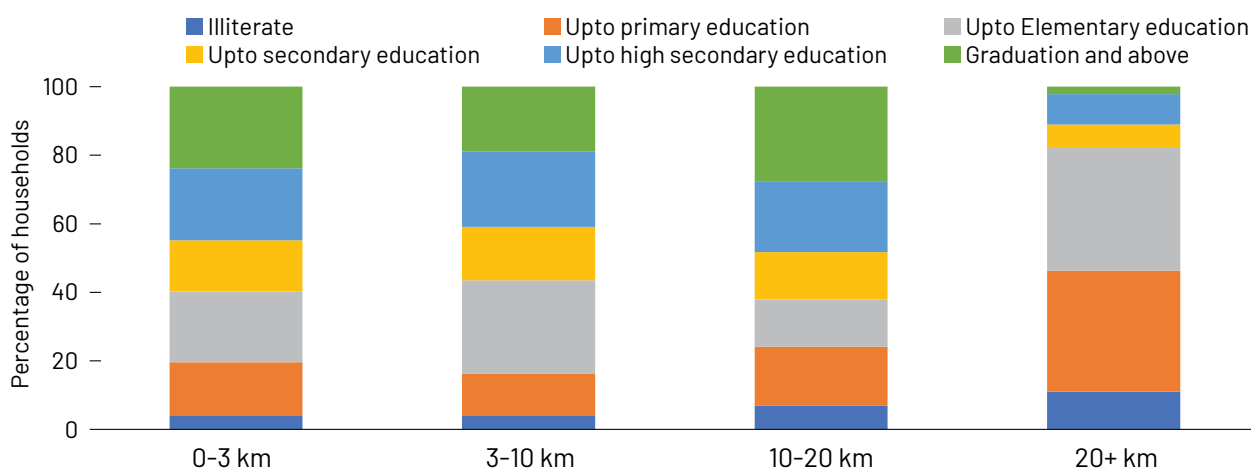
- Education level of the primary earning member of the household (an indicator of adult education);
- Enrolment (and dropout) among children between the age of six to 14 years, as education upto 14 years of age is considered a fundamental right under the Constitution (Eighty-sixth Amendment) Act, 2002;¹⁵ and,
- Type of educational facilities.

Education level of primary earning member

The household survey shows that:

- About 87% of the primary (highest) earning members of the households are literate. However, the level of education is poor. The highest proportion of respondents (25.5%) are educated only up to elementary school (eighth standard), and 12% up to the primary school (fifth standard) level. Only 17% are graduates or above.
- About 13% of the respondents do not have any formal schooling.
- There is also a spatial disparity in education levels among people in remote parts of the district (beyond 20 km from the mines and industries), which also have a high proportion of tribal population. Among the respondents located beyond 20 km, about 82% reported elementary or lower levels of education.

Figure 2: Education level of the primary earning member





A public school in the rural parts of Korba block/ Chinmayi Shalya, iFOREST

School enrolment

School enrolment, as noted earlier, has been analysed for children between six to 14 years of age considering the basic right to education. Among the 600 households surveyed, 118 households (i.e., about 20% of the households) did not have any children of the specified age group. Among the rest (482) of the households:

- About 83% had all children attending school.
- Of the rest 17% households, where children were not attending school, most (70%), were in rural and tribal areas.
- No school drop-out was reported within this age group.

While dropouts are negligible among children below 14 years of age, some dropouts were reported above this age. For example, 12% of the surveyed households reported having at least one family member between 15 to 25 years of age, who dropped out of school at the secondary or higher secondary level.

Secondary data on education corroborates the survey results. For example, the poor levels of education completion in Korba are evident from the gross enrolment ratio (GER), particularly at higher secondary levels; the GER elementary level is nearly 94%, but drops to less than 60% at the higher secondary level.¹⁶

Table 2: Gross Enrolment Ratio

Block	GER (%)		
	Elementary level (Class VIII)	Secondary level (Class X)	Higher secondary level (Class XII)
Korba	93.78	80.86	52.41
Katghora	87.96	88.68	62.49
Pali	98.97	89.86	55.8
Kartala	95.35	91.99	69.09
Poundi Uproda	95.78	67.87	60.22
Total	93.67	83.62	58.75

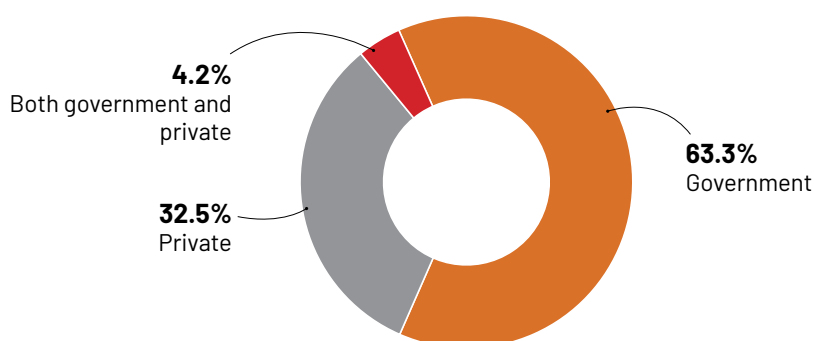
Source: District Education Department, Korba, 2021

Educational facilities

With respect to educational facilities (government and private schools), the household survey shows that:

- There is a high reliance on government schools. About 66% of households depend on government schools and 32% on private schools. An additional 4.3% households reported sending their children to both government and private schools.
- There is minimal reliance on schools supported by mining and power companies, even among the company employees. For example, only 5% of the SECL workers reported that they rely on the company for their children’s education. None of the TPP workers reported dependence on the companies for education. Also, none of the employees’ children were reported to receive any educational scholarships from the companies.¹⁷

Figure 3: Type of education facilities accessed



The high reliance on government schools is also related to the limited number of private schools and their access. Of the total number of schools in Korba, about 86% are government supported. Not only are private schools limited in number, they are also not accessible by a majority considering costs, and their concentration in the urban areas.

Another challenge with the educational infrastructure is the limited number of schools providing secondary and higher secondary level education. For example, the number of schools for higher secondary level education is about one-tenth of the schools that provide primary level education, and one-fourth of those providing up to elementary (eighth standard) level education.

It can be concluded that the education and healthcare infrastructure of the district needs significant improvement. Investments are necessary in both of these sectors to improve development indicators of the district, and build community resilience.

Table 3: Various levels of schools

Block	Number of schools providing primary education		Number of schools providing up to elementary education		Number of schools providing up to secondary education		Number of schools providing up to higher secondary	
	Public	Private	Public	Private	Public	Private	Public	Private
Korba	303	21	95	52	19	16	19	33
Katghora	223	19	89	43	20	16	18	39
Pali	327	8	115	22	15	6	18	7
Kartala	222	7	82	9	13	3	20	1
Poundi Uproda	401	21	137	8	23	1	15	2
Total	1,476	76	518	134	90	42	90	82

Source: District Education Department, Korba, 2021

5.2.3 Access to basic amenities

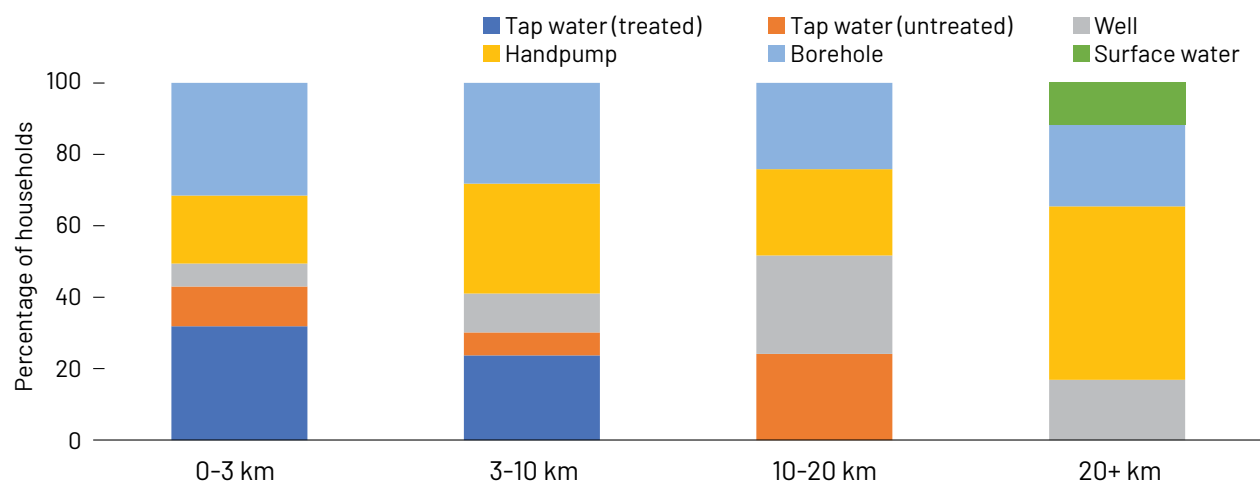
The access has been analysed with respect to four parameters - clean drinking water, clean cooking fuel and electricity.

Drinking water

Access to clean drinking water in Korba has been analysed considering the primary source of drinking water for the surveyed households. The analysis shows that:

- Only 21% of the households use treated tap water. All of these are in the urban areas (Korba municipality and other urban areas).
- A whopping 71% households rely on untreated water from various sources such as wells, hand pumps and boreholes for drinking purposes. About 8% reported using untreated tap water.

Figure 4: Access to clean drinking water



The official data also shows poor coverage of treated tap water in Korba. Barely about 6.6% of the rural households (which is about 23,900 households) have a tap water connection under the Central Government's Jal Jeevan Mission (which aims to provide a functional tap and 55 litres of water per capita per day by the year 2024).¹⁸ A large proportion of households in the rural areas continue to source water from hand pumps (47%) and open wells (over 21%).¹⁹

In urban areas, only Korba municipality has all households covered with treated tap water connection as per the records.²⁰ The coverage in other urban areas is inadequate. For example, in Katghora and Dipka nagar palika parishads, only 32% and 55% households respectively have tap water supply.²¹

Cooking fuel

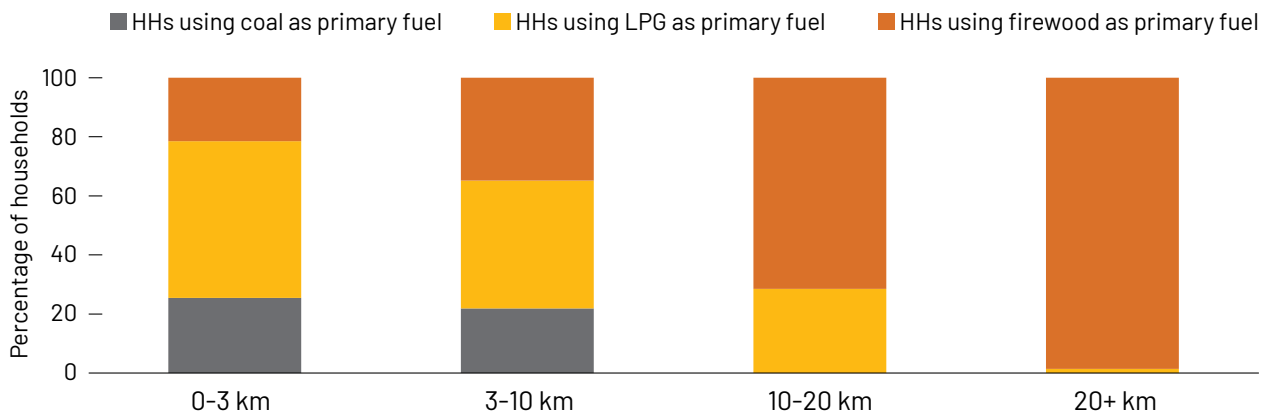
Households in Korba use a mix of cooking fuels to meet their everyday needs.

- Firewood is the predominant cooking fuel used by a majority of households. Over 44% of households reported relying on it as the primary fuel source. While these households are spread across the district, the reliance sharply increases beyond the 10 km radius and becomes the only fuel used in households beyond 20 km radius.
- About 17.3% of households reported using coal as the primary source of cooking fuel, all of whom are concentrated within a 10 km radius of the coal mines and the TPP cluster.
- However, about 26% households additionally use coal as a secondary source of fuel, to complement other sources, such as liquefied petroleum gas (LPG) or firewood. Most of these households reside within a 3 km radius of the mines.
- About 37.2% of households reported using LPG as the primary cooking fuel.



Women cooking on fuel wood in Korba's forested village/ Chinmayi Shalya, iFOREST

Figure 5: Primary fuel use in households



Official data shows that 75% of the households in Korba have LPG connection. However, ground observations and interviews suggest that refilling is low. While 36% of households having LPG connection received it under the Pradhan Mantri Ujwala Yojana, only 15% of urban and about 3% of rural households have returned for a refill due to the high cost.²²

Electricity

Korba has universal access to electricity. As the household survey shows:

- About 51% of the households have reliable round-the-clock electricity supply.
- About 35% of the households reported getting electricity for 18 to 20 hours a day, and 14% households reported electricity supply for 14 to 15 hours a day.
- The households facing challenges with reliable supply (i.e., getting 14 to 15 hours a day) are mostly located beyond 20 km radius from mines and TPP clusters.

According to official estimates of the Pradhan Mantri Sahaj Bijli Har Ghar Yojana (2021), Korba is 100% electrified.²³ However, there is some gap in electricity access when it comes to public facilities such as educational institutions (schools), public healthcare and nutrition outreach facilities, as pointed out by officials and people during ground interactions.

Overall, Korba has poor access to clean cooking fuel and clean drinking water, but good access to electricity.

5.3 Assets

The assets available with households in Korba have been evaluated considering two parameters:

- Housing; and,
- Land ownership.

5.3.1 Housing

Housing facilities in Korba have been analysed with regard to house ownership, as well as the type of house owned by the respondents. The household survey shows that:

- About 87% of the respondents own the houses they live in. About 7% live in company quarters and the remaining 6% live in rented accommodation.
- The quality of housing, however, is poor. Only 20% of respondents live in *pucca* houses (permanent structures made of durable material). About 41% live in *kutchra* houses (entirely made of temporary material such mud, bamboo, etc.) and 39% in mixed houses (those where either the wall or the roof is made of permanent material, but the rest is temporary material such as mud, grass, thatch, wood, etc.).²⁴
- There is also a spatial disparity in terms of quality of housing. Over 75% of the households beyond the 20 km radius live in *kutchra* houses. Within the 0–3 km radius, the proportion of mixed houses is the highest (46%), followed by *pucca* houses (31%) and *kutchra* houses (23%).

The latest official data available on housing also shows high ownership of houses but poor quality of houses that people live in. About 84% of the total households in Korba own a house, while 10.6% stay in rented houses, and the rest stay in facilities categorised as 'others' (which include company provided housing).²⁵

Overall, it can be concluded that the standard of living for a majority of the households in Korba is poor. There is a gross deficit in access to clean drinking water, clean cooking fuel and housing. The situation in all cases is much worse off for people living in the rural and tribal areas.

5.3.2 Land ownership

Land is considered an important asset, usually as an avenue to supplement income and also to provide security. The household survey captures the ownership status and the spatial distribution of land owners, type of land owned, and the size of the landholding. The survey shows that:

- About 68% of the households own land. Among them, about 74% own agricultural land, 24% own non-agricultural land, and 2% own land which is used for commercial purposes.
- With respect to spatial distribution, land ownership is significantly higher among households residing in the rural areas. About 75% of the households that reported owning land are located in rural areas.
- The size of landholding is, however, small among a majority of the households. About 59% landholdings are below one hectare (marginal holding) and 31% are between one to two hectares (small). Only 10% of the households have landholdings between two to four hectares.

The observations of the household survey align with the official data on agricultural land holdings in the district. As per official estimates, about 64% landholdings are marginal and 20% are small (see *Section 2.4.1. Primary sector, page 34*).

Overall, it can be concluded that while a significant proportion of people in Korba own houses or have land, their present or future economic value is not significant. The high proportion of people with *kutchra* and mixed houses, and the high proportion of households with marginal landholding indicate low economic security.

5.4 District resilience assessment

The social infrastructure along with the socio-economic conditions of a district are crucial determinants for the ability of the local community to adjust to any disruptions, such as the energy transition. The status of Korba with respect to these factors as analysed so far (*Chapters 2,3,4 and 5*), shows that the district has a poor adaptive capacity under the current scenario and remains highly vulnerable to any unplanned change.

An overall understanding of the district's resilience considering various parameters is outlined below. The parameters have also been determined considering the climate vulnerability assessment parameters (sensitivity and adaptive capacity) as considered by the Department of Science and Technology (GOI).²⁶

Table 4: Resilience assessment

Criteria	Indicators	Status	Inference on resilience
Poverty	<ul style="list-style-type: none"> i. Percentage of BPL population ii. Household income 	<ul style="list-style-type: none"> i. 41.5% of the population are BPL. ii. In 91.3% of rural households, the highest earning member earns less than ₹5,000 per month (US\$ 66). iii. As per the primary survey, overall, 65% of the households in the district earn less than ₹10,000 per month (US\$ 132). v. As per ration card distribution status, about 67.5% fall under the very low-income category, and 18% are the poorest of the poor. 	Very poor
Deprivation	Percentage of multi-dimensionally poor people	32% of the district's population are multi-dimensionally poor (India's average 27.5%), having very poor status of healthcare, education, basic amenities.	Poor
Healthcare infrastructure and access	<ul style="list-style-type: none"> i. Healthcare facilities and resources ii. Access to healthcare facilities and resources 	<ul style="list-style-type: none"> i. There is a gross deficit of doctors and trained medical staff in the primary healthcare facilities, with positions lying vacant. The CHCs in most blocks are serving nearly twice their capacity as compared to IPHS norms. ii. Private clinics are highly concentrated in the urban areas making access difficult for people living in rural and tribal areas. Affordability also remains a key challenge. iii. Company sponsored hospitals are only accessible to formal employees of the company. iv. The district has 22 healthcare centres covered by the PMJAY, which though an important intervention, needs scaling up. v. The primary survey showed that people are highly reliant on government healthcare. While insurance coverage under government schemes increases the scope of healthcare access, lack of facilities and resources in rural areas hinders healthcare support. 	Poor
Education	<ul style="list-style-type: none"> i. Educational infrastructure ii. Enrolment and completion 	<ul style="list-style-type: none"> i. The status of secondary and higher secondary education establishments is particularly poor. The number of schools for higher secondary level education is about one-tenth of the schools that provide primary level education. ii. The level of education completion beyond elementary levels is poor. The gross enrolment at secondary level declines by nearly 35% compared to the elementary level. The situation worsens at the higher secondary levels. 	Poor

Criteria	Indicators	Status	Inference on resilience
Workforce	<ul style="list-style-type: none"> i. Proportion of non-workers ii. Women participation in workforce iii. Worker distribution 	<ul style="list-style-type: none"> i. As per the primary survey, about 54% of people within the working age group (15 to 59 years) are non-workers, and only 46% are workers (As per 2011 Census, 43% are workers). ii. Of the total workers only 22% are women, while of the total non-workers 73% are women. iii. The highest proportion (37%) of workers are engaged in agriculture, largely as agricultural labourers. The next predominant source of income is miscellaneous labour work in which 29% of the workers are engaged. 	Very poor
Dependence on coal for earnings	District GDP dependence	About 50% of the district GDP is dependent on coal mining.	High dependence
Income shares from natural resources	<ul style="list-style-type: none"> i. Output and income from agriculture, livestock and fishery ii. Income from forest products/ resources 	<ul style="list-style-type: none"> i. As per the primary survey, 47% of respondents in agriculture earn less than ₹25,000 per month; about 17% earn below ₹10,000. ii. 32% rear livestock; about 15% of them derive an income from it. iii. Forest-based livelihood is not a primary occupation of most people given low income and seasonal nature. Most people earn below ₹5,000 per month in the season from gathering and processing of forest products. 	Very poor
Landholding	Marginal and small landholdings	About 65% of the total land holdings in the district are marginal, i.e., below one hectare (ha), and 20% are small holdings, i.e., between one to two hectares.	Poor
Area under rainfed agriculture	Share of rainfed agricultural land	About 88% of the agricultural land is rainfed.	Very poor
Forest land availability	<ul style="list-style-type: none"> i. Available forest land per 1,000 rural population ii. Forest rights settlement for community led management and livelihood generation (CFR rights) 	<ul style="list-style-type: none"> i. About 0.64 ha of area under forest per 1,000 rural population (this is far surpassing the India average of 0.08 ha of forest land per capita). ii. 135 CFR rights titles given so far covering land area of about 93,021 ha. 	Good
Road and rail network	Access and connectivity	<ul style="list-style-type: none"> i. As per field observations, poor connectivity to the district due to lack of road and railway networks. Inter-district rail network is poor. ii. Connected to Raipur through Champa-Korba-Katghora national highway. Poor conditions of roads connecting the blocks of the district. 	Moderate

The resilience assessment shows that with respect to most economic and development indicators, Korba fares poorly. The district remains highly vulnerable to transition and has low adaptive capacity. Thus a broad-based intervention will be necessary to ensure a just transition for the district and its people.

Chapter 6

Planning a Just Transition for Korba





Courtesy: Gabriel, unsplash.com

- Aligning with India's net-zero emission target of 2070, all the coal mines in Korba can be closed by 2050 and power plants by 2040 with least disruption.
- Securing pension funds and skilling the new workforce will be a key issue for the formal workers; for informal workers government support and infrastructure investment will be necessary.
- The aim of Korba's economic diversification planning should be to have a balanced contribution of primary, secondary and tertiary sectors to the district GDP.
- Over 10,000 ha of mining land available with the closed and operational OC mines is a crucial asset for economic use through proper reclamation and repurposing.
- ₹1.5 trillion can be available as direct finance for just transition over the next three decades in Korba by pooling DMF, coal cess, and CSR funds.

6.1 Context for just transition planning

Planning a just transition for Korba district requires a structured approach, taking into consideration the phasing down (and eventual closure) of coal mining and coal-based power plants, and simultaneously implementing an inclusive and integrated economic restructuring plan to achieve net positive environmental, social and economic outcomes.

Considering the nature of the coal economy in the district (including industrial operations and direct and indirect income dependence), worker distribution, the socio-economic conditions, issues of land, resources and environmental pollution, and the need for ensuring a transition that is inclusive and least disruptive, there are eight key components that should be considered for planning a just transition. These include:

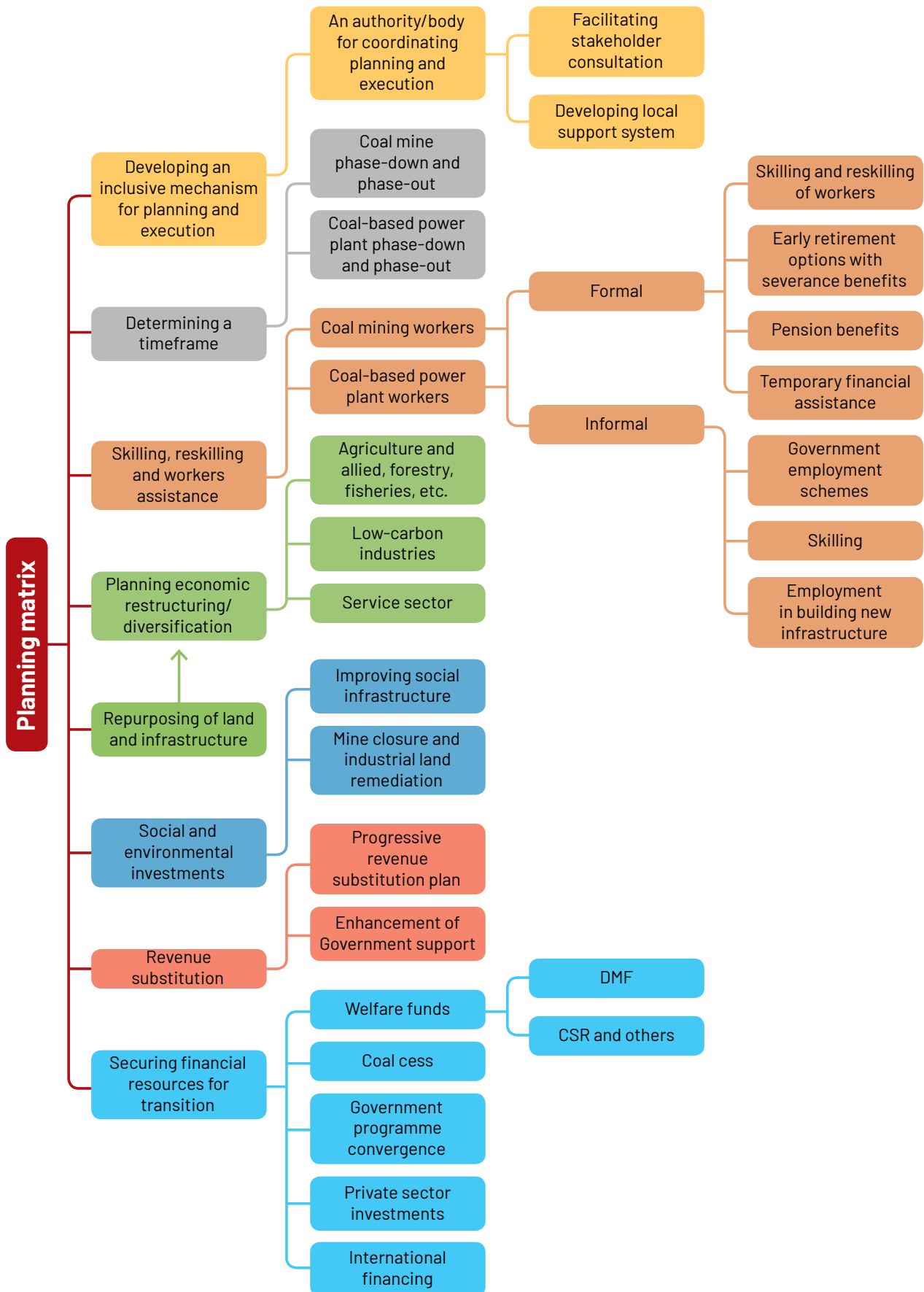
- i. Developing an inclusive planning and execution mechanism;
- ii. Determining a timeframe for just transition considering a phased closure of coal mines and coal-based power plants;
- iii. Skilling and reskilling of the workforce and providing workers assistance;
- iv. Planning economic restructuring and diversification;
- v. Repurposing land and infrastructure for productive economic use;
- vi. Responsible social and environmental investments;
- vii. Revenue substitution; and
- viii. Securing finances for a just transition.

This chapter elaborates on each of these components in the context of the district for the coming years.



A worker cleaning a solar panel/ Arpo Mukherjee, iFOREST

Figure 1: Just transition planning matrix



6.2 Developing an inclusive planning mechanism

The need to develop an inclusive plan for a just transition has been underscored by UN organisations, by various governments and commissions appointed by them, stakeholder groups such as labour unions, environmental and climate justice groups, as well as multilateral institutions.¹ There are three main reasons for this:

- First, developing inclusive mechanisms for planning and execution is essential to garner a broad-based support for it.
- Secondly, a top-down approach will hinder the social acceptance of just transition, which is essential for its success.
- Finally, for the transition plans and investments to be effective, assessing the needs and aspirations of people is crucial.

Global experiences of coal mine and industry closures show that a top-down planning approach has not led to successful transition outcomes.²

The study of Korba district clearly brings out the need for having an inclusive approach for planning and implementing a just transition. Korba is a mono-industry district where all major economic activities are centred around coal. A large group of people in the district and outside have a stake in this economy. However, there is another large group of people, such as the agricultural and forest-dwelling communities, who have very little stake in the present coal economy, as it has not benefited them. Reconciling the needs and aspirations of these two groups requires an inclusive approach. The stakeholder consultation conducted during the course of this study (besides the household survey), gives an understanding of this.

Stakeholder consultation

Developing an inclusive planning and implementation mechanism requires the following:

- An authority/body for coordination, planning and execution;
- Facilitating stakeholder dialogues; and,
- A local support system to engage in planning and implementation.

While this study has not recommended any body/authority for coordinating a just transition, it certainly has come to a conclusion that the existing district administration does not have the capacity to manage it. This is simply because authorities at the district level are overburdened with existing responsibilities, and lack the resources and capacity to plan and implement such a large-scale economic and social transition. Similarly, the study has not detailed-out the kind of local support mechanism that will be necessary; a separate study would be required for this. However, what the study has done is to undertake an extensive consultation with stakeholders to understand their perception, aspirations and needs during the transition away from coal mining and coal-based industries.

During the study period (July to September 2021), 21 focus group discussions (FGDs) were held with various stakeholder groups in Korba. Discussions were separately held with women to have more objective observations on gender-sensitive issues that would require targeted interventions towards their inclusion and participation in the process of just transition. Besides, individual interviews were conducted with government officials, industry, public representatives and labour unions.

The observations and opinions of various stakeholders, as captured through the FGDs and interviews, provide an overall understanding of the people's perspective about a just transition. Observations from the FGDs, as outlined below (see *Figure 3: Closure impacts, needs and solutions, page 92*), give a thematic summary of the following:

- Impacts of closure of coal mines and power plants; and,
- Needs and solutions as identified by the stakeholders.

Figure 2: Stakeholder engagement matrix for Korba

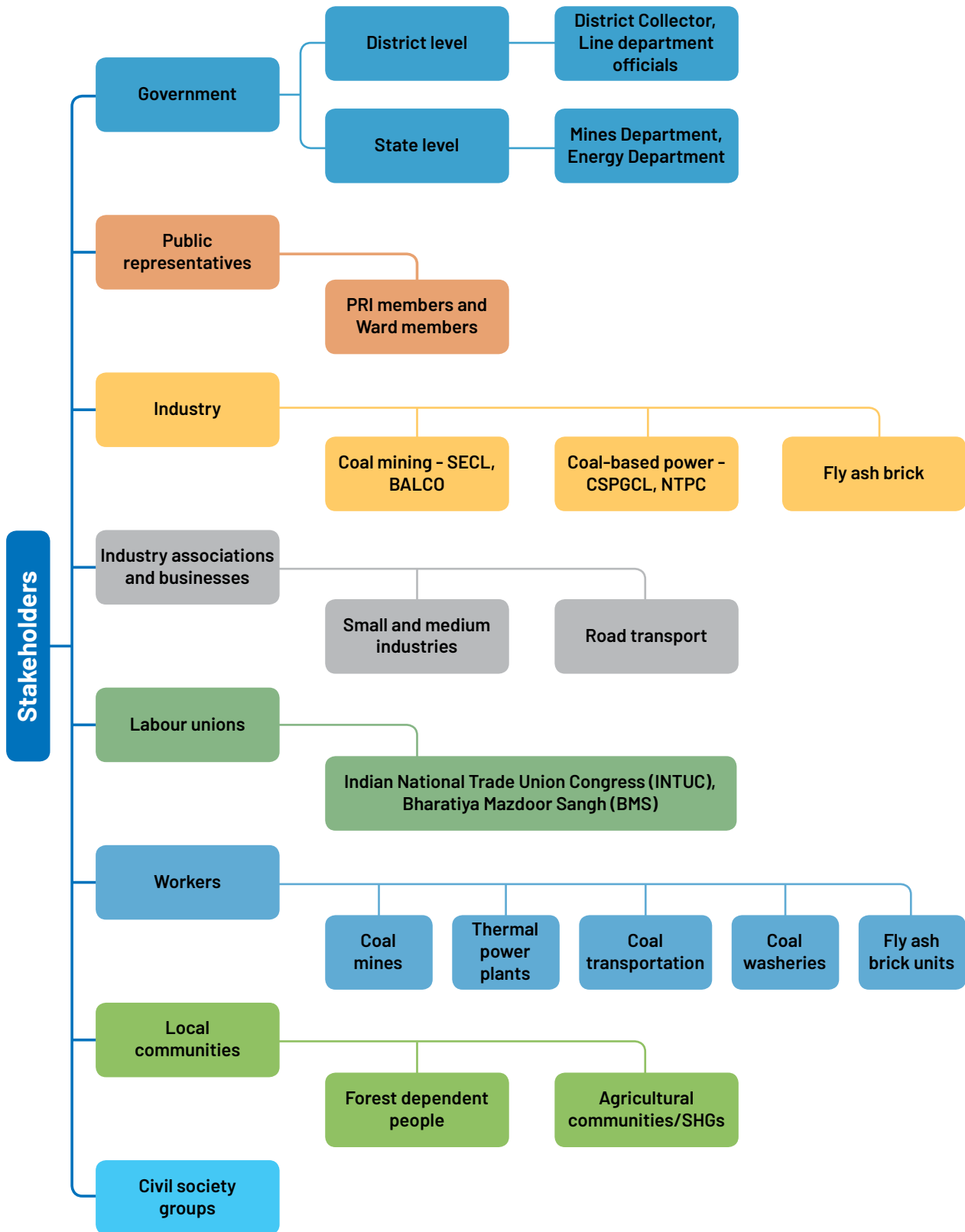


Figure 3: Closure impacts, needs and solutions

Informal coal mining workers

Key concerns

- i. Loss of income.
- ii. Fear of long-term unemployment in the absence of other big industries to absorb them.
- iii. Lack of earnings will impact their families, particularly their children's future.

Needs and solutions

- i. Employment in high-value industries, which can also assure stable income.
- ii. Income and social security support from the government during initial years of transition.
- iii. Skill-training for new jobs.

Formal coal mining workers

Key concerns

- i. Job loss unlikely as will be transferred to other SECL sites or other CIL subsidiaries.
- ii. Concerns of loss of welfare benefits, such as housing.
- iii. Other sector jobs can be a challenge in terms of job security.

Needs and solutions

- i. Transfer and redeployment to other CIL subsidiaries.
- ii. Early retirement package for those closer to retirement.
- iii. Reskilling of young employees to suit CIL's changing business and operational focus.

Informal coal-based power plant workers

Key concerns

- i. Loss of income.
- ii. Unemployment due to lack of other skills and lower education levels.
- iii. Lack of opportunities can lead to out-migration of people to other districts (though workers between 25 to 35 years of age are willing to migrate to neighbouring districts for industry jobs).

Needs and solutions

- i. Employment in high-value industries with social security benefits.
- ii. Vocational training for new skills that can help secure a job. Potential industries identified include aluminium plants and steel plants.

Informal fly ash brick workers

Key concerns

- i. Loss of seasonal income (informal workers do not have year around work in fly ash industry) which complements their small earnings from agriculture.
- ii. Miscellaneous labour work for supplementing income will be the only option. However, labour demand might also get affected if major industries go away.

Needs and solutions

- i. Round-the-year employment for at least one person in the family with decent income.
- ii. Skill development necessary, as being low-skilled or unskilled has led to poor wages.

Drivers in coal transport

Key concerns

- i. Immediate income loss before they could move to other driving jobs.
- ii. Out-migration to other industrial towns, mostly around the state capital or other states, due to lack of local opportunities.

Needs and solutions

- i. Need to diversify industries in the district as that can ensure the continuous demand for transportation services.
- ii. If transportation work becomes difficult, then new skill training will be necessary, as drivers have limited skill sets.

Coal transport business

Key concerns

- i. Huge loss in business earnings.
- ii. Closing down of business in the long-term due to lack of other industries and requirement of truck transport.
- iii. Out-migration to other areas.

Needs and solutions

- i. Large and medium industries in the region needed to sustain transport business.
- ii. Improving local connectivity through rail and road will be important to attract new businesses.

Medium and small-scale industry

(Represented by Korba Jila Udyog Sangh, the industry association)

Key concerns

- i. A number of small industries will be severely affected as they are engaged in manufacturing spare parts for the machines used by the mining companies, power plants and fly ash brick making units.
- ii. In the district, particularly urban areas, there will be unemployment and out-migration.
- iii. Businesses will also be affected by non-availability of labour due to out-migration.

Needs and solutions

- i. Diversification of industries (non-coal) will be key.
- ii. Some of the industries indicated include food processing, poultry and dairy-based industries, forest product-based industries and tourism.
- iii. Investments in education will be necessary for preparing the younger generation for other jobs.
- iv. As Korba is a little far from the state capital, initial financial support and incentives by the government will be necessary to attract businesses and industries in the district.
- v. Improving local connectivity through rail and road will be important.

Local retail businesses

Key concerns

- i. Downturn of businesses as many consumers will face job loss or decline in income.
- ii. Losses to retail business, and eventual closing down of many shops.
- iii. Mass out-migration of people.

Needs and solutions

- i. Diversification of industries will be necessary.
- ii. Income opportunities of people must be created to sustain local businesses.

Municipal ward members

Key concerns

- i. Job loss and economic downturn.
- ii. Social unrest and substance abuse among the locals.
- iii. Out-migration of labour in search of jobs.
- iv. Loss of revenue to the municipality as PSUs pay significant property tax.
- v. Loss of DMF funds in the coming years, which are a key source of funds for local area development.

Needs and solutions

- i. Expanding aluminium (finished product manufacturing) and steel industry in the district.
- ii. Developing food parks to promote agriculture-based industries.
- iii. Providing loans and credit to support entrepreneurs.
- iv. Investments in education for better job work opportunities in future.

Panchayati Raj Institution members

Key concerns

- i. Impact will be limited to those employed in the coal mines or coal-dependent industries.
- ii. Impact will not be widespread as the local economy is largely agrarian and forest-dependent.
- iii. Closure can lead to better environmental conditions, particularly considering air pollution and water availability.

Needs and solutions indicated

- i. Improving agricultural potential through better irrigation.
- ii. Improving livelihood opportunities by investments in dairy-based industries, poultry, horticulture.
- iii. Strengthening women SHGs and providing support to set up cooperatives.

Agriculture and forest dependent communities

Key concerns

- i. Not concerned about closure of coal mines or power plants as they do not benefit much from the industries.
- ii. However, fear of out-migration of their family members who work as labourers in many of the industrial operations and businesses.

Needs and solutions

- i. Support for irrigation to enable multiple cropping.
- ii. Other income opportunities to supplement household income.
- iii. For forest produce, better processing and storage facilities at the village level.
- iv. Training and support to run small forest produce-based businesses.
- v. Women particularly asked for opportunities of adult education through evening schools to improve their ability to manage small enterprises.

Civil society groups

Key concerns

- i. Impact will be largely concentrated around coal mines and coal-based industry clusters.
- ii. Loss of income, labour distress and unemployment around the industrial areas.
- iii. In rural areas, impact would be minimal and limited to families whose members are working in the mines.

Needs and solutions

- i. Support for forest-based industries including medicinal plants and silk as they have a bigger market.
- ii. Development of farmer cooperatives to improve their income.
- iii. Using existing schemes like MGNREGS for asset creation for rain water harvesting, composting, etc.
- iv. Training and financial support for locals to boost entrepreneurship, particularly small businesses.

There are two distinct perceptions regarding coal in the district. For those living in urban areas and dependent on coal for jobs and livelihoods, a future without coal is unimaginable. For them, Korba is “synonymous” with coal and thermal power. The industries are also considered as a conduit to having better connectivity in the region and investments in other businesses. Therefore, income loss and an economic downturn was the biggest fear among a majority. Then there is another group, living in rural areas and dependent on agriculture and forestry for livelihoods, who do not perceive a major impact of the closing of coal mines and power plants. They in fact believe that the closure will improve their environment and economic status.

With respect to alternative opportunities, most stakeholders, however, suggested a need to diversify industries and businesses, as that will also help to absorb people with variety of skill sets. The agrarian and forest-dependent communities particularly demanded avenues to improve incomes from agriculture and forest-based products and improve their standard of living.

One of the biggest concerns was the lack of proper education and skill-sets to get absorbed into new jobs. However, the youth and women felt that with required skill trainings, they could be part of local industries and enterprises. Most stakeholders also insisted on early intervention by the government to minimise unemployment, out-migration and economic downturn that can result from closure of the coal mines and coal-dependent industries.

6.3 Timeframe for just transition

The first step for planning a just transition is determining a timeframe for closing down coal mines and coal-based TPPs. For determining such timeframe for Korba, two scenarios have been considered, viz., the Current Policy Scenario (CPS) and the Net-Zero 2050 (NZ-2050) Scenario. Further, for planning a phased closure, separate sets of criteria have been considered for coal mines and the TPPs as elaborated in the following section.

Policy scenarios

Current Policy Scenario

The Current Policy Scenario (CPS) is based on existing government policies, and has been constructed assuming that India will meet its net-zero target by 2070. Under this scenario, the coal-based power plants will be phased out by 2050 and the non-coking coal production will cease by 2050 with least disruptions. Planned expansion of existing mines will happen, and new coal mines will come up till 2025. The coal production will peak by 2030.

Net-Zero 2050 Scenario

The Net-Zero 2050 (NZ-2050) Scenario explores how India can meet a net-zero target by 2050. The NZ-2050 Scenario assumes a stiffer but achievable pathway for phasing down coal-based power and non-coking coal production. Under this scenario, both coal-based power and non-coking coal production cease by 2040. Power plants and coal mines under construction will come up till 2025, but will undergo a forced closure by 2040.

6.3.1 Coal mine phase-down and closure

The timeframe to close the mines in Korba district can be determined based on three important factors:

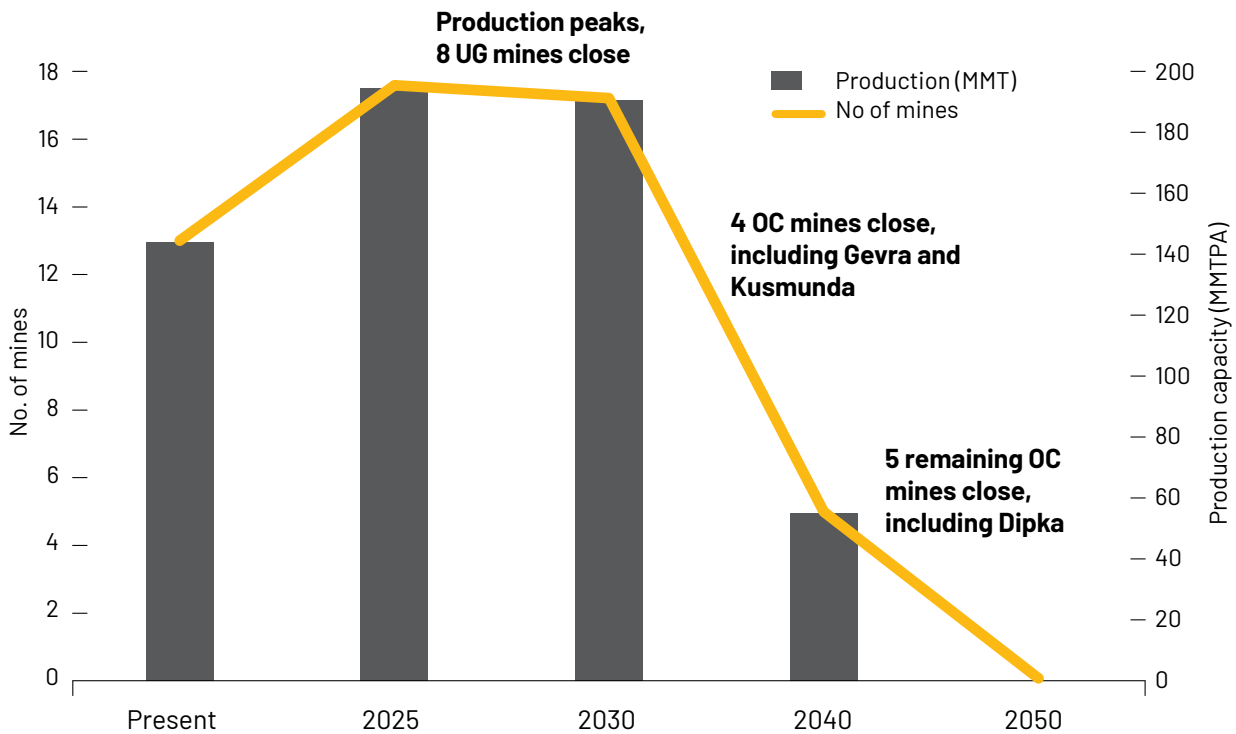
- Production and normative capacity;
- Financial performance of the mine; and,
- Life of the mine and mineable reserves.

Considering these factors, two closure timeframes are proposed below, the first under CPS and the second under a NZ-2050 Scenario considering the need for accelerated action.

Current Policy Scenario

A three-phase plan for closing down of the coal mines under CPS is outlined below. The proposition of coal mine closure under this scenario is based on the fact that the low-producing UG mines, which are also unprofitable, can be closed early on. The big opencast mines can continue to produce as per their normative production capacity till the end of the life of the mines. Planned expansion (as per proposals in the pipeline), has been considered for all the OC mines. The assessment also takes into account upcoming mines.

Figure 4: Coal mines closure under CPS



Phase I - by 2030: In phase I, all of the eight UG mines in the district can be closed down considering their low production (1.75 MMTPA) and unprofitability. All of these mines are also very old, two of them being nearly 50 years old, and have limited mine life remaining.

Table 1: Phase I coal mine closures

Name of mine	Block	Operation type	Production capacity (normative) (MMTPA)	Production in 2020-21 (MMT)	No. of years in operation (as of 2021)
Surakacchar	Katghora	UG	0.45	0.23	57
Balgi	Katghora	UG	0.6	0.12	38
Singhali	Katghora	UG	0.42	0.23	28
Dhelwadih	Katghora	UG	0.33	0.18	20
Bagdeva	Katghora	UG	0.76	0.41	24
Rajgamar 4&5	Korba	UG	0.45	0.07	NA**
Raniatari	Poundi Uproda	UG	0.48	0.51*	25
Vijay West	Poundi Uproda	UG	0.5		NA**

* For Raniatari and Vijay West, combined production data was provided by District Mines Department, Korba; **Information not available

Phase II - Between 2030-2040: In phase II, two of the largest coal mines, Gevra and Kusmunda can be closed down, along with two other OC mines, Manikpur and Ambika. For Gevra, while as per the current capacity and clearance document the remaining mine life is only eight years, the closure plan takes into account the planned expansion of the mine.

Table 2: Phase II coal mine closures

Name of mine	Block	Operation type	Production capacity (normative) (MMTPA)	Production in 2020-21 (MMT)	Mineable reserves (MMT)	Estimated remaining mine life (as of 2021)	No. of years in operation (as of 2021)
Manikpur	Korba	OC	4.9	4.9	66.4	13 years (as per normative capacity and current production)	55
Gevra	Katghora	OC	49 (Planned expansion 70 MMTPA)	40	400.2 (1,085.24 at planned expansion to 70 MMTPA)	i. 8 years (as per normative capacity) ii. 15 years (as per planned expansion of 70 MMTPA) iii. 10 years (as per current production and mineable reserves)	41
Kusmunda	Katghora	OC	50	37.3	779	i. 15 years (as per normative capacity) ii. 21 years (as per current production)	42
Ambika (upcoming)	Pali	OC	1		7.6	9 years	Will start in October, 2022

Phase III - Between 2040-2050: In phase III, the remaining five mines in the district can be closed down. The biggest closure in this phase includes Dipka mine.

Table 3: Phase III coal mine closures

Name of mine	Block	Operation type	Production capacity (normative) (MMTPA)	Production in 2020-21 (MMT)	Mineable reserves (MMT)	Estimated remaining mine life (as of 2021)	No. of years in operation (as of 2021)
Dipka	Katghora	OC	35 (Planned expansion 40 MMTPA)	33.53	948.04 (as per planned expansion to 40 MMTPA)	6 years (as per normative capacity and last EC letter) 26 years (as per re-assessed reserve for planned expansion to 40 MMTPA)	20
Saraipalli	Pali	OC	1.4	0.05	32.8	23 years (as per normative capacity)	1
Gidhimuri and Paturia	Poundi Uproda	OC	5.6		158.4	28 years (from 2025 or the year of start)	To start in 2025
Madanpur South	Poundi Uproda	OC	5.4		159.5	35 years (from the year of starting as per mining plan) 29 years (as per normative capacity)	Was expected to start in 2020, project delayed
Kartali	Pali	OC	2.5		Not available	Not available	Expected to start in 2025. Mine delayed due to lack of forest clearance.

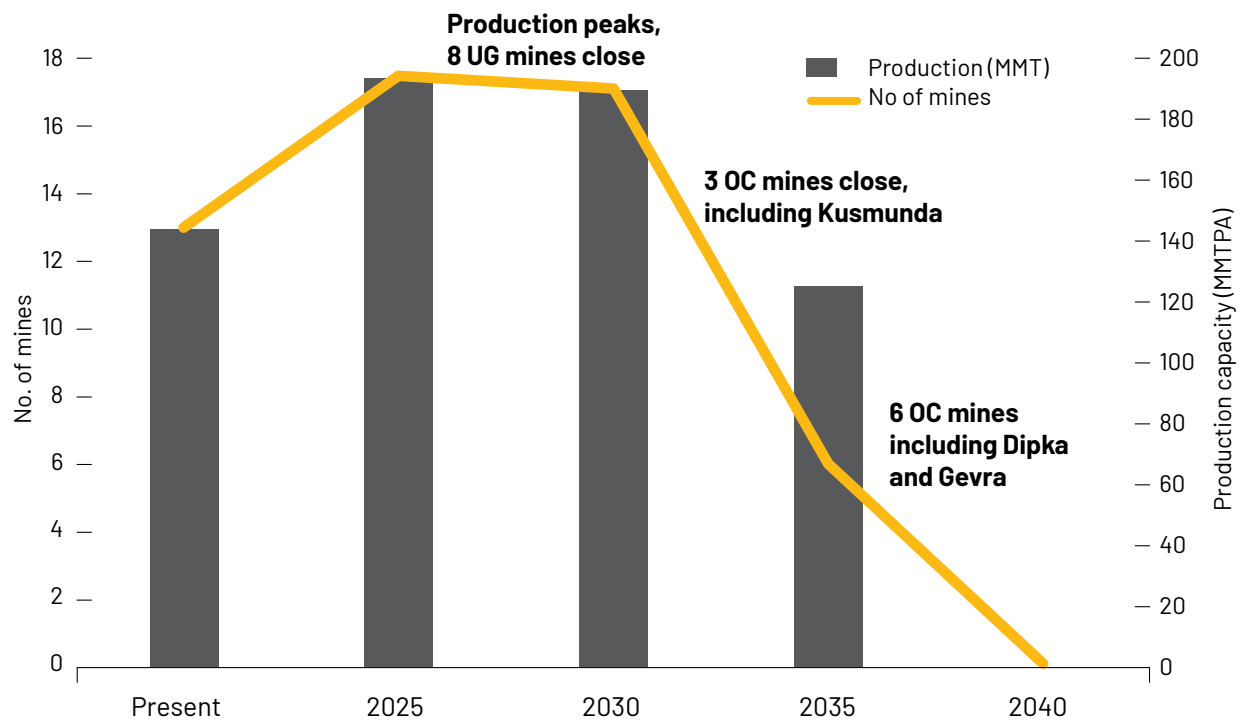
Overall, under the CPS, it can be estimated that about 3,387 MMT of coal will be produced in Korba over the next three decades (until 2050). By early closure of two UG mines in 2030, and two OC mines (which are still in pipeline) in 2050, the district will forego only 46 MMT of coal production if all mines are closed by 2050.

In fact, planned closure activities during this period can be a win-win for the coal company. The SECL (and CIL), can utilise the money saved from closing the low producing UG mines in the first decade for diversifying its portfolio and invest in low-carbon businesses, including renewable energy, in the district. This will also help the district to transition to a low-carbon economy in the least disruptive manner.

Net-Zero 2050 Scenario

Coal mine closure in Korba under the NZ-2050 Scenario can also be planned in three phases. However, the last mine will close down in 2040 following an accelerated closure scenario.

Figure 5: Coal mines closure under NZ-2050 Scenario



Phase I - by 2030: Mine closure remains the same as under the CPS, with all eight UG mines closing by 2030.

Phase II - Between 2030-2035: In phase II, three OC mines can be closed, including Manikpur, Kusmunda and Ambika. Except for Kusmunda, under the accelerated closure scenario, the two other mines will complete their remaining mine-life. For Kusmunda too, only one year of life will be left (remaining mine life is 15 years as per current estimates).

Phase III - Between 2035-2040: In phase III, all the remaining OC mines can be closed down. This includes the two largest mines Gevra and Dipka. The accelerated closure, however, will only affect Dipka as it will still have reserve equivalent to five years of production left in 2040.

Overall, under the NZ-2050 Scenario, it can be estimated that about 3,019 MMT of coal will be produced in Korba over the next two decades (until 2040). By early closure of two UG mines in 2030, and five OC mines (including Dipka, Saraipalli and three in the pipeline) in 2040, the district will forego 414 MMT of coal production.

Table 4: Decadal coal production under CPS and NZ-2050 Scenario

Decade	Production in CPS (MMT)	Production in NZ-2050 Scenario (MMT)
2021-2030	1,727.5	1,727.51
2031-2040	1,291.6	1,291.6
2041-2050	368.1	0
Total production	3,387.2	3,019.11
Production foregone	46	414

6.3.2 Coal-based thermal power plants phase-down and closure

The timeframe to close coal-based TPPs in Korba can be determined based on two important factors:

- The age of the power plants; and,
- Their ability to meet environmental norms.

These are also the criteria considered by the CEA for closure of TPPs as outlined in the National Electricity Plan (2018), which lists the units that can be closed down by the year 2027. Besides the ones noted by the CEA for closure, for the remaining units, a life of 25 years has been considered (the typical 'design life' of coal fired units).³ Also, as noted earlier, the state had made an announcement in 2019, that it will not set-up any new coal-fired power plants.

Considering the above criteria, the operational TPP units in Korba can be phased out in a staggered manner in two phases over the next 20 years as outlined below. The last unit can close down by 2040. On the demand side for coal, the closure of all the units will result in a reduced demand of about 30.4 MMT of coal, which is sourced from the mines in Korba. Unlike coal mines, for the coal-based power plants, there is no difference in closure timeframe between the CPS and NZ-2050 Scenario.

Figure 6: Coal-based TPP closure

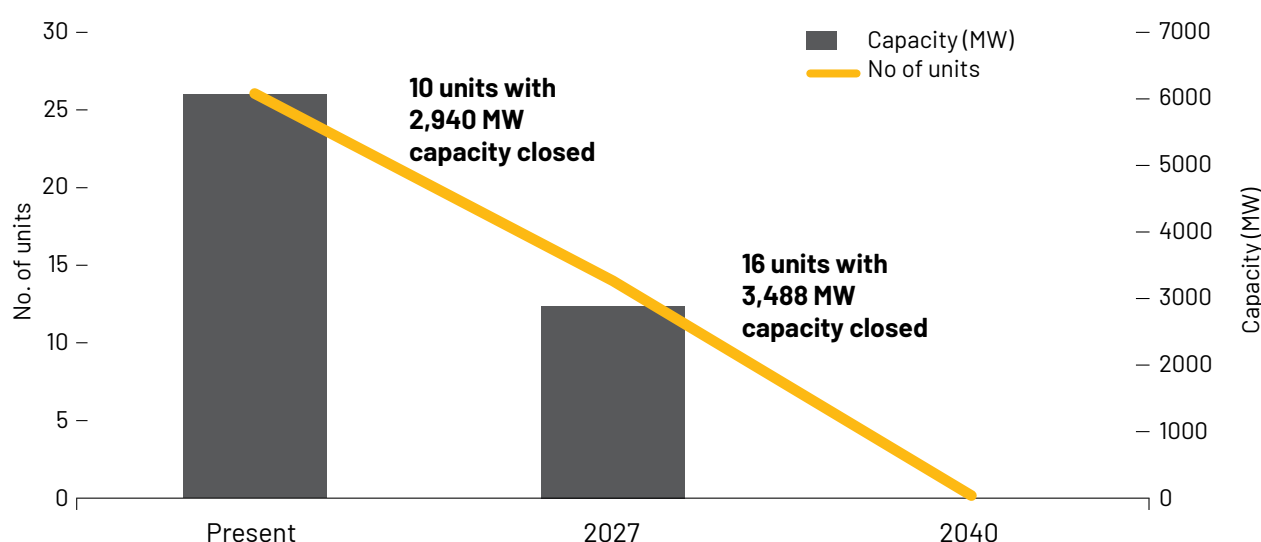
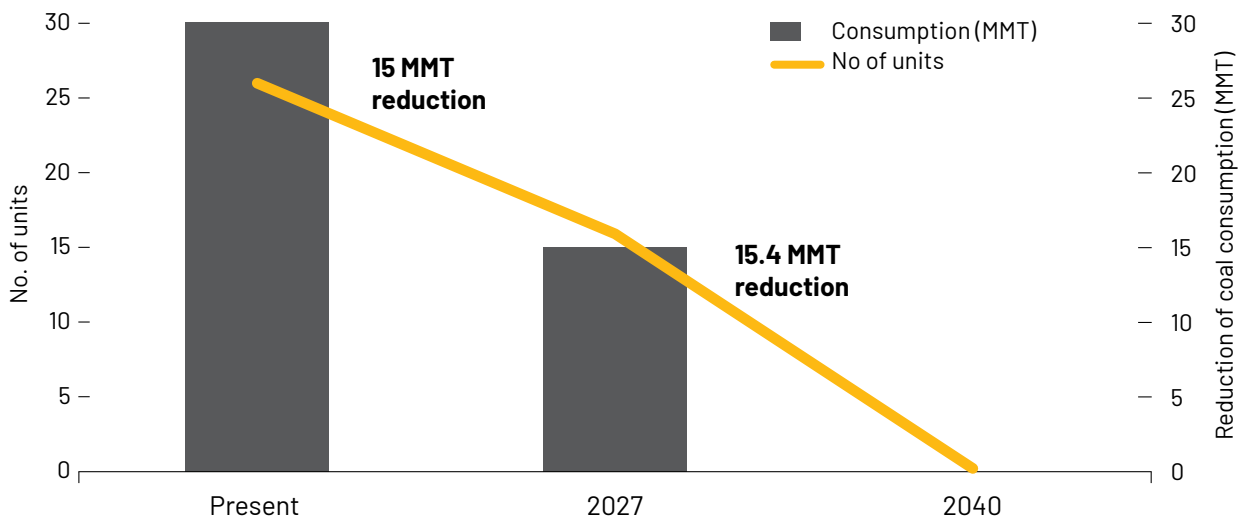


Figure 7: Reduction in coal demand from TPP closure



Phase I - By 2027: In phase I, 10 units of cumulative 2,940 MW capacity can be closed. These include, four units of CSPGCL and six units of NTPC. There will be a concomitant reduction in coal consumption of 15 MMT.

Table 5: Phase I coal-based TPP closures

Company	Name of TPP	Block	Units to be retired	Installed capacity (MW)	Year started	Current age (years)	Reason (as noted for closure in National Electricity Plan)
CSPGCL	Korba West TPS/ Hasdeo TPP	Katghora	1	210	1984	37	Age/ environmental norms
			2	210	1983	38	Age/ environmental norms
			3	210	1985	36	Age/ environmental norms
			4	210	1986	35	Age/ environmental norms
NTPC	Korba STPS	Korba	1	200	1983	38	Age
			2	200	1983	38	Age
			3	200	1984	37	Age
			4	500	1987	34	Age
			5	500	1988	33	Age
			6	500	1989	32	Age

Phase II - Between 2030-2040: In phase II, the remaining 16 units of cumulative 3,488 MW capacity can be closed. These include, three units of CSPGCL, the remaining unit of NTPC, and other units operated by private companies. There will be a concomitant reduction in coal consumption of nearly 15.4 MMT.

Table 6: Phase II coal-based TPP closures

Company	Name of the TPP	Block	Units to be retired	Installed capacity (MW)	Year started	Age at 2040 (years)
CSPGCL	DSPM TPS	Korba	1	250	2007	33
			2	250	2007	33
Lanco Amarkantak Power Limited	Pathadi TPP	Korba	1	300	2009	31
			2	300	2010	30
NTPC	Korba STPS	Korba	7	500	2010	30
S V Power Private Limited	SVPL TPP	Pali	1	63	2011	29
ACB (India) Limited	Kasaipalli TPP	Katghora	1	135	2011	29
			2	135	2012	28
CSPGCL	Korba West TPS/ Hasdeo TPP	Katghora	5	500	2013	27
ACB (India) Limited	Chakabura TPP	Pali	2	30	2014	26
ACB (India) Limited	Swastik Korba TPP	Katghora	1	25	2015	25
Maruti Clean Coal and Power Limited	Bandakhar TPP	Pali	1	300	2015	25
Spectrum Coal and Power Limited	Ratija TPS	Pali	1	50	2013	27
			2	50	2016	24
Bharat Aluminium Company Limited	BALCO TPS	Korba	1	300	2015	25
			2	300	2015	25

6.4 Skilling, reskilling and worker assistance

Skilling and reskilling of the workforce is a key consideration of just transition. The need stems not only from the fact that coal mining, coal-based TPPs, and other fossil-fuel intensive sectors need to plan for a transition, but also due to automation in traditional industries, that has reduced and altered labour demand.⁴

Besides skilling and reskilling, another key factor for just transition is arranging for the pension benefits for eligible workers and creating provisions of workers assistance, if early retirement should happen. This is mostly for formal workers who are entitled to such benefits.

For Korba, the evaluation of skilling and reskilling needs, pension support and transition assistance are done with respect to the following:

- Formal workers in coal mining and the coal-based power industry.
- Informal workers in coal mining and the coal-based power industry.
- Coal transportation workers, including truckers and associated people, such as helpers and mechanics.

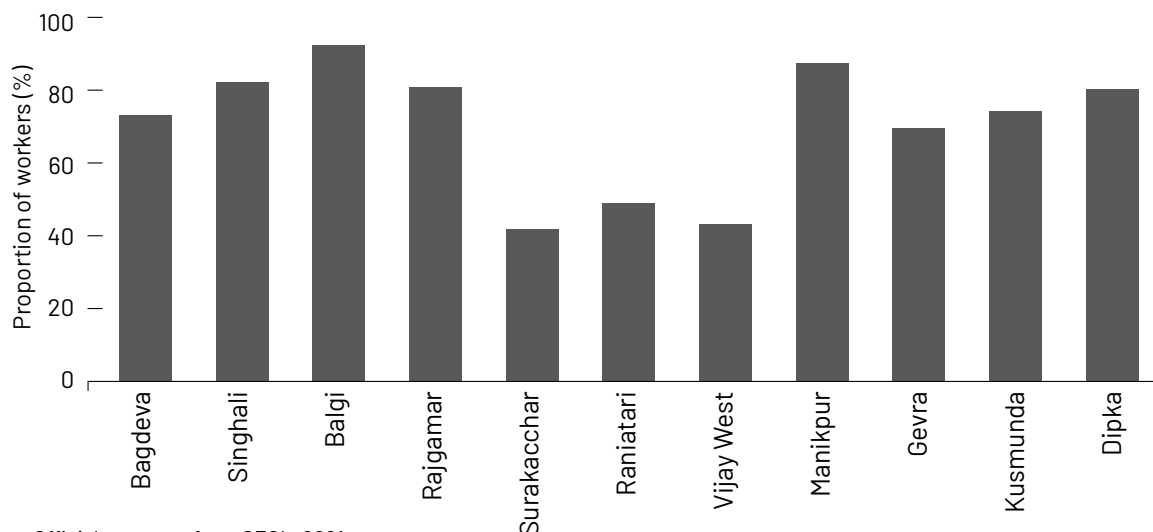
6.4.1 Transition of formal workers

The formal workers engaged in the coal mining industry and power plants are among the best paid workers in Korba. They receive various benefits, and the departmental workers of the PSUs are further entitled to pension and post-retirement benefits.

Considering this, it becomes essential to understand the skilling and reskilling need of these workers, i.e., what proportion of the formal workers will need it, and what will be the retirement and pension liabilities. For this, an assessment of the age profile of the workers becomes essential.

With respect to coal mining, a mine-wise age profile of the workers shows that about 73% of the SECL's departmental employees fall within the 40-60 years age-group. In some mines, such as Balgi (UG) and Manikpur (OC), over 87% of workers are above 40 years old.

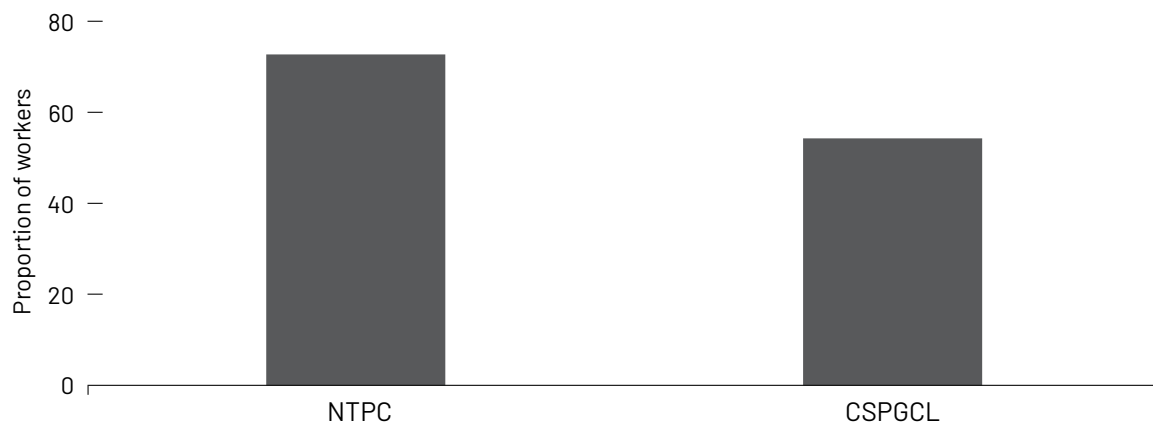
Figure 8: Mine-wise proportion of workers between 40-60 years age



Source: Official response from SECL, 2021

For the TPPs, age profile of the employees working in the plants operated by NTPC and CSPGCL shows that, in the NTPC operations of Korba, about 73% of the employees are above the age of 40 years as well. For CSPGCL it is about 54%. No worker age profile was available for the private operators.

Figure 9: Proportion of workers between 40-60 years age in TPPs



Source: Official response from NTPC and CSPGCL, 2021

Considering the age profile, it can be concluded that for SECL, the formal worker transition will be far less of a challenge. While most of the departmental employees are in the older age bracket, the declining trend of hiring of departmental employees by the company over recent years also makes it clear that this proportion will not change, and people falling within the older age bracket will only increase. Considering such a scenario, the retirement of a large majority of formal employees can be synchronised with the closure of mines in the next 20 years.

Overall, for SECL's existing departmental employees, the following needs to be ensured:

- Securing pension benefits for about 75% to 80% of its employees;
- Considering early retirement options with severance benefits for people who will be above the age of 55 during the closure of mines;

- Planning to shift the formal and younger age group workers of the UG mines (which is on an average 20% of the departmental employees), to other OC operations, particularly whose capacities are being enhanced, or the new mines; and,
- Reskilling and reemployment of the remaining 20% to 25% of workers.

For the employees of coal-based TPPs, while there is a significant proportion falling within the older age bracket, reskilling and re-employment will be a key consideration as a large number of plants are likely to close down in the next five years. Overall, the following needs to be ensured:

- Reskilling and skilling of the formal workers for jobs that will be required for building the new economy. An important consideration can be the RE sector related jobs, which should also be a component of economic diversification planning.
- A large number of workers will also be required for repurposing of the existing infrastructure.
- Employees above the age of 55 years during the closure of the TPPs can be retired with early retirement package and pension benefits. Also for employees of NTPC and CSPGCL, who are in the older age group, consideration of early retirement options with severance benefits will be an important issue.

Overall, a key issue for both coal mining and thermal power operations will be securing pension funds (for current retirees and those in the future), and skilling of the new workforce. To build the green economy, companies will have to start developing employee portfolio considering the kind of skills they will need for the future.

For the contractual workers, the key issue will be their ability to get absorbed in low-carbon industries and service sector jobs. This has also been captured during the FGDs. For this, restructuring of businesses of the coal mining PSUs, developing new industrial opportunities in the district, as well as boosting the service sector will be important. These workers will need reskilling support accordingly.

For the coal washeries in Korba, which will also be impacted directly by coal mine closure, the primary factor would be skilling and reskilling of the formal workers to get absorbed in new industries. Since all the washeries in Korba are operated by a private company, addressing job loss will be a key concern.

Table 7: Transition scenario for formal workers of coal mines and TPPs

Sector	Company	Proportion of employees whose retirement can be synchronized with closure (%)	Proportion of employees who will need reskilling and reemployment (%)
Coal mining	SECL	75-80	20-25
Coal-based thermal power	NTPC	73	27
	CSPGCL	54	46

6.4.2 Transition of informal workers

Securing alternative livelihood opportunities and income substitution for the informal workers is a key consideration of just transition planning. Most of the informal workers engaged in coal mining and the TPPs can be categorised as semi-skilled and unskilled.⁵ Besides, there is no clear inventory of this category of workers considering the ad hoc nature of their hiring and terms of employment, and considerable involvement of middlemen. They also belong to low-income categories and are unorganised (indicating lack of bargaining power).

Therefore, to secure a fair income substitution for this category, a broad-based approach needs to be adopted. This can be ensured through:

- Government employment generation schemes;
- Employment in building the new infrastructure and industries; and,
- Reskilling and skilling.

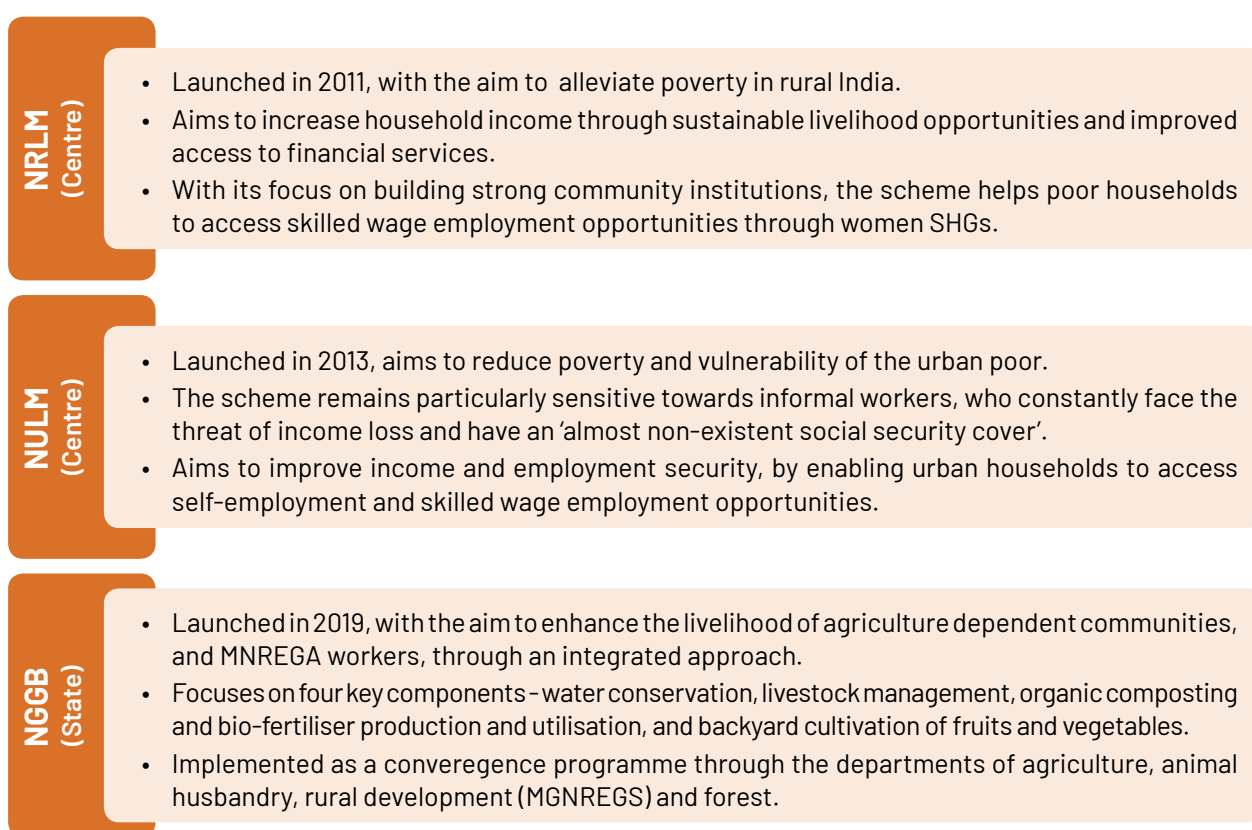
Government employment generation schemes

Income generation and employment schemes of the Centre and the State Government will have a key role in creating alternative income opportunities for the informal workers. This will also help to improve overall household income, including of women. Some of the key schemes include the National Rural Livelihood Mission (NRLM)⁶ and the National Urban Livelihood Mission (NULM)⁷ of the Central Government, and the State Government livelihood enhancement schemes, such as the integrated *Narwa, Garuwa, Ghurwa and Badi* (NGGB)⁸ scheme, which involves MGNREGS and agricultural workers and aims to enhance earnings and income security.

Employment in building new infrastructure and industries

Development of new social and economic infrastructure, including reclamation and redevelopment of mined areas, will be a significant component of diversifying the economy and creating long-term assets in Korba. This will require the engagement of large numbers of skilled and unskilled workers. Informal workers currently engaged in the coal mining industry and the TPPs can be suitably trained and employed for infrastructure development in various sectors. In fact, well-planned infrastructure projects with complementary investments will not only generate direct employment, but can have a far-reaching benefit for the local economy.

Figure 10: Key employment generation schemes for informal workers and poor households



Reskilling and skilling

The first step for reskilling and skilling the informal workers will be identifying these workers and mapping their skills. As the primary survey shows, there are a variety of informal workers with varied skill sets. The identification and mapping will also help to understand the most suitable sector where they can be absorbed, and determine their skilling and reskilling requirements.

Table 8: Education and skill mapping of informal workers in the coal industry and TPPs

Type of work	Education level	Skill level
Miscellaneous labour (casual labour work, such as loading and unloading, civil work, housekeeping, etc.)	Illiterate or without formal schooling; up to elementary school	Unskilled, semi-skilled
Security guards	Up to elementary and secondary school	Semi-skilled
Coal samplers	Up to secondary and higher secondary school	Semi-skilled
Construction work	Up to elementary school	Semi-skilled
Machine operators	Up to elementary and secondary school	Semi-skilled, skilled
Mechanical and maintenance work in TPPs	Up to higher secondary school	Skilled
Drivers	Up to secondary and higher secondary school; Graduation	Skilled

As the mapping exercise shows, informal workers in coal mines are mostly unskilled, except for the drivers of coal trucks and other vehicles. FGDs held with these workers showed a high demand for skill training, especially in the sectors of servicing and repairing (electrician, mechanic, welder, etc.), construction (masonry), information and technology (computer operator, office jobs), and transport (driving).

Given that Korba is an aspirational district, the informal workers can be covered under the skill development component of the aspirational districts programme of the GOI. Acquiring new skills can improve the scope of employment opportunities of these workers. However, a limiting factor is that most of these people can only be skilled in low-paying jobs.

This also indicates the need for inter-generational considerations in just transition planning. Just transition interventions should be planned in a manner that the children of informal workers are not trapped in the same vicious cycle of poverty, poor education and skills. Therefore, investments in quality and affordable education and skill-building infrastructure are crucial.

6.4.3 Coal transportation workers

The coal transportation sector employs more than 15,000 people in Korba. This is only 15% less than the formal employment in coal mines. Therefore, in the process of just transition planning, the coal transportation sector will require specific attention.

While coal transport is not likely to be affected in the next 15 years as coal production in the district will remain high, after that the drivers and helpers will have to be re-skilled and prepared for the new economy, including in building of new infrastructure and repurposing the existing ones.

However, the transportation sector itself will undergo a transition in the coming years, considering the need to reduce oil consumption and the use of alternative fuels. In fact, in the next 15 years, most of the existing trucks are likely to be scrapped given the opportunity to shift to low-emission freight. Therefore, transition plan for the coal transportation sector should not only remain as a component of coal transition planning, but should be part of a comprehensive decarbonisation strategy for the road transport sector supported by the government.⁹

6.5 Economic diversification

Just transition for Korba will entail restructuring and diversifying the district's economy and industrial activities. Korba is by and large a 'mono-industry' district where coal mining and coal-based TPPs dominate the industrial and economic landscape. There is a near-absence of any other major industry in the district, other than the aluminium plant operated by BALCO.

Overall, as discussed earlier, the primary sector has a share of over 56% in the district's GDP (50% is related to mining), followed by the secondary sector with a share of 31%, and the tertiary sector with a share of merely 12.7%. The aim of Korba's economic diversification planning should be to move away from the coal-centric economy and create a balanced GDP with nearly equal shares of the primary, secondary and tertiary sectors.

The key aspects of economic diversification in the district will, therefore, involve the following:

- Boosting non-mining components of the primary sector - agriculture, forestry and fisheries;
- Supporting development of low-carbon industries; and,
- Improving income opportunities in the service sector, including healthcare and tourism.

The potential and opportunities around these are outlined below.

6.5.1 Boosting agriculture, forestry and fisheries

The primary sector holds significant opportunity for diversifying the economy in Korba. This section outlines the scope and some of the key interventions required for improving productivity and livelihood opportunities in the agriculture (and allied), forestry and fisheries sectors.

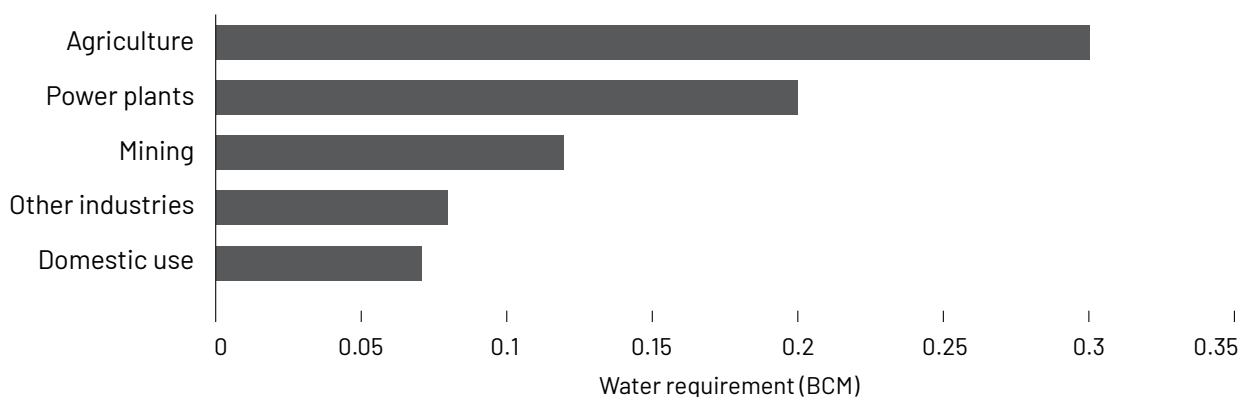
Agriculture

About 19.7% of the total geographical area in Korba (about 140,765 ha) comes under gross cropped area. While the district's land is suitable for a wide range of crops including rice, legumes, maize, etc., the yield for major crops is fairly low (as discussed in Chapter 2).

The agricultural production in the district is highly dependent on rainfall and is primarily practiced in the kharif season. In the rabi season, it is partly done through ground water, as well as through surface water like canals and other sources.¹⁰ However, variation in the yearly rainfall directly affects the main crop, i.e., paddy.¹¹

Overall, agriculture is the highest consumer of water in the district estimated to consume about 0.3 BCM of water per year. This is followed by water use by power plants and coal mining (considering their production in 2020-21). The Central Ground Water Board (CGWB) has observed that the demand of ground water in the area has been increasing for agricultural, various industrial activities, and domestic uses.¹² At present the total water demand combining agriculture, domestic use, livestock, and various industrial uses (including mining, TPPs and other industries), can be estimated to be 0.73 BCM, as compared to the water availability of 1.4 BCM.¹³

Figure 11: Estimated water demand in Korba (2020)



Note: District total water availability, and water demand for domestic and agricultural use is considered as per the data of District Irrigation Plan, 2015-20, Korba. For water demand by power plants, the maximum demand of 5 m³/MWh has been considered; for coal mining about 1 m³/tonne has been considered, and for other industries water demand has been considered as 40% of power plants, as per Indian average.

The CGWB has also indicated that there is huge water contamination problem due to the absence of proper sewage treatment plants (STPs), as there is only one STP in the entire district. This affects the availability of water for various uses, including for agriculture. The CGWB thus recommended setting up STPs for the treatment of sewage water to avoid contamination of ground water. The treated water can be reused for irrigation and other industrial purposes, and to address the ground water availability problem.¹⁴

Overall, to improve the agricultural potential of the district, a number of measures can be adopted. Some of the key interventions include, improving irrigation coverage of the district through micro-irrigation systems and by using solar water pumps, improving groundwater availability through artificial recharge, supporting small and marginal farmers and improving farm-based income, among others. The interventions have been identified based on government reports, scientific studies and inputs from stakeholders.¹⁵

Besides augmenting agricultural production, boosting income from other allied activities, such as those related to livestock, will also be necessary. The integrated *Narwa, Garuwa, Ghurwa and Badi* (NGGB) scheme promoted by the State Government is an important measure in this regard (See box: *Convergence in agriculture and allied sectors*).

Table 9: Potential interventions in agriculture and allied activities

Advantage	Status of development	Intervention and opportunity
Necessary human resources and skills exist for the sector and people living in the rural areas are keen to enhance livelihood opportunities and income from agriculture.	<ul style="list-style-type: none"> i. Majority of the landholdings are marginal (about 65%) and small (20%). ii. Low levels of income; subsistence agriculture iii. Limited number of Farmer Producer Organisations (FPOs). iv. Absence of well-developed agro-processing industry. 	<ul style="list-style-type: none"> i. Improving farmer's incomes through the development of farmers cooperatives. ii. Supporting small and marginal farmers through FPOs by providing end-to-end support, to reach economies of scale. Aggregation through FPOs can also increase their bargaining power. The Centre and the State Government's support systems for farmer welfare can be harnessed.¹⁶ iii. Strengthening implementation of the Rajiv Gandhi Kisan Nyay Yojana, the State Government scheme that provides input subsidy to farmers.¹⁷ iv. Supporting agriculture dependent families for livestock and horticulture development to supplement incomes.
Potential for a wide variety of crops, including rice, oil seeds, pulses, etc.	<ul style="list-style-type: none"> i. Primarily rainfed agriculture (88% of the agricultural land is rainfed) and yield largely limited to kharif season. Variation in rainfall affects rice production. ii. Poor irrigation coverage. iii. Ground water contamination. 	<ul style="list-style-type: none"> i. Investments in irrigation, particularly in micro and drip irrigation. Boosting irrigation will also help in multiple cropping practices and improving crop yield. ii. Deployment of solar water pumps holds particular potential for improving irrigation. A large proportion of the rainfed agricultural land area can be brought under irrigation through such mechanism. There is strong case for Korba to explore micro solar water pumps of under one horsepower (HP), or community-based solar pumps that can serve multiple farmers, especially those with marginal and small landholdings. iii. Improving water potential through groundwater recharge, integrated watershed development approaches, soil and water conservation measures, arresting runoff, and simultaneously enhancing livelihood options through natural resource management activities. iv. Enhancing implementation of the State Government's convergence scheme - NGGB, targeted towards enhancing agriculture and farm activities and improving livelihoods.¹⁸ v. Setting up adequate wastewater treatment facilities, including decentralised systems and STPs, to improve ground water availability.

Convergence in agriculture and allied sectors

The *Narwa, Garuwa, Ghurwa and Badi* (NGGB) is a flagship initiative of the Government of Chhattisgarh that was started in 2019 to boost agriculture and allied activities, and to enhance the livelihoods of agriculture dependent communities through an integrated approach. As the name suggests, the integrated approach focuses on four key components - water conservation (*narwa* means rivulets and streams), livestock management (*garuwa* means livestock), organic composting and bio-fertiliser promotion (*ghurwa* means compost), and backyard cultivation of fruits and vegetables (*badi*).

NGGB was rolled out by converging schemes and funds administered by various departments. For example, *narwa* which focusses on developing low-cost water conservation structures, such as check dams, gully controls, underground dykes, is implemented through the national watershed mission and MGNREGA.¹⁹ The livestock improvement component is being implemented through the veterinary and forest departments and MGNREGA. The agriculture and horticulture departments are in charge of composting and bio-fertilizer promotion. The horticulture department, along with the land department, is entrusted with developing the backyard kitchen gardens by providing seedlings, fertilisers, and promoting community dug wells.

The NGGB initiative is being implemented under the State Government's *Suraji Gaon Yojna*. A state-level committee headed by the chief secretary of Chhattisgarh, along with secretary and additional secretary level representation from various concerned convergence departments, is in charge of oversight of the initiative.

For local level implementation, a district committee is constituted, which is headed by the district collector. Other members of the committee include departmental heads from forest, public health and engineering, energy, agriculture, water resource departments, and the *zila panchayat*. Besides, there are also block level committees.

In Korba, so far 10 *nullahs*/drains have been constructed under the water component (target is 140), five pastures have been developed, 243 cowsheds have been developed for livestock management (target 317), 1,782 bio-composting centres have been approved and 10,638 kitchen gardens have been developed (target 10,756).²⁰



SHG women preparing organic manure under NGGB scheme/ Ashutosh Nanda, Pradan

Forests

While not a primary source of household income, forest produce does provide some income support to the tribal community in Korba. However, due to low income from forest produce, most households are engaged in miscellaneous labour activities, including in coal mines. As the household survey showed, almost all households who derived some income from forest produce seasonally are otherwise engaged in low paid and insecure labour work.

The status of forest-based livelihoods and income, and the associated interventions and opportunities have been assessed on the basis of official data and interviews, existing research, interaction with forest-dependent communities, and NGOs working on forest-based livelihoods and forest rights in the area.²¹ The interventions for the sector are outlined below.

Table 10: Potential interventions for forest-based livelihoods

Advantage	Status of development	Intervention and opportunity
About 66% of geographical area under forest, and local tribal population already engaged in collection and processing of forest produce. Therefore, human resources having association with and knowledge of the forests already exist.	<ul style="list-style-type: none"> i. Low levels of income due to the seasonal nature of produce. ii. Low rates of procurement by private traders due to lack of awareness of MSP and collective bargaining power (other than for tendu leaves). iii. Only 12 <i>Van Dhan Vikas Kendras</i> in Korba (some of which are yet to start).²² 	<ul style="list-style-type: none"> i. Aggregating forest-dependent communities and building awareness on the MSPs for forest-products for better bargaining power. ii. Providing end-to-end support, low-interest loans to independent FPOs and small cooperatives for storage, processing, packaging and developing forward and backward market linkages of forest produce.²³ iii. Improving coverage of <i>Van Dhan Kendras</i> for involvement of SHGs.²⁴ iv. Settling CFR rights of local communities to improve management of forest resources and income of local communities.²⁵
Availability of high value forest products in the forest such as lac, honey, chiraunji, tamarind, etc.	Only tendu leaves procurement is facilitated by the government in an organised manner. Potential of other high value forest-products remains untapped. Lower collection than the set targets reported. ²⁶	<ul style="list-style-type: none"> i. Enhancing procurement of other MFPs through bonus and sale proceeds (apart from tendu). ii. Incentivising and promoting private investments in small and micro industries for value addition and manufacturing of finished products.
Forest type suited for high value tasar rearing. Being practiced in Pali block and a seed multiplication and training centre is operating.	<ul style="list-style-type: none"> i. Limited to Pali block. Not promoted or practiced in other blocks. ii. Poor community mobilization for tasar rearing, despite potential.²⁷ 	<ul style="list-style-type: none"> i. Promoting tasar rearing plantations through financial and hand-holding support of the local NGOs.²⁸ ii. Setting-up tasar processing and weaving industry.

Fisheries

Development of the fisheries sector in Korba would be important for generating livelihoods. The district has identified 4,932 water bodies across blocks which include small and big ponds, lakes and rivers. The cumulative water body area in the district is 17,538.6 ha.²⁹ Of these, 630 water bodies, with a cumulative area of 386 ha are currently not involved in fisheries activities. The remainder have small ongoing fishing activities.

However, as per the feedback of officials at the state and district fisheries department, fisheries are small-scale in Korba and overall production is low (as discussed in Chapter 2). This is largely because of the fact that the capacities of the fish federations in the district (which are cooperatives), have not been adequately developed.

Additionally, the small producers do not use high quality fish feed, due to which production suffers. Supporting cooperatives, building capacity of fish federations, and creating market linkages need to be prioritised. There is also a huge potential to develop fisheries in water bodies created after closure of the mines.

6.5.2 Supporting low-carbon industrial development

A key component of economic diversification in Korba will be industrial restructuring. A major focus should be to support the development of low-carbon industries, including micro and small-scale industries. For this, necessary infrastructure, policies and financial incentives need to be put in place.

While development of low-carbon industries in Korba shall include a variety of industries based on investment potential, policy support and various other factors, there are three potential sectors that provide immediate opportunity. These include non-timber forest product (NTFP) processing, agro and food processing, and renewable energy. These industries can, in fact, be developed early on to create alternative and dependable economic opportunities in the district over the next decade. It will also help to build community support for a coal transition.

Non-timber forest product processing

NTFP processing will be a key sector to develop in Korba to harness the full economic potential of forest produce and create local livelihoods. The district has high value forest products such as honey, lac, tamarind, chiraunji, gooseberries, etc., as well as many medicinal plants. However, the potential of most of these products is underutilised due to poor collection, processing and marketing.³⁰

The value addition of NTFPs through processing and enterprise development is being increasingly recognised for its potential for creating employment and income opportunities.³¹ The processing and marketing of forest products to support and diversify the local economy is also a key intervention identified by the forest-dwelling communities, PRIs and civil society groups in Korba.

There are government schemes that already incentivise and promote NTFP processing. For example, the one district one product (ODOP) scheme of the Central Government, that aims to promote potential products of a district, generate employment and support entrepreneurship around it, has identified MFPs as a potential product category for Korba.³² The Government of Chhattisgarh in the State Agro and Food Processing Industries Policy (2017 amendment) has also underscored the importance of NTFP processing and development of large-scale enterprises (with a capital investment of more than ₹5 billion) around it.³³ The state Industrial Policy (2019) also emphasises on the need to develop MFP-based industries and identifies this sector as a 'high priority'.³⁴

To develop the NTFP processing industry in Korba, the following interventions will be further necessary³⁵:

- Inventorisation and prioritisation of NTFPs to organise collection and processing, and to optimise economic values.
- Development of value chain by aggregation, primary processing, grading, branding and certification of the products.
- Undertaking conservation measures for NTFPs, including assisted natural regeneration, to prevent resource depletion following the development of industry around it.
- Capacity building of the rural and forest-dwelling communities, procurement agencies, as well as officials of the forest department, on various aspects of NTFP management, processing and marketing.

Agro-processing

The agro-processing industry is considered to be crucial for value addition to agricultural products and improving the income of agricultural communities by better price realisation of such products.³⁶ It is also important for promoting non-farm livelihoods.³⁷

The development of agro-processing industries in Korba will be important to complement the investments in agriculture and allied activities (such as, horticulture, livestock and fisheries), and to improve employment and income potential of the rural community. Promotion of small and medium scale agro-processing enterprises has also been identified as important mechanism to diversify and support the local economy by stakeholder groups during FGDs and interviews. Potential has been highlighted for cash crops, horticultural crops, dairy and poultry in the district.



Produce from kitchen garden under NGGB scheme / Ashutosh Nanda, Pradan

Agro-processing industry is being promoted in Chhattisgarh through Centre and state support. One of the key initiatives is the development of mega food parks. These food parks provide modern infrastructure for food processing (such as primary processing centres and collection centres and other supporting infrastructure) along the value chain, and also strong forward and backward linkages through a cluster-based approach. The GOI provides financial assistance up to ₹500 million per mega food park project.³⁸ Apart from this, development of food processing clusters is also an important government initiative.³⁹

The Government of Chhattisgarh is also providing incentives for agro and food processing industries under the state's Industrial Policy (2019), identifying it as a 'high priority' industry.⁴⁰ So far one food park has been developed in Dhamtari district. Another mega food park has been inaugurated in Raipur (in 2021), which aims to benefit 25,000 farmers in the region. Such measures, along with other necessary investments in agro-processing industry need to be expanded for Korba.

For developing agro-based industries in the district, aggregation and capacity building of farmers will also be necessary. This will also help to promote entrepreneurship. Besides, providing easy access to institutional credit will also be key.⁴¹

Renewable energy

Development of the renewable energy sector will be important for diversification of income and revenue generation opportunities in Korba. A significant potential in this regard is for solar energy generation.

Korba's solar energy generation potential can be estimated to be 890 MW, when calculated using the existing methodology of the National Institute of Solar Energy (NISE), which considers availability of 3% of the wasteland nationally for such projects.⁴² However, this is overly conservative for a district-level estimation. For Korba, even if 10% of the district's wasteland (about 5,930 ha) is utilized for solar, the potential for generation would stand at about 3,000 MW.

In addition to wastelands, ready land area is/will be available in Korba in the form of closed OC mines that can be used for setting up clean energy plants. In OC mining land, the following areas can be considered for solar: the reclaimed external overburden (OB) dump area, which can be utilised 100% for such purpose, and the built-up area (infrastructure and buildings), 50% of which can be utilised for such purpose.

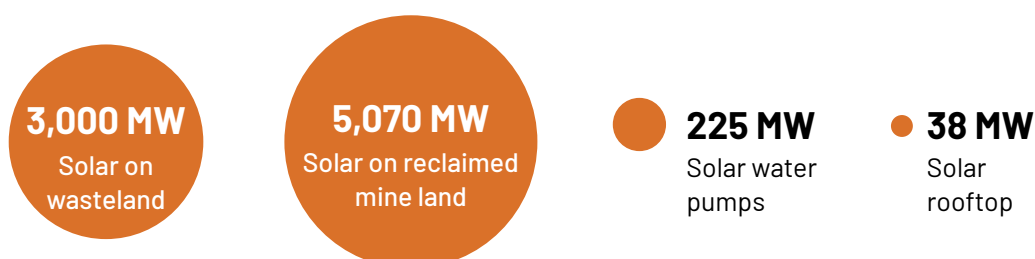
Considering the existing closed coal mine(s), 1,180 ha of abandoned land area is readily available with Chotia mine, which can be utilised to develop solar parks of about 570 MW capacity. Going forward, when the existing OC mines will be gradually closed under a CPS or NZ-2050 Scenario within the next two to three decades, an additional 9,138 ha of land will become available for potentially setting up 4,500 MW of solar capacity. This transition however would require a clear policy vision and schemes to support the transition.

Korba also has a strong potential for decentralised solar installation both in rural and urban areas. Using the NISE estimation methodology and the Census 2011 data on buildings in the district, Korba's rooftop solar potential can be estimated to be about 38 MW. However, detailed studies using high resolution maps of the district, drone surveys, machine learning and artificial intelligence algorithms can reveal the potential to be much higher.

Meanwhile, there is substantial potential in the district for deployment of solar in the agriculture value chain, especially for irrigation. About 20% of the land area in Korba is currently being cultivated, but 88% of this is rainfed. A large proportion of the 125,100 ha of rainfed agricultural land area can be brought under irrigation through solar water pumps. An estimated 225 MW of solar capacity can be set up in the district to bring the entire rainfed area under solar irrigation. Majority of these would be micro solar pumps of less than one horsepower (HP), as 79,656 land holdings in the district out of the total 123,592 are marginal holdings of less than one ha of land area.

As per the Ministry of New and Renewable Energy (2021), Chhattisgarh is a leader in solar pump deployment, with 61,970 pumps installed in the state (as of December 2020),⁴³ which is 23% of the total pumps deployed in the country. Korba can build on this opportunity, and utilise micro solar water pumps or community-based solar pumps that can help to boost the income of small and marginal farmers.

Figure 12: Renewable energy potential in Korba



Government policies for industrial diversification

The Government of Chhattisgarh has three relevant policies in place that can enable industrial restructuring and diversification in Korba during the process of just transition. The key one in this regard is the state Industrial Policy (2019-24). Besides, the Special Economic Zone (SEZ) policy and the state Solar Policy (2017-2027) can also be leveraged to support industrial diversification, including RE based industry.

1. Industrial Policy

A starting point of industrial diversification in Korba can be the current industrial policy of the government. A closer review of the policy suggests that its objective already includes certain important factors essential for a just transition in Korba.⁴⁴

Components of Industrial Policy aligned to just transition



To provide targeted support for industrial development, the policy also highlights 'high priority' and 'priority' categories, in which the State Government wants to boost investments through public and private resources. Some of the high priority and priority categories that have relevance for Korba's just transition planning are outlined below.

High priority and priority categories for investments and development

High Priority	Priority
Herbal, medicinal plants and minor forest produce-based industries	Downstream products based on non-ferrous metals and aluminium
Processing industries around flowers, fruits, vegetables and other horticultural produce	Industries based on food processing and agriculture
Automobile, auto components	Branded dairy products
Electric two-wheeler, three-wheeler and four-wheeler vehicles and manufacturing of batteries for them	Manufacturing of machinery and equipment required for generation, transmission and distribution of electricity
Manufacturing of charging station equipment for electric vehicles	Production of organic manure and organic pesticide

Source: Industrial Policy, 2019-2024, Government of Chhattisgarh

A number of fiscal incentives, including subsidies and reimbursements, have been further introduced in the industrial policy to promote investments and entrepreneurship in high priority and priority sectors. These incentives have been specified depending on developmental status of various blocks in the districts.

For Korba, a block-wise evaluation shows that two blocks fall under 'developed' (Korba and Pali) and three blocks under 'developing' (Katghora, Pundi Uproda, Kartala) categories. The fiscal incentives for the developing blocks are little higher than the developed blocks, as outlined below. However, considering that the developed blocks will need industrial restructuring due to the closure of coal mines and power plants, the industrial policy will need to be revised to enable just transition in these blocks. This could mean higher incentives or at least similar incentives for the developed blocks compared to the developing blocks.

The subsidies are particularly targeted to boost the micro and small-scale industries in the district, such as those based on forest and agricultural products.

Subsidies and reimbursements for industrial development

Scale of industry	Block	Subsidies and fiscal reimbursements	
		High priority industry	Priority industry
Fixed capital subsidy			
Micro	Korba, Pali	35% subsidy with an upper limit of ₹1.5 million (US\$ 20,000)	30% subsidy with an upper limit of ₹1.4 million (US\$ 19,000)
	Katghora, Poundi Uroda, Kartala	40% subsidy with an upper limit of ₹1.8 million (US\$ 24,000)	35% subsidy with an upper limit of ₹1.6 million (US\$ 21,000)
Interest subsidy			
Micro and small	Korba, Pali	50% subsidy with an upper limit of ₹2 million (US\$ 26,667)	50% subsidy with an upper limit of ₹1.5 million (US\$ 20,000)
	Katghora, Poundi Uroda, Kartala	50% subsidy with an upper limit of ₹2.5 million (US\$ 33,000)	50% subsidy with an upper limit of ₹2 million (US\$ 26,667)
Medium and large	Korba, Pali	35% subsidy with an upper limit of ₹3.5 million (US\$ 47,000)	35% subsidy with an upper limit of ₹3 million (US\$ 40,000)
	Katghora, Poundi Uroda, Kartala	40% subsidy with an upper limit of ₹4.5 million (US\$ 60,000)	40% subsidy with an upper limit of ₹4 million (US\$ 53,000)
Reimbursement of net SGST			
Small, medium and large	Korba, Pali	For 9 years from commencement, with maximum limit of 45% of fixed capital investment	For 7 years from commencement, with maximum limit of 40% of fixed capital investment
	Katghora, Poundi Uroda, Kartala	For 10 years from commencement, with maximum limit of 50% of fixed capital investment	For 8 years from commencement, with maximum limit of 45% of fixed capital investment

The state has also promulgated a number of non-fiscal incentives under the Industrial Policy for ease of doing business.⁴⁵ Some of the key ones (particularly in terms of land diversion and obtaining permits) include:

- Decentralisation of power to divert land to districts (absolute authority given to the sub-divisional/revenue officer);
- Single window clearance system at the district and state levels under the Chhattisgarh Industrial Investment Promotion Act (2002) for fast tracking permits;
- Promotion of industries (small scale) in rural areas by specifying non-requirement of 'No Objection Certificate' for 'industries set up 2 km away from the rural population'; and,
- Increase of renewal period for 'Consent to Operate' issued to industries by the Chhattisgarh Environment Conservation Board - five years for 'red', 10 years for 'orange' and 15 years for 'green' category of industries.

2. Special Economic Zone Policy

Chhattisgarh's Special Economic Zone (SEZ) Policy can also be leveraged to scale up investments in low-carbon and renewable energy (RE) industries. Out of the two SEZs that are being developed in the state, one is for solar equipment manufacturing and the other is for informational technology (IT). The solar SEZ (in Rajnandgaon) is developed by Lanco Solar Private Limited in about 101 ha of land.⁴⁶

For Korba, such investments for RE equipment manufacturing hold significant potential. As the coal mining and TPP sectors are already diversifying investments in RE⁴⁷ (such as CIL, NTPC, etc.), such investments can be planned for Korba in the coming years.

3. Solar Energy Policy

The Chhattisgarh Government in 2017 brought out the state's new Solar Energy Policy, to promote solar power generation in the state and support the growing energy demand.

The business-friendly provisions of the state's Solar Energy Policy⁴⁸ and the Industrial Policy can be collectively leveraged for supporting investments in solar energy. The Chhattisgarh Renewable Energy Development Agency (CREDA) is already facilitating processes such as, tendering, getting all state-level approvals for projects, land identification and distribution of government land, assisting in getting infrastructure support, such as water supply and road connectivity, human resource development through training programmes and educational institutions, etc.⁴⁹

6.5.3 Improving income opportunities in the service sector

The service sector has remained the least developed in Korba, as is evident from the district GDP as well as on-ground survey. However, it is essential to develop service sector opportunities in the district to create balanced economic opportunities and have a future-ready workforce.

Opportunities in the service sector can be improved by three important measures:

- Investing in education and skill development;
- Strengthening the healthcare sector; and,
- Developing the tourism industry.

Planning a new economy in Korba will need to take into consideration the skill sets that will be required for future jobs. Due to technological innovations and automation, opportunities in various economic sectors are rapidly changing. It has been projected (2020), that in the next 10 years, 50% of the jobs worldwide will be changed by automation. This will change both development of products, as well as services.⁵⁰ Korba, therefore, will need to create opportunities for service sector jobs, as well as invest in education and skill development that will be suitable for future jobs.

The second important opportunity lies with the healthcare sector. The Public Health Foundation of India (PHFI) has suggested that the health sector can be a massive job creator, particularly at the level of frontline health workers.⁵¹ For Korba, considering the deficit in primary healthcare and also people's limited access to it, strengthening the healthcare sector will not only create jobs, it will also provide the co-benefit of improving healthcare services and health outcomes in the district.

The district should also boost the tourism and hospitality sector for job creation and revenue generation. Korba has potential for both nature-based and historical tourism. It is home to waterfalls and dam sites which are located amid forested areas. Kendai and Devpahari waterfalls are popular locations among the locals, and through proper marketing strategies and investments, these regions can be promoted for attracting tourists from other states as well.⁵² The district has also developed an eco-tourism hub at Satrenga, a tribal and forested village in the Korba block, for both conservation and employment generation purposes. The project has created better employment opportunities among the locals, who were working earlier as agricultural or MGNREGS labourers.⁵³

Additionally, Korba has old temples and ruins from various dynasties, dating back to 11 A.D. Most of these locations are potential areas for development of historical tourism. Some of the places already have basic tourist infrastructure. For example, there is a SECL tourist guest house at Chaiturgarh, which is home to architectural ruins of the 12th century rulers of Central India, the Kalachuris of Ratnapura.⁵⁴ These sites can be further developed through investments in maintenance of the archaeological ruins and expansion of infrastructure.



Kendai waterfall, Korba/Amritash, flickr.com

6.6 Repurposing of land and infrastructure

A key determinant for industrial development in coal regions, including Korba, will be availability of land. Land acquisition in these regions can be difficult given the history of land and community alienation and displacement in many of these areas.

For Korba, the transfer of land becomes a more complex issue as it is a Schedule V district. The Constitution of India safeguards people against land transfers in such areas considering the fact that they remain vulnerable to exploitation. Article 244 of the Indian Constitution and the Fifth Schedule (paragraph 5) requires the Governor of the state to enact regulations for the advancement of peace and good governance, including to “prohibit or restrict the transfer of land by or among members of the Scheduled Tribes in such area.”⁵⁵ In addition, the Madhya Pradesh Land Revenue Code, 1959 (Sections 165 and 170), and the Madhya Pradesh Land Distribution Regulation Act, 1964, are two state-specific laws that remain in force in Chhattisgarh’s Scheduled Areas that prevent land alienation.⁵⁶

Therefore, a key opportunity lies in redevelopment and repurposing of mining and industrial lands in Korba. An assessment of land currently under coal mining (including closed mines) and coal-based TPPs in Korba shows that there is over 24,364 ha of land available with these industries. About 90% of this land is related to coal mining (21,779 ha). This still excludes the four upcoming mines which will include an additional 3,300 ha of land area.

Scientific closure and repurposing of this land, particularly for land available with the OC mines, collectively hold huge potential for various economic activities. The potential can be estimated by analysing the post-closure mine land use of four OC mines in Korba.⁵⁷ A review of these mines - Gevra, Dipka, Kusmunda and Manikpur—shows nearly 8,859 ha of land is available for various economic activities and investments. These include potential for fisheries and tourism, horticulture and value-added agriculture, industrial development and renewable energy, among others.

The advantage of repurposing mining and industrial lands in Korba also lies in the fact that these are located close to the municipality areas in Korba and Katghora blocks. These areas have good connectivity and infrastructure, as compared to other parts of the district. These factors are of significant importance for improving investment potential and attracting businesses in any region.⁵⁸

Table 11: Redevelopment and repurposing potential of OC coal mine areas

Post-mine closure land use	Gevra	Dipka	Kusmunda	Manikpur	Total area (ha)	Potential repurposing activities
Void / Water body (ha)	659.3	222.1	348.9	321.4	1,551.5	Fisheries; Tourism
Reclaimed internal overburden (OB) dump area (ha)	1,378	780	611.9	189.6	2,959.5	Industrial development; Value added agriculture and agro-processing industry
Reclaimed external OB dump area (ha)	480	206	198.1	187.7	1,071.8	Solar PV; Plantation
Green belt (ha)	5.7	23	13	5	46.7	
Built up area (Infrastructure and buildings)(ha)	1,227.4	633.9	393.6	88.5	2,343.4	Reuse of infrastructure; Solar PV
Road diversion (ha)	6	4	7.5	1.1	18.6	
Safety zone (ha)	418.1	130.5	82.8	225.7	867.2	Horticulture; Tourism
Total area (ha)	4,184.5	1,999.4	1,655.8	1,018.9	8,858.7	

Source: Environmental clearance letters of Gevra (2021), Manikpur (2018) and Dipka (2018) mines; Environmental clearance compliance report of Kusmunda (2018)

6.7 Social and environmental investments

One of the key aspects of just transition is building community resilience by augmenting social and physical infrastructure and improving environmental conditions, as these have a direct bearing on people's lives and livelihoods. It is important to consider just transition not just as a component of climate change action, but to deliver co-benefits related to developmental goals.

6.7.1 Social infrastructure

With respect to social infrastructure, interventions are particularly required (but not limited to) in the following areas:

- Improving educational access and outcomes, with specific focus on women;
- Improving healthcare support and access;
- Improving access to basic amenities, such as clean water supply, cooking fuel, electricity, etc.

The interventions with respect to these are outlined below.



Solar handpump at a tribal village in Korba block/ Chinmayi Shalya, iFOREST

Table 12: Interventions in social infrastructure

Sector	Key gaps	Target and interventions
Education	<ul style="list-style-type: none"> i. Poor enrolment in secondary, and particularly higher secondary level (GER 58% at higher secondary level as compared to 94% at elementary level). ii. Low number of higher secondary schools. iii. Very poor levels of education beyond high school levels, with limited vocational or technical skills (the household survey barely captured people with technical skills). 	<ul style="list-style-type: none"> i. Ensure access to quality education to meet SGD #4 targets. ii. Increase secondary school infrastructure (including scope of higher secondary education) as per Rashtriya Madhyamik Shiksha Abhiyan standards; Develop higher secondary schools at block levels. iii. Improve educational access at all levels of school, as per the Samagra Shiksha Abhiyan.⁵⁹ iv. Extend mid-day meal coverage to secondary schools for better retention of students. v. Scholarship coverage for meritorious students to study in public and private higher education institutions. vi. Improve opportunities for vocational training and technical education to develop a skilled workforce.
Healthcare and child development	<ul style="list-style-type: none"> i. Shortage of primary healthcare services, particularly in rural areas where people are highly dependent on it. ii. Shortage of healthcare staff, particularly specialist doctors and technicians. iii. While Government data shows insurance coverage for nearly 90% of households in Korba, the primary survey reveals that a much smaller number of people are actually availing it due to lack of information on their coverages and also access to these facilities. 	<ul style="list-style-type: none"> i. Ensure universal health coverage to meet SDG #3 targets to improve healthcare access and outcomes. ii. Augment facilities and resources at least as per IPHS norms. iii. Fill staff deficits to meet sanctioned posts for health service delivery. In some cases, doctors can be hired on contractual basis to fill the gaps. iv. Ensure universal health insurance coverage of people for secondary and tertiary care. Improve access to healthcare facilities for people to avail insurance benefits.
	High proportion of stunted and underweight children below five years age.	Improve intervention through government programmes on women and child development to meet SDG #2 targets of improved nutrition and food security.
Clean drinking water	Only 6.6% rural households have tap water connection; Coverage 32%-55% in urban areas (barring Korba municipality).	<ul style="list-style-type: none"> i. Ensure safe drinking water access to meet SGD #6 targets. Key target, by 2030, is to achieve universal and equitable access to safe and affordable drinking water for all. ii. Improve treated water supply in the district as in many locations surface and ground water are not potable. Also install STPs to prevent water pollution and improve safe water availability.
Clean cooking fuel	Only 35% households use clean cooking fuel.	<ul style="list-style-type: none"> i. Ensure clean cooking fuel access for households to improve health and well-being of women and children and meet targets of SDG #3 and SDG#5. ii. Ensure clean fuel access and supply through subsidising refills of LPGs, introducing electric cooking and focusing on behaviour change.
Energy access	Gap in electricity supply to public facilities such as healthcare centres in rural areas.	<ul style="list-style-type: none"> i. Ensure access to affordable, reliable and modern energy services to meet SDG #7 targets. ii. Scale-up distributed renewable energy to improve energy access, particularly in the rural areas. This can have co-benefits of energy access, as well as job creation.

6.7.2 Environmental remediation and pollution mitigation

Responsible environmental practices will be a key consideration of just transition planning considering the pollution burden of the district, as well as the potential for land degradation and pollution that can result from unplanned and unscientific closure of mines and disposal of assets. Ensuring such practices will also help to ensure environmental justice, and not just economic justice, in the process of just transition, as the poor already bear disproportionate burdens of environmental pollution.

For responsible environmental practices during just transition the following must be ensured:

- Scientific closure of coal mines (progressive and final), through proper planning and oversight, including ecological restoration of mining areas and development of land for productive economic use.⁶⁰
- Reclamation and redevelopment of industrial lands following appropriate remediation practices.⁶¹
- Disposal of industrial structures and assets during the decommissioning of TPPs and other industrial structures through appropriate practices of waste management and safe practices of waste disposal, material recycling, ash management (including closure of fly ash ponds), among others.⁶²

6.8 Revenue substitution

The main source of revenue from coal for the states includes royalty and District Mineral Foundation (DMF) funds. Currently, the earnings of the State Government from coal royalty in Korba and DMF contributions is about ₹20 billion (US\$ 250 million) per year. The other major revenue is the coal cess (currently the GST compensation cess) that goes to the Centre. At the peak coal production of 180 MMT, which will happen during 2025-2030, the state will get about ₹35 billion from royalty and DMF, and the coal cess will be about ₹72 billion. Overall, about ₹107 billion in public revenue (US\$ 1.5 billion) will be contribute by coal mines in Korba.

As coal mining activities phase-down in the district over the next three decades, the state and the district will lose the royalty and DMF earnings. However, there will be an increase in revenue till 2030 and then it will start reducing. The revenue loss can be substituted through economic diversification and industrial restructuring measures, that will help in revenue generation from other economic sectors and industrial activities in the district.

Overall, revenue substitution must be planned early on, and carefully by the governments, including the state and the Centre.⁶³ A progressive plan for revenue substitution needs to be developed considering the just transition timeframe. Such planning is also necessary because the states will have to play a role in supporting the just transition, and a declining revenue base can mean less funding for public services or increasing the tax burden on citizens.

A key aspect of revenue substitution will be enhancement of support from the Central Government. Besides, a proactive role by the private sector in economic diversification can lead to substitution of revenue lost by the government through newly emerging industries.⁶⁴

Table 13: Revenue from coal at peak coal production in Korba

	Revenue at peak coal production (₹ Billion)
DMF	8.5
Royalty	26.4
Coal Cess	72.0
Total	106.9

6.9 Financial resources for transition

Securing the necessary financial resources is one of the most crucial considerations for a just transition. Considering the required scale of funding, both public and private funds as well as international financing support will be crucial.⁶⁵

In the context of just transition planning for Korba, five types of resources can be considered as immediate ones to start investing in just transition. These include:

- The District Mineral Foundation (DMF) funds;
- The Corporate Social Responsibility (CSR) funds;
- The coal cess (currently the GST compensation cess);
- Pooling in resources through convergence of government schemes; and,
- Leveraging private sector investments.

In fact, Korba already has a significant amount of financial resources to start planning and investing in a just transition. The welfare funds, such as DMF and CSR provide such immediate opportunity. Going ahead, the coal cess can be the most critical green fund for a just transition in the district. Overall, it can be estimated that under CPS, about ₹1.5 trillion (US\$ 20.2 billion) can be collectively available from these three sources as direct finance for undertaking just transition measures in Korba. Even under a NZ-2050, ₹1.3 trillion (US\$ 17.5 billion) will be available.

Table 14: Estimated direct finance for just transition in Korba

Sources of financing	2021-2030		2031-2040		2041-2050		Total	
	CPS	NZ-2050 Scenario	CPS	NZ-2050 Scenario	CPS	NZ-2050 Scenario	CPS	NZ-2050 Scenario
DMF* (₹ billion)	81.8	81.8	61.2	61.2	17.4	0	160.4	143
Coal cess** (₹ billion)	691	691	516.6	516.6	147.2	0	1,354.9	1,207.6
CSR*** (₹ billion)	2	2	2	2	2	2	6	6
Total direct finance for just transition (₹ billion)	774.8	774.8	579.8	579.8	166.6	2	1,521.3	1,356.6

*DMF estimated at ₹47.4 per tonne of coal; **Coal cess at ₹400 per tonne of dispatch (considered equal to production for projections); ***CSR considered at the current rate SECL is paying assuming that the company will not incur overall loss from phased mine closure and will simultaneously diversify business

6.9.1 District Mineral Foundation funds

The DMF funds hold huge potential for planning some of the necessary investments to support a just transition. Established as a non-profit trust (2015) in all mining districts, including coal districts, the objective of DMF is to work for the interest and benefit of mining-affected communities and areas. DMF today is a major source of revenue at the district level for supporting development interventions.

Korba receives the highest amount of money under DMF in the country with a cumulative accrual of about ₹24.8 billion (US\$ 327 million) as of August, 2021. The district receives about ₹5-5.5 billion (about US\$ 66-73 million) annually in DMFs by contribution of coal companies operating in the district.

The DMF law stipulates that at least 60% of this fund must be utilised towards certain 'high priority' developmental and environmental issues that ails communities in most mining areas. These include drinking water supply, livelihood generation and skill development, healthcare, education, sanitation, welfare of women and children, and environmental preservation and pollution control.⁶⁶

So far, Korba has allocated about ₹12.3 billion (US\$ 164 million) towards various projects across sectors, of which ₹6.8 billion (US\$ 90 million) is already spent. The highest allocation in the district is for various physical infrastructure work (largely roads, etc.) for which over ₹4.3 billion (US\$ 57 million) have been sanctioned. The



Educational hub built with DMF funds in Korba leased out to CIPET/ Chinmayi Shalya, iFOREST

two other major sectoral investments include drinking water supply and education, for which ₹1 billion (US\$ 13.3 million) and ₹3 billion (US\$ 40 million) have been allocated respectively. Livelihood has seen negligible investment through DMF funds in the district until now.⁶⁷

However, the funds hold enormous potential for enhancing livelihood opportunities in the agriculture, forestry and fishery sectors, which are extremely important for economic diversification in Korba and for improving their contribution to the district GDP. The funds are also essential to build community resilience in the district by investments in healthcare, education, and skill development. In fact, DMF planning and investments, if aligned with just transition planning, can optimize the utilization of this fund, and be a win-win for the community as well as the environment.

Table 15: Sectoral allocations under DMF (as of 2021)

Sectors	Share of allocation (%)
Education	24.31
Drinking water supply	8.17
Environmental protection and pollution control	3.85
Healthcare	2.89
Agriculture and allied activities	1.12
Women and child welfare	2.87
Old and disabled welfare	0.82
Skill development and livelihood	2.69
Sanitation	4.61
Irrigation	6.18
Energy and watershed development	3.46
Physical infrastructure	34.87
Other infrastructure works	0.002
Public welfare works	4.16
Gram Sabha training for planning and monitoring	0.013

Source: DMF portal, Government of Chhattisgarh, 2021

6.9.2 Corporate Social Responsibility funds

The CSR funds are another source of welfare investments in the district which was introduced through the Companies Act in 2013.⁶⁸ The law requires that every company having net worth of ₹5 billion (US\$ 66 million) or more, or turnover of ₹10 billion (US\$ 132 million) or more, or a net profit of ₹50 million (US\$ 0.7 million) or more during any financial year shall contribute towards CSR. The company is required to spend in every financial year at least 2% of its average net profits made during the three immediately preceding financial years, in pursuance of its CSR policy. The funds are required to be spent on social welfare activities and local development of areas where the companies are operating. The sectors of CSR spending include poverty eradication, education, healthcare, women and child development, skill training, etc.⁶⁹

Since 2013-14, projects of nearly ₹1.57 billion (US\$ 21 million) have been undertaken in Korba through CSR investments by various companies. The biggest investments have come from SECL worth ₹1.39 billion (US\$ 18.5 million). This is followed by NTPC worth ₹107 million (US\$ 1.4 million).⁷⁰ As per records, the maximum amount of investments has happened in education, livelihood and on the differently-abled, with a combined investment of ₹1.43 billion (US\$ 19 million).

Going ahead, the CSR funds can be spent to build community resilience in Korba in addition to the DMF funds and other government schemes, to optimise on development intervention.

Table 16: Sectoral investments through CSR (until 2021)

Sectors	Share of allocation (%)
Education, livelihood, differently-abled	91.35
Sports	0.05
Environment, animal welfare, resource conservation	0.36
Gender, women empowerment, old age homes, reducing inequalities	0.003
Health, hunger and malnutrition, poverty, drinking water, sanitation	6.37
Rural development	1.17
Heritage art and culture	0.70

Source: Ministry of Corporate Affairs, Government of India, 2021

6.9.3 Coal cess

A major potential revenue for supporting just transition in the coming years is the coal cess (currently known as the GST compensation cess). The cess levied at ₹400 per tonne of coal dispatch (US\$ 5 per tonne) is the largest direct source of finance to support just transition measures in coal districts. Post 2022, if the GST compensation cess is not continued further, the coal cess will be the immediate green fund for a just transition in India, aligning with its original purpose of promoting clean energy and environment.⁷¹

Overall, it can be concluded that, despite the total coal production foregone over the next three decades under the CPS (46 MMT) and the NZ-2050 scenarios (414 MMT), Korba will have a very significant amount of direct finance for just transition in the district. It will be important for the government to institute necessary policy measures and reforms, so that crucial funds, such as the coal cess and DMF can be optimally utilised for implementing just transition measures.

6.9.4 Convergence of schemes

Convergence of schemes to build on financial resource availability and maximise the potential of each other has been widely recognised now by the Centre and State governments. From livelihood development and poverty alleviation, to addressing issues of deprivation, schemes are being converged to improve intervention.⁷²

A review of government schemes in Chhattisgarh shows that there are various big and small schemes to support interventions in human development and socio-economic development in the state.

With respect to the necessary interventions for a just transition, some of the flagship schemes of the state that can be considered include the *Narwa, Garuwa, Ghurwa, Badi* (NGGB) scheme launched in 2019 (for supporting livelihoods and enhancing income as discussed earlier), the *Rajiv Gandhi Kisan Nyay Yojana* (for input subsidy to farmers)⁷³, the *Pauni Pasari Yojana* recently launched in December 2021 (targeted for supporting traditional businesses and for creating employment opportunities)⁷⁴, and the *Van Mitra Yojana* launched in 2020 (to create self-employment opportunities for forest dwellers)⁷⁵. The convergence of these programmes with the livelihood schemes of the Centre (such as the NRLM, NULM and MGNREGS), the aspirational districts programme, minimum support price for minor forest produce (MSP for MFP) scheme, and the DMF and *Pradhan Mantri Khanij Kshetra Kalyan Yojana*, can optimise intervention on issues, such as for livelihood support and income generation, healthcare, education, skill development, etc., that are necessary components of a just transition.

Figure 13: Potential schemes for convergence



6.9.5 Leveraging private sector investments

While there is much scope for supporting a just transition through public financing, the support of the private sector will be crucial. In fact, public finances can be used to attract private sector investments by making necessary investments in infrastructure and resources.

Besides, the domestic Development Finance Institutions (DFIs) can be critical for raising private investment "through their financing, risk sharing and supporting activities". These include the national development banks, such as the Small Industries Development Bank of India (SIDBI) and Industrial Development Bank of India (IDBI), the National Bank for Agriculture and Rural Development (NABARD), the State Finance Corporations and the State Industrial Development Corporations, among others.⁷⁶

Overall, it can be concluded that just transition planning will need to be a long-term, deliberative and an integrated process. Considering the nature of planning that will be necessary, and the financial resources that must be mobilised, it will also be important to have a dedicated institutional mechanism to facilitate it. While just transition plans will be implemented at the district level, the capacity of authorities at this level is clearly not adequate. Therefore, for coordination, planning and monitoring, there is the necessity to consider a dedicated commission or a special purpose vehicle for facilitating a just transition, as global experiences also suggest.⁷⁷

6.10 Role of CIL and NTPC in just transition

The SECL, a subsidiary of CIL, and NTPC are the two biggest companies in the district involved in coal mining and coal-based power production respectively. A transition of the business portfolios of these companies will have an important role to support just transition in Korba. A key opportunity lies with diversification of these companies in the RE sector. Investments in RE businesses by the companies in Korba will be helpful for creating local employment during the process of transition and absorbing a significant proportion of the coal mining workforce through retraining and reskilling. In fact, both CIL and NTPC have started diversifying into green industries.

In April 2021, CIL established two wholly-owned subsidiaries, Solar PV Limited and CIL Navikarniya Urja Limited for manufacturing of solar value chain products (ingot-wafer-cell module) and for undertaking RE projects.⁷⁸

The Ministry of Coal has also insisted upon the coal company to take up decarbonisation and diversification initiatives. Following the 'mandate', in September 2021, CIL announced a plan to establish a 4 GW solar PV ingot-wafer-cell-module manufacturing plant.⁷⁹

NTPC has also established a wholly-owned RE subsidiary in October 2020 called NTPC Renewable Energy Limited. The subsidiary had been developed to diversify the company's business portfolio and to 'build, own and operate' RE projects.⁸⁰ The company further plans to have 60GW capacity through RE sources constituting nearly 45% of its overall power generation capacity by 2032. So far, RE projects of 1,365.4 MW capacity have been commissioned and projects of 2,029.6 MW capacity are under implementation, as the company's own addition.⁸¹

Both these companies also have huge opportunity to invest in Korba. The companies have land and assets that can be repurposed for RE investments. For example, for CIL, rehabilitation of mines and repurposing of the reclaimed mine area and existing infrastructure provide crucial infrastructure for the company to invest in green industries. Similarly, for NTPC, repurposing of the existing asset and land in Korba can help to diversify the company's green investment portfolio. Such investments will also help to reduce disruptions and allow an orderly transition in the district.

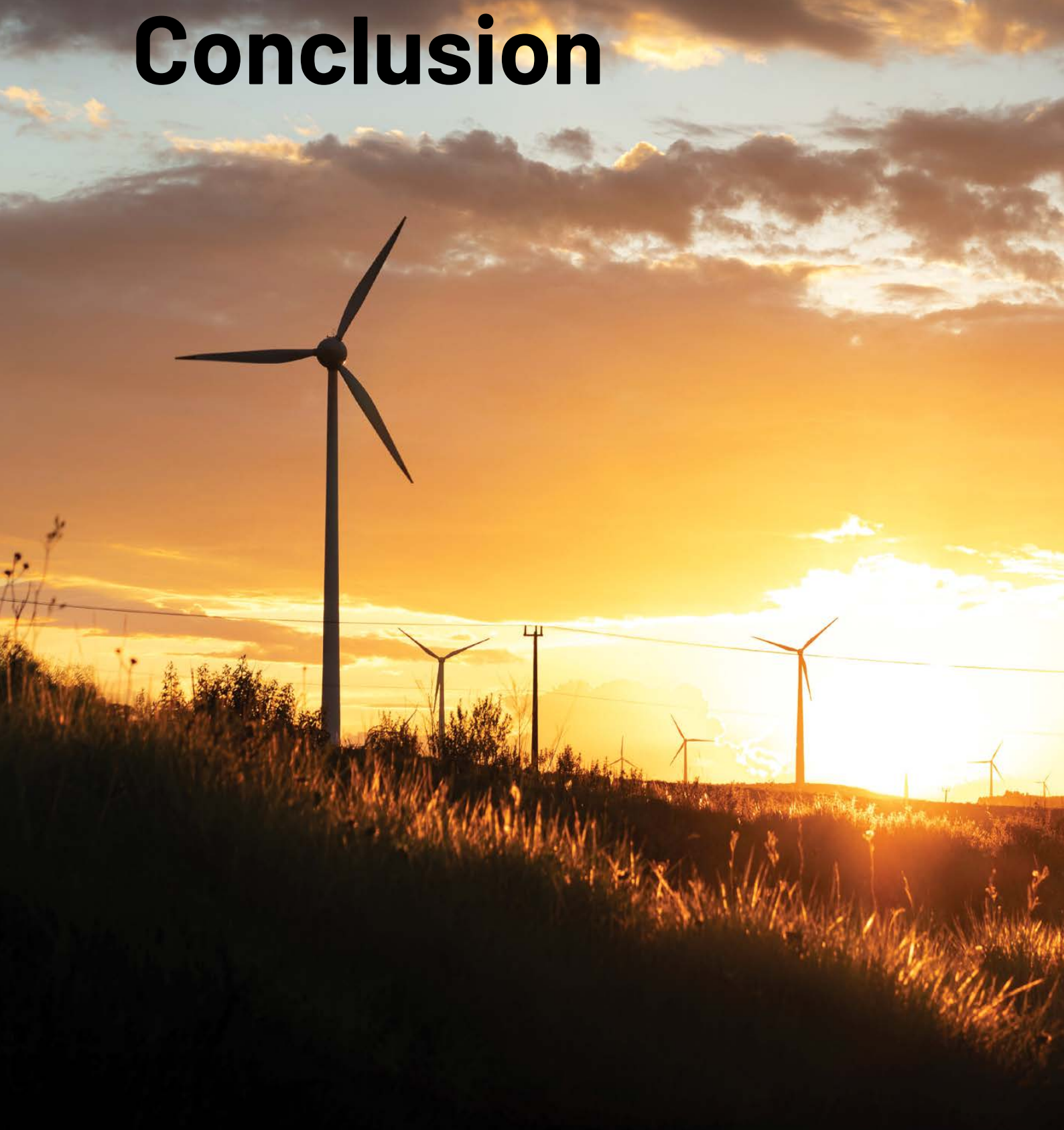
Perspective plan for just transition in Korba

Components	Phase I- 2022-2030	Phase II- 2030-2040	Phase III- 2040-2050
Phase-down schedule	Under CPS i. Eight UG mines of 4 MMT production capacity can be closed. These mines are unprofitable. ii. 10 power units of 2,940 MW capacity can be closed.	Under CPS i. Four OC mines of 105 MMT capacity (125 MMT with planned expansion) can be closed. ii. 16 power units of 3,488 MW capacity can be closed.	Under CPS Five OC mines of about 50 MMT capacity (55 MMT with planned expansion) can be closed.
	Under NZ-2050 Scenario i. Eight UG mines of about 4 MMT production capacity can be closed. ii. 10 power units of 2,940 MW capacity can be closed.	Under NZ-2050 Scenario i. Nine OC mines of about 155 MMT (180 MMT with planned expansion) capacity can be closed. ii. 16 power units of 3,488 MW capacity can be closed.	
Total formal manpower to be retired, retrained, reemployed	Under CPS i. Retired- 75-80% for SECL; 73% for NTPC, 54% for CSPGCL. ii. Reskilled and reemployed- 20-25% for SECL; 27% for NTPC, 46% for CSPGCL.		
	Under NZ-2050 Scenario i. Retired- 75-80% for SECL; 73% for NTPC, 54% for CSPGCL. ii. Reskilled and reemployed- 20-25% for SECL; 27% for NTPC, 46% for CSPGCL.		
Social dialogue and just transition planning	i. Organisation established for just transition, considering institutional roles, and the influence and interest of actors in the transition process. ii. Block-level offices opened to provide support to the workers and engage local communities in just transition. iii. Social dialogue conducted for formulation of transition strategy, and developing consensus among various stakeholders. iv. A stakeholder dialogue report prepared (through engagement of independent agencies and experts) and shared in public domain. iv. Just transition plans developed following a participatory planning process.	i. Continuation of social dialogue in the blocks, villages and in vicinity of urban areas where mines, TPPs and other coal-dependent industries are to be closed. ii. Preparation of stakeholder dialogue report, including experiences of Phase I and considering measures for Phase II. iii. Review of implementation of transition plan and measures as undertaken in Phase I, and make revisions as necessary.	i. Continuation of social dialogue in the blocks, villages and in vicinity of urban areas where mines, TPPs and other coal-dependent industries are to be closed. ii. Preparation of stakeholder dialogue report, including experiences of Phase I and II, and considering measures for Phase III. iii. Review of implementation of transition plan and measures as undertaken in Phase I and II, and make revisions as necessary.
Reskilling, skilling, and transition support plan	i. Worker transition plan developed for formal and informal workers of the mines considered for closure in Phase I. ii. Worker transition plan developed for formal and informal workers of the TPP units considered for closure in Phase I.	i. Worker transition plan developed for formal and informal workers of the mines considered for closure in Phase II. ii. Worker transition plan developed for formal and informal workers of the TPP units considered for closure in Phase II.	i. Worker transition plan developed for formal and informal workers of the mines considered for closure in Phase III.

Components	Phase I- 2022-2030	Phase II- 2030-2040	Phase III- 2040-2050
Social and physical infrastructure development plan	<ul style="list-style-type: none"> i. Plans (including convergence mechanisms) developed for augmenting investments in education, vocational training, and skill development programmes through demand analysis. ii. Investments in public amenities and services, such as for drinking water, clean cooking fuel, healthcare infrastructure and resources, etc., through need assessment. iii. Periodic monitoring and evaluation of investments to ensure improvement in target outputs and outcomes. 	<ul style="list-style-type: none"> i. Review of the implementation of plans and corresponding works undertaken, including assessment of impacts and progress towards target outputs. ii. Revisions in plans as per progress and evaluation of needs/demands. 	<ul style="list-style-type: none"> i. Review of the implementation of plans and corresponding works undertaken, including assessment of impacts and progress towards target outputs. ii. Revisions in plans as per progress and evaluation of needs/demands.
Repurposing plans for land, infrastructure and assets	<ul style="list-style-type: none"> i. Mine closure and rehabilitation plans revised to maximise land value. ii. Land repurposing plans developed, particularly for the OC mines based on revised mine closure plans, prioritising, Gevra, Kusmunda, Manikpur, and Ambika which will close down in Phase II under both CPS and NZ-2050 Scenarios. iii. Repurposing plan(s) developed for TPPs/units operated by NTPC and SECL considered for closure in Phase I. These include, Korba West TPS and Korba STPS. iv. Environmental remediation plans developed for select land and assets, as necessary, based on the principle of polluter pays. v. Re-permitting guidelines and mechanisms developed to allow new industries and businesses. 	<ul style="list-style-type: none"> i. Land repurposing plans developed and finalised for all mines, including Dipka, Saraipalli, Gidhimuri and Paturia, Madanpur South and Kartali. ii. Monitoring and implementation of coal mine closure plans (progressive and final closure) and repurposing plans. iii. Repurposing plan(s) developed for all TPPs/units considered for closure in Phase II. These include, the remaining units of the Korba West TPS, Korba STPS, DSPM TPS and all the privately operated units. iv. Environmental remediation plans developed for select land and assets, as necessary, based on the principle of polluter pays. v. Information platform developed on post-closure land, infrastructure and assets, including comprehensive set of data on other infrastructure and amenities in the region, to support investment decisions. 	<ul style="list-style-type: none"> i. Maintain information platform on post-closure land, infrastructure and assets, including comprehensive set of data on other infrastructure and amenities in the region. ii. Continue monitoring and implementation of coal mine closure plans (progressive and final closure) and repurposing plans. iii. Environmental remediation plans developed for select land and assets, as necessary, based on the principle of polluter pays.
Progressive revenue substitution plan	<ul style="list-style-type: none"> i. Revenue substitution plan developed for the district and the state to substitute public revenue that the government was earning from the operational industries. ii. Secure public revenue through Central government support and economic diversification. 	<ul style="list-style-type: none"> Review of revenue substitution plan to secure public revenue as necessary through Central government support and economic diversification. 	<ul style="list-style-type: none"> Review of revenue substitution plan to secure public revenue as necessary through Central government support and economic diversification.
Public accountability	<ul style="list-style-type: none"> i. Development of a website on just transition to share all relevant information, including plans, policies, stakeholder dialogue announcements and reports, monitoring and review reports, expenditures, investors information, etc., to maintain transparency and public accountability throughout the process. ii. Sharing all relevant information through other publicly accessible platforms, such as at the local institutional levels, to improve people's access and understanding. 	<ul style="list-style-type: none"> i. Periodic updating and maintenance of the website on just transition. ii. Sharing all relevant information through other publicly accessible platforms, such as at the local institutional levels, to improve people's access and understanding. 	<ul style="list-style-type: none"> i. Periodic updating and maintenance of the website on just transition. ii. Sharing all relevant information through other publicly accessible platforms, such as at the local institutional levels, to improve people's access and understanding.

Chapter 7

Conclusion





Courtesy: Filipe Resmini, unsplash.com

- India's coal districts have much variation in terms of coal dependence, worker distribution and local resilience, which necessitates district-specific planning for a just transition.
- Just transition should be considered as a development intervention with the aim to improve environmental, social and economic outcomes.
- Early planning is necessary to build stakeholder consensus, minimise socio-economic disruptions, and allow sufficient time for transition.
- Energy transition plans and investments need to be matched by those for just transition, as India's coal producing states will not be the renewable energy superpowers.

7.1 Introduction

Experiences of just transition across the world show that it is region and context-specific, and requires plans and interventions to be designed in a manner that is sensitive to the local dynamics of fossil fuel dependence, as well as the economic, social and environmental conditions.¹

At the same time, policies and plans developed for facilitating just transition at the local and regional levels is largely envisioned as a process of development intervention.² Major fossil fuel dependent countries of the global North, such as Germany,³ Canada,⁴ the United States of America,⁵ and other European countries⁶ (with territorial just transition plans); and countries of the global South, such as South Africa, have framed their respective just transition policies, plans and strategies as development interventions.

Finally, global experiences also clearly suggest that sufficient time must be provided for planning and implementing a just transition, for it to be fair and inclusive, and to avoid social and economic disruption from unplanned closure of mines, power plants and related industries.⁷ The most cited case of a successful transition of a coal mining region in Ruhr Germany took 50 years, though such a long period of time will not be available for countries considering the climate emergency.⁸

Considering global experiences, the reality of coal districts of India, and the present study of Korba district, the key considerations for just transition for coal-dominant districts of India is outlined in the following section.

7.2 Key considerations for just transition

Just transition in India will need to take into account three important aspects:

- Just transition will require district-specific, as well as, regional planning;
- The transition should be designed and planned as a development intervention to achieve net-positive environmental, socio-economic outcomes; and,
- Planning should be a long-term and deliberative process, and must start early on.

A combination of all these can help to achieve a well-planned and well-managed just transition, that will not only strengthen India's commitments for climate action, but will help the country to achieve inclusive growth and meet the sustainable development goals.

7.2.1 District-specific planning and regional considerations

The coal districts in India vary widely in terms of the scale of coal mining operations, the presence of coal-based power plants and other coal-dependent industries. The extent and nature of dependence also differs, particularly with respect to the workers (formal and informal), income opportunities and other indirect dependence.

This can be elucidated by two district-level studies, viz., of Ramgarh district of Jharkhand (conducted by iFOREST in 2020) and the present study of Korba district of Chhattisgarh. While both of these states are India's top coal producers, the district-level characteristics of the coal economy vary widely.

Ramgarh has over 100 years of coal mining history. The district's coal production has been steadily going down in the past five years and currently coal production stands at 11 MMT per year from 12 mines (10 OC and one each of UG and mixed mining operation). However, many of the operational mines are incurring losses, and about two-third of them are unprofitable. Additionally, there are 15 mines in the district which have been temporarily or permanently closed without a plan for just transition.

The Ramgarh study, which involved a primary survey of 406 households, showed high dependence of the households in the district on coal for income, with one in four households depending on it. However, the dependence is highly informal in nature. Only 7% of the households had a member with a formal job in coal mining or related industry. The informal dependence was nearly three times the formal dependence, and a majority of the households were found to be earning a living by gathering and selling coal.

Korba, on the other hand, is very different than Ramgarh. It produces over ten times more coal than Ramgarh – 117 MMT of coal (from 13 mines). But 95% of coal production comes just from three OC mines - Gevra, Kusmunda and Dipka. The eight UG mines in the district account for less than 2% of the production and all of them are unprofitable. There are two mines in the district which are currently closed, one temporarily and one permanently.

The primary survey involving 600 households showed that nearly one in five households are dependent on the coal mining industry and coal-based power plants for an income. However, the share of informal dependence is not as high as Ramgarh for coal mining. For example, about 5% of the surveyed households were found to be engaged informally in coal mining activities, which is nearly comparable to the proportion of households having a member with formal coal mining job. There are no coal gatherers and sellers.

The districts also differ in terms of the presence of other coal-based industries. Korba is a power producing hub with 6,428 MW of installed coal-based power capacity, while in Ramgarh, there is just one power plant.

However, in both the districts there are a number of medium and small-scale industries which are coal-dependent, which overall makes the economy of these districts highly reliant on coal. While for Ramgarh, coal mining and manufacturing collectively contribute to nearly 40% of the district GDP (21% from coal mining), in Korba it is over 60% (over 50% from coal mining). This has stymied the growth of other economic sectors in the districts, including agricultural and forestry sectors, other non-coal industries and the service sector.

The contrasting picture of Ramgarh and Korba underscores the need for developing just transition plans at the district-level, taking into account their unique challenges and opportunities. While the just transition planning approach and mechanism for Korba, as outlined in this report, provides a blueprint for developing just transition plans for other coal mining and coal-based power dependent districts of India, a detailed assessment based on a participatory approach will be necessary for each case.

The regional implications of the energy transition should also be considered while planning a just transition, as many of India's top coal producing districts remain as the nerve-centre for the supply of fuel for various industrial activities in adjoining regions and other parts of the states. Finally, going ahead, an effective governance mechanism needs to be developed to plan and manage a just transition.

Table 1: Ramgarh and Korba comparative

Domain	Parameter	Ramgarh	Korba
Coal mining	Annual coal production (MMT)	11	117
	No. of operational coal mines	12	13
	No. of operational OC coal mines	10	5
	No. of operational UG coal mines	2	8
	No. of temporarily/permanently closed coal mines	15	2
	No. of operational unprofitable mines	8 (6 OC and 2 UG)	8 (all UG)
	Coal production from OC mines (%)	99	98
	Coal production from UG mines (%)	1	2
	Existing area under coal mining (ha)	14,000	21,797
Coal-based thermal power	Installed capacity (MW)	310	6,428
	No. of operational TPPs	1	11
Distribution of formal and informal workers among households dependent of coal mining as primary income source*	Formal workers (%)	29	44**
	Informal workers (%)	12	48
	Coal gatherers and sellers (%)	59	0
GDP	Share of coal mining (%)	21	50
	Share of mining + manufacturing (%)	40	61

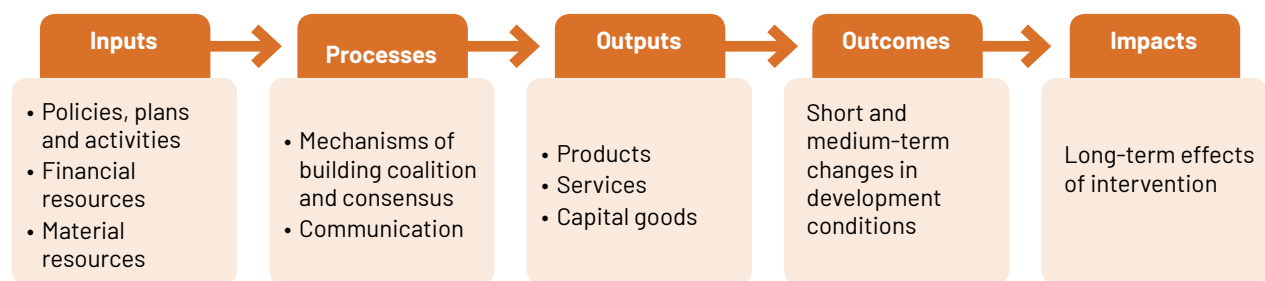
*For the primary survey, 406 HHs were selected for Ramgarh and 600 HHs for Korba; ** The rest 8% are pensioners

7.2.2 Just transition planning as a development intervention

Considering the complex nature of the fossil fuel economy, including direct and indirect income dependence, high proportion of informal workers, the poor development indicators in coal districts, burden of environmental pollution, and the need to secure the interests of women and marginalised people (as many of these districts have high proportion of tribal population),⁹ just transition in India cannot be considered as a linear question of substituting a 'mono' industry (say coal mining) along with its workforce. It is a development agenda and must be planned in a manner that the socio-economic and environmental conditions of these areas are improved, and the new economy is an inclusive one.¹⁰

Just transition, therefore, should be considered as a development intervention.¹¹ This means that it should be conceptualised and aligned with the components of development planning, including inputs, processes, outputs, outcomes and impacts.¹²

Figure 1: Development intervention



The following section elaborates on the key components of development intervention that will be necessary for a just transition.

Inputs

Three input factors will be important to support a just transition.

- **Governance:** A governance mechanism based on principles of cooperative federalism will be necessary to facilitate a just transition securing local (district), regional (states), and national interests. Strong national and state government support will be essential to strategically plan a just transition, aligning with India's energy transition pathways, climate commitments, and sustainable development goals.
- **Policies and plans:** Policies and plans need to be developed to support the crucial components of just transition. These will include:
 - A national just energy transition policy including components of fossil fuel phase-down strategy at the national and state levels, plan for phasing down coal mining and coal-based power and simultaneous incentivisation of clean energy, plan for clean energy transition in other industrial sectors dependent on fossil fuels, regulatory revisions pertaining to issues of labour, social protection and welfare, etc.
 - Fossil fuel sector restructuring policies and plans for transitioning the fossil fuel sector and allied industries, considering technological alternatives and readiness, greenhouse gas emission reduction potential, market opportunities, and economic viability.
 - Policies for responsible environmental and social practices, including reforms in regulatory provisions related to mine closure and mine area redevelopment, policies for land repurposing, reuse of industrial assets, ensuring environmental justice, community engagement and benefits, etc.
 - Plan(s) for economic diversification and revenue substitution to shift the focus from a mono-industry led economy. This should take into account local resources potential, investment potential (including incentives) of the region, workforce capacity, infrastructure status, etc. Reclamation and repurposing of mining and industrial lands and associated infrastructure holds significant opportunity for economic diversification and socio-economic development in fossil fuel regions.

- Reskilling and skilling policies and programs aimed at creating diversified opportunities of job substitution, job creation and job transformation in the new green economy.
- Active labour market policies to ensure that not only formal workers are provided a replacement income, but to deliver a net-positive employment outcome for all workers (formal and informal), as well as the local communities, particularly the disadvantaged.¹³
- **Financing:** Public and private investments, and international financing support will be essential for supporting a just transition and creating provisions for revenue substitution.¹⁴ Investments will be necessary for:
 - Closing down existing facilities and building new ones and support accelerated transition to a low-carbon economy.
 - Building social and physical infrastructure, such as for education, healthcare, clean water, energy, connectivity, and urban amenities to improve social capital, build community resilience, and to attract businesses and investors.
 - Providing compensation and transition support for workers, early retirement, mobility assistance, etc.

Processes

There are three important processes that must be considered for a just transition to make it inclusive. These include:

- Development of diverse coalition of various actors and stakeholders (including workers, labour unions, civil society organisations, public representatives, businesses, and local level institutions) to work towards a shared vision of just transition through coordination and consensus.
- Development of effective and transparent communication strategy to reach out to all stakeholders, from national to local levels, to clearly convey the objective, need and opportunities of a just transition, to deepen stakeholder knowledge, and to build public support and engagement for just transition.
- Establishment of local support system by engaging local civil society groups and other active members of the civil society to create a sustained engagement mechanism for just transition, for implementation of just transition plans, and provide any other support as necessary to the local community during the transition process.

Outputs

Based on the processes and inputs as mentioned above, just transition should be aimed at achieving the following outputs within defined timeframes, and during various phases of implementation of just transition plans.¹⁵

- Restructured economy and industries in the fossil fuel-dependent districts and states with a shift from a brown economy to a thriving green economy;
- Repurposed land and infrastructure belonging to the coal mining and coal-dependent industries to boost economic activities;
- Reskilled, upskilled, and a newly skilled workforce for a green and sustainable economy;
- Revenue substitution for the districts, states and the Central Government; and,
- Responsible social and environment practices, with a new environmental and social contract between the people, the government, and the private sector. The new social contract shall ensure inclusive decision-making, poverty alleviation, fairer income distribution, and improved social infrastructure and human development outcomes. The new environmental contract shall ensure ecological protection and restoration, also contributing to the enhancement of sustainable livelihood and income opportunities.

Outcomes/impacts

Just transition should be envisioned to achieve long-term outcomes with respect to environmental, social and economic conditions. This will include:

- Net-zero emission outcome within a defined timeframe.
- Net-positive employment outcome, including enhancement of job quality.

-
- Net-positive environmental and ecological outcomes, involving pollution reduction, conservation of land and biodiversity, ecological protection and restoration, enhancement of ecosystem services, all of which shall also be contributing to better health and sustainable livelihood outcomes.
 - Improvement in human development and human capital outcomes.
 - Environmental justice outcomes for communities in the fossil fuel regions, including enhancement of community engagement.
 - Net-positive outcome with respect to climate resilience, economic growth and prosperity.

7.2.3 Early planning

At COP-26, India has pledged to achieve net-zero emissions by 2070, along with ambitious renewable energy targets to be achieved by 2030. The country's energy transition plan should now be complemented with strategies and plans for a just transition.

For India to achieve the net-zero emissions target by 2070, at least 120 districts will have to undergo fossil fuel transition in the coming three decades. Among these, 40 districts which account for nearly 95% of India's total coal production and 60% coal based thermal power capacity, will face transition in the next decade.¹⁶

Given the diversity and expanse of these districts, it is important for India to start on just transition planning at the earliest. In fact, a just transition plan must be in place for these districts much before coal mines and power plants start closing down to avoid socio-economic disruptions.

Finally, India needs to plan for an energy future that is inclusive, and ensures equitable development. The country's energy geography will rapidly change in the coming years because of massive and growing investments in renewables. However, today's coal producing states will not be the renewable superpowers, as large-scale renewable energy generation will happen in the western and southern states.¹⁷ The roadmap for just transition should take this reality into account and the new green economy should be planned accordingly.

References

Chapter 1: Introduction

1. United Nations. (2021, November). Glasgow Climate Pact. https://unfccc.int/sites/default/files/resource/cop26_auv_2f_cover_decision.pdf
2. Banerjee, S. (2021). Defining and Framing Just Transition for India. Working Paper. International Forum for Environment, Sustainability & Technology, New Delhi, India. <https://iforest.global/wp-content/uploads/2021/11/Working-paper-1.pdf>
3. Prime Minister's Office, Government of India. (2021, November 1). National Statement by Prime Minister Shri Narendra Modi at COP26 Summit in Glasgow. <https://pib.gov.in/PressReleasePage.aspx?PRID=1768712>
4. Ministry of New and Renewable Energy. (2021). Annual Report 2020-21. Government of India. https://mnre.gov.in/img/documents/uploads/file_f-1618564141288.pdf
5. OECD. (2020). Managing Environmental and Energy Transitions for Regions and Cities. OECD publishings, Paris, France. <https://doi.org/10.1787/f0c6621f-en>
6. Bhushan, C., Banerjee, S. and Agarwal, S. (2020). Just Transition in India: An inquiry into the challenges and opportunities for a post-coal future. International Forum for Environment, Sustainability & Technology (iFOREST), New Delhi, India.
7. Bhushan, C. and Banerjee, S. (2021). Five R's: A Cross-sectoral landscape of Just Transition in India, International Forum for Environment, Sustainability and Technology (iFOREST), New Delhi.
8. Rathi, A. and Singh, K. (2019, September 16). One of India's largest coal-mining states says it will not build new coal power plants. Quartz India. <https://qz.com/india/1709483/after-gujarat-indias-chhattisgarh-wont-build-coal-power-plants/>
9. Ministry of Mines. (September 16, 2015). Order No.16/7/2015-M.VI (Part). Government of India. <https://mines.gov.in/writereaddata/UploadFile/PMKKKY%20Guidelines.pdf>
10. Department of Tribal and Scheduled Caste. (2021). Scheduled area declared in the state. Government of Chhattisgarh. <http://tribal.cg.gov.in/scheduled-areas>

Chapter 2: Korba district profile

1. Korba District. About the District. <https://korba.gov.in/about-district/>
2. Korba District. Villages and Panchayats. <https://korba.gov.in/about-district/administrative-setup/village-panchayats/>
3. Korba District. Municipalities. <https://korba.gov.in/public-utility-category/municipality/>
4. Department of Agriculture. District Irrigation Plan Korba 2015-2020. Government of Chhattisgarh. <https://pmksy.gov.in/mis/Uploads/2016/20160505060349246-1.pdf>
5. Chhattisgarh Infotech Promotion Society, Government of Chhattisgarh. (2021). Our State. <http://www.chips.gov.in/our-state>
6. Korba District. About the District. <https://korba.gov.in/about-district/>
7. Department of Agriculture. District Irrigation Plan Korba 2015-20. Government of Chhattisgarh. <https://pmksy.gov.in/mis/Uploads/2016/20160505060349246-1.pdf>
8. Ibid
9. Directorate of Economics and Statistics. (2021). Projected Population. Government of Chhattisgarh. http://descg.gov.in/Projected_Population.aspx
10. Ministry of Law and Justice. (2020). The Constitution of India. Government Of India. <https://legislative.gov.in/sites/default/files/COL1.pdf>
11. Department of Tribal and Scheduled Caste. Scheduled area declared in the state. Government of Chhattisgarh. <http://tribal.cg.gov.in/scheduled-areas>
12. Tribal Research and Training Institute, Government of Chhattisgarh. (2021). <http://cgtrti.gov.in/PVTG.html>
13. Department of Mines, Korba, Government of Chhattisgarh. (2021).
14. Coal Controller's Organization, Ministry of Coal. (2021). Provisional Coal Statistics 2020-21. Government Of India. <http://www.coalcontroller.gov.in/writereaddata/files/download/provisionalcoalstat/provisional-coal%20statistics-2020-21.pdf>
15. Indian Bureau of Mines, Ministry of Mines. (2020). Indian Mineral Yearbook 2019 Part III: Mineral Reviews. Government of India.
16. Central Mine Planning and Design Institute (CMPDI). (2013). Report on vegetation cover mapping of Korba coalfield based on satellite data of the year 2012. <http://www.secl-cil.in/writereaddata/Korba%20CF%202012%20Report.pdf>
17. Ministry of Agriculture and Farmers Welfare. Crop production statistics for selected states, crops and range of year extracted for 2019. https://aps.dac.gov.in/APY/Public_Report1.aspx
18. Aujla, I. (2019, December 5). Punjab, Haryana way ahead of other states in rice, wheat yields. The Times of India. <https://timesofindia.indiatimes.com/city/chandigarh/punjab-haryana-way-ahead-of-other-states-in-rice-wheat-yields/articleshow/72378497.cms>
19. Maitra, S. et. al. (2021). Intercropping—A Low Input Agricultural Strategy for Food and Environmental Security. *Agronomy*. Volume 11, 343. <https://doi.org/10.3390/agronomy11020343>
20. Census Organisation. (2011). District Census handbook: Korba. Census of India 2011, Government of India.
21. Department of Agriculture and Farmers Welfare. Agricultural Census, 2015-16. Government of India. <https://agcensus.dacnet.nic.in/districtsummarytype.aspx>

22. Korba forest division working plan 2011- 2021. As obtained from Korba Forest Division Office.
23. As per details provided by Korba and Katghora Divisional Forest Office. Government of Chhattisgarh. 2021, 28 September.
24. Ibid
25. Chhattisgarh State Minor Forest Produce (Trading and Development) Cooperative Federation. Welfare Schemes. Government of Chhattisgarh. https://www.cgmfpfed.org/new/welfare_scheme.php
26. Chhattisgarh State Minor Forest Produce (Trading and Development) Cooperative Federation. Details of approved microenterprises. Government of Chhattisgarh. <https://www.cgmfpfed.org/new/pdf/Microenterprises.pdf>
27. As per details provided by Korba and Katghora Divisional Forest Office. Government of Chhattisgarh. 2021, 28 September.
28. Tribal Cooperative Marketing Development Federation of India, Ministry of Tribal Affairs. (2020). Van Dhan Yojana: 200 days report. Government of India. https://trifed.tribal.gov.in/sites/default/files/2020-05/200%20DAYS%20PMVDY%2025_05_2020-compressed.pdf
29. As per details provided by Korba and Katghora Divisional Forest Office, Government of Chhattisgarh. 2021
30. Central Silk Board (CSB) & Professional Assistance for Development Action (PRADAN). (2017). Tasar Value Chain Analysis- Chhattisgarh. Mahila Kisan Sashaktikaran Pariyojana (MKSP). http://www.mksptasar.in/adminpradanmkc/reports/262_Tasar_VCA_Chhattisgarh_Chhattisgarh.pdf
31. Indiatat. (2021). Korba District Handbook. Indiatat Publications.
32. Department of Tribal and Scheduled Caste, Government of Chhattisgarh. (2021, May).
33. Department of Fisheries, Government of Chhattisgarh. (2021). Statistics Fish Production 2020-21. http://agriportal.cg.nic.in/fisheries/pdf/Statistics_Fish_Production_2020-21_Eng.pdf
34. Bhushan, C. and Banerjee, S. (2021). Five R's: A cross-sectoral landscape of Just Transition in India. International Forum for Environment. Sustainability and Technology (iFOREST), New Delhi.
35. Coal Controller's Organization, Ministry of Coal. (2021). Provisional Coal Statistics. 2020-21. Government of India. <http://www.coalcontroller.gov.in/writereaddata/files/download/provisionalcoalstat/provisional-coal%20statistics-2020-21.pdf>
36. District Industry Department, Korba, Government of Chhattisgarh. (2021).
37. Chhattisgarh State Industrial Development Corporation Limited. (2021). Bharat Aluminium Co. Ltd (BALCO), Korba. <https://csidc.in/balco.htm>
38. District Industry Department, Korba, Government of Chhattisgarh. (2021).
39. Census Organisation. (2011). District Census Handbook: Korba. Government of India.
40. Ibid
41. Ibid
42. Indiatat. (2021). Korba District Handbook. Indiatat Publications.
43. Bhandari, L. and Chakraborty, M. (2015, March 9). Spatial Poverty in Chhattisgarh. Mint. <https://www.livemint.com/Opinion/TelfQDSiZ1IPufDbwZ526K/Spatial-poverty-in-Chhattisgarh.html>
44. Department of Food and Public Distribution. Ministry of Consumer Affairs and Food and Public Distribution. Coverage and Entitlement Under NFS. Government of India. <https://dfpd.gov.in/pds-caeunfsa.htm>
45. Chhattisgarh Environmental Conservation Board. (2015). Monitoring in Critically Polluted Area (CPA), Korba of Chhattisgarh for Assessment of Comprehensive Environmental Pollution Index (CEPI). <https://www.enviscecb.org/Data/Final%20Technical%20Report%20of%20CEPI%20%202015%20from%20IIT%20Kharagpur.pdf>
46. Central Pollution Control Board, Ministry of Environment, Forest and Climate Change. CEPIs of various Industrial areas/ clusters. Government of India. <https://cpcb.nic.in/displaypdf.php?id=Q1BBLONFUEIfYXNzZXNzbWVudF8yMDEzLnBkZg==>
47. Central Pollution Control Board, Ministry of Environment, Forest and Climate Change. (2017). Comprehensive Environmental Pollution Index (CEPI) Monitoring for Polluted Industrial Areas. Government of India. <https://cpcb.nic.in/comprehensive-environmental-pollution-index-cepi/>
48. Ibid
49. Central Pollution Control Board, Ministry of Environment, Forest and Climate Change. (2020). National Ambient Air Quality Monitoring Programme. Ambient air quality monitoring data for the year 2020. Government of India. <https://cpcb.nic.in/displaypdf.php?id=bWFudWFsLW1vbml0b3JpbmVtTG9jYXRpb25fZGF0YV8yMDIwLnBkZg==>
50. Central Pollution Control Board, Ministry of Environment, Forest and Climate Change. (2003). Guidelines for Ambient Air Quality Monitoring. http://www.indiaairquality.info/wp-content/uploads/docs/2003_CPCB_Guidelines_for_Air_Monitoring.pdf
51. Ministry of Environment, Forests and Climate Change. (2019). National Clean Air Programme. Government of India. https://moef.gov.in/wp-content/uploads/2019/05/NCAP_Report.pdf
52. State Health Resource Centre. (2020). Poison in Air-II, Air Quality Report from Korba, Champa and Raipur. Government of Chhattisgarh. <https://shsrc.org/wp-content/uploads/2020/05/Korba-AQ-report-2020.pdf>
53. Chhattisgarh Environmental Conservation Board. (2015). Monitoring in Critically Polluted Area (CPA), Korba of Chhattisgarh for Assessment of Comprehensive Environmental Pollution Index (CEPI). <https://www.enviscecb.org/Data/Final%20Technical%20Report%20of%20CEPI%20%202015%20from%20IIT%20Kharagpur.pdf>
54. Dang, K. (2015, December 6). Amid India's push for clean energy, a dark spot in Chhattisgarh. The Times of India. <https://www.ndtv.com/india-news/amid-indias-push-for-clean-energy-a-dark-spot-in-chhattisgarh-1251077>
55. Gaon Connection. (2021, December 10). Eight major coal ash breach accidents in past two years, penalties levied but not paid by coal-based power plants. <https://en.gaonconnection.com/coal-ash-power-plants-health-pollution-environment-singrauli-sonbhadra-bokaro-water-pollution-tuberculosis/>

56. Chhattisgarh Environmental Conservation Board (CECB). (2015). Monitoring in Critically Polluted Area (CPA), Korba of Chhattisgarh for Assessment of Comprehensive Environmental Pollution Index (CEPI). <https://www.enviscecb.org/Data/Final%20Technical%20Report%20of%20CEPI%20%202015%20from%20IIT%20Kharagpur.pdf>
57. Dixit, A. and Bhaskar, M. (2015). Water Quality Appraisal of Hasdeo River at Korba in Chhattisgarh, India. *International Journal of Science and Research (IJSR)*. 4. 1252-1258.
58. Central Ground Water Board. Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti. Aquifer mapping and management of Ground Water Resources, Korba Block, Korba District. Government of India. http://cgwb.gov.in/AQM/NAQUIM_REPORT/Chhattisgarh/KORBA/6-Korba%20Block%20NAQUIM%20Report-%20Korba.pdf

Chapter 3: The coal economy

1. Ministry of Coal. (2021). Monthly Statistical Report: September 2021. Government of India. <https://coal.nic.in/sites/default/files/2021-11/srn-Sept-2021.pdf>
2. Kumar, R. (2015, February 16). As coal auctions begin in Delhi, a splendid forest in Chhattisgarh awaits slow death. *Scroll*. <https://scroll.in/article/704945/as-coal-auctions-begin-in-delhi-a-splendid-forest-in-chhattisgarh-awaits-slow-death>
3. South Eastern Coalfields Limited (SECL). (2021). <http://www.secl-cil.in/coalfield.php>
4. District Mining Department, Korba. (2021). Government of Chhattisgarh
5. Ibid.
6. Ministry of Coal. (2021). Annual Report 2020-21. <https://coal.gov.in/sites/default/files/2021-03/chap3AnnualReport2021en.pdf>
7. South Eastern Coalfields Limited (SECL). (Approved in 2016). Pre-feasibility report for Gevra OC expansion project. <http://environmentclearance.nic.in/DownloadPfdFile.aspx?FileName=X9J2G40At2dPMwVpQHBo9+qe+UIYvpM706+lpHOT-85McSsv5ISjRPOh/28ykTE69QbISi2RqLb46DilruK06kxyleBE8Ub2QnqCJZII7u0BeeN74f0B8XZT600AuN+FS/ARj+iEPLBitDX-y03059Jg==&FilePath=93ZZBm8LWEXfg+HAIQix2fE2t8z/pgnoBhDIYdZCzxMg8GlihX6H9UPIHygCn3pCkAF2zPFXfQnqA-4krKa1Aw==>
8. Central Mine Planning and Design Institute (CMPDI). (2020). Project report for Dipka OC Expansion, 40.0 Mty.
9. Interview with South Eastern Coalfields Limited (SECL) Korba mining circle officials, dated September 27, 2021
10. Interview with Joint Director, Mineral Administration, Chhattisgarh Mineral Resources Department, Government of Chhattisgarh. (September 25, 2021).
11. Editorial Bureau. (2018, September 12). CIL to shut 53 underground mines. *The Hindu Business Line*. <https://www.thehindubusinessline.com/companies/cil-to-shut-53-underground-mines/article24937625.ece>
12. Press Trust of India. (2021, June 15). Coal India to close down 23 unviable mines, to help save around Rs 500 cr. *Business Standard*. https://www.business-standard.com/article/companies/coal-india-to-close-down-23-unviable-mines-to-help-save-around-rs-500-cr-121061501435_1.html
13. Securities and Exchange Board of India (SEBI). (2017). Order no: WTM/MPB/ISD/ 114 /2017. https://www.sebi.gov.in/sebi_data/attachdocs/dec-2017/1513937225388.pdf
14. The Supreme Court of India. (August 25, 2014). Judgement in the matter Manohar Lal Sharma vs The Principal Secretary & Ors. Writ Petition (CRL.) No. 120 of 2012.
15. Ministry of Environment, Forest and Climate Change. (2018). Environment Clearance of Chotia 1 and Chotia II coal mines. http://environmentclearance.nic.in/writereaddata/modification/Amendment/Covering_Letter/290820181QD72UZSCoverletter.pdf
16. Ibid.
17. As per interaction with the workers and BALCO labour union members, between July to September 2021.
18. As per the Central Mine Planning and Design Institute (CMPDI) estimates for Gevra, Dipka, Kusmunda, Manikpur, Rajgamar and Saraipalli coal mines. (2020).
19. Central Mine Planning and Design Institute (CMPDI). (2021). Land Restoration / Reclamation Monitoring of more than 5 mcm (Coal+OB) Capacity Open Cast Coal Mines of South Eastern Coalfields Limited based on Satellite Data of the Year 2020. http://www.secl-cil.in/writereaddata/LandReclamationSECL_2020%20MT5Final.pdf
20. Reserve Bank of India. (2021, November). State Finances: A Study of Budgets. Government of India. <https://rbi.org.in/Scripts/AnnualPublications.aspx?head=State%20Finances%20:%20A%20Study%20of%20Budgets>
21. District Mining Department, Korba. (2021). Government of Chhattisgarh
22. Corporate Social Responsibility. (2014). Ministry of Corporate Affairs. Government of India. http://ebook.mca.gov.in/Actpagedisplay.aspx?PAGE_NAME=17518
23. Ministry of Environment, Forest and Climate Change (MoEFCC). (2021, May 10). Environmental clearance letter for Gevra coal mine. Government of India. <http://www.secl-cil.in/writereaddata/EC%20GEVRA%2049.pdf>
24. South Eastern Coalfields Limited. (2021). Submission of online application for Terms of Reference (TOR), as per EIA notification- 2006, for Environment Clearance (EC) for Gevra Opencast Coal Mine for 70 MTPA Expansion (from 49 MTPA to 70 MTPA). http://environmentclearance.nic.in/writereaddata/Online/TOR/16_Aug_2021_12101932025264870SubmissionofOnlineapplication.pdf
25. Srivatsan, K.C. (2021, October 13). Union minister Pralhad Joshi says there will be no shortage of coal for power production. *Hindustan Times*. <https://www.hindustantimes.com/india-news/union-minister-pralhad-joshi-says-there-will-be-no-shortage-of-coal-for-power-production-101634128868376.html>

26. District Mines Department, Korba. (2021). Government of Chhattisgarh
27. Interview with Gevra coal mine officials dated September 28, 2021
28. Ibid.
29. South Eastern Coalfields Limited (SECL). (2021). As per communication on November 23, 2021.
30. Central Mine Planning and Design Institute (CMPDI). (2021). Land Restoration / Reclamation Monitoring of more than 5 mcm (Coal+OB) Capacity Open Cast Coal Mines of South Eastern Coalfields Limited based on Satellite Data of the Year 2020. http://www.secl-cil.in/writereaddata/LandReclamationSECL_2020%20MT5Final.pdf
31. Ministry of Environment, Forest and Climate Change (MoEFCC). (2021, May 10). Environmental clearance for Gevra OC coal mine project. Government of India. <http://www.secl-cil.in/writereaddata/EC%20GEVRA%2049.pdf>
32. South Eastern Coalfields Limited (SECL). (2021). As per communication dated October 23, 2021.
33. Ibid.
34. South Eastern Coalfields Limited. (2018). Half yearly compliance of Environment clearance, Kusunda. <http://www.secl-cil.in/writereaddata/HYCR%2040%20MTPA%20FOR%20UPLOAD.pdf>
35. Central Mine Planning and Design Institute (CMPDI). (2020). Project report for Dipka OC Expansion, 40.0 Mty.
36. South Eastern Coalfields Limited (SECL). (2021). Meeting with SECL officials. September 2021.
37. South Eastern Coalfields Limited (SECL). (2021). As per communication dated November 30, 2021.
38. Ministry of Environment, Forest and Climate Change. (2018, February 20). Environmental clearance for expansion of Dipka OC coal mine project. Government of India. http://www.secl-cil.in/writereaddata/Dipka%20OC%2035_00.pdf
39. Bhushan, C. and Banerjee, S. (2021). Five R's: A cross-sectoral landscape of Just Transition in India, International Forum for Environment, Sustainability & Technology (iFOREST), New Delhi
40. Central Electricity Authority (CEA). (2021). Government of India. https://cea.nic.in/wp-content/uploads/pdm/2021/06/list_power_stations_2021.pdf
41. Central Electricity Authority (CEA). (2021). Energywise - Performance Status All India- Regionwise. March-2021 vis-a-vis March 2020 and April-March-2021 vis-a-vis April-March 2020. Government of India.
42. Central Electricity Authority (CEA). (2020). Annual Report 2019-20. Government of India. https://cea.nic.in/old/reports/annual/annualreports/annual_report-2020.pdf
43. Central Electricity Authority (CEA). (2018). National Electricity Plan. Volume I. Government of India. https://cea.nic.in/wp-content/uploads/2020/04/nep_jan_2018.pdf
44. Coal Controller's Organization, Ministry of Coal. (2021). Provisional Coal Statistics. 2020-21. Government of India. <http://www.coalcontroller.gov.in/writereaddata/files/download/provisionalcoalstat/provisional-coal%20statistics-2020-21.pdf>
45. Ibid.
46. Ministry of Environment, Forest and Climate Change (MoEFCC). (2021). Responsibilities of Thermal Power Plants (TPPs) to dispose fly ash and bottom ash. Draft Notification. Government of India. <https://egazette.nic.in/WriteReadData/2021/226711.pdf>
47. South Eastern Coalfields Limited (SECL). (2021). 35th Annual Report 2020-21. http://www.secl-cil.in/writereaddata/AR_ENGLISH_2020-21.pdf

Chapter 4: Jobs and livelihood dependence

1. Census of India. (2011). Sample Registration Survey. Vital Statistics. https://censusindia.gov.in/vital_statistics/SRS_Report/9Chap%20%20-%202011.pdf
2. Census of India. (2011). District Census Handbook: Korba. Government of India. https://censusindia.gov.in/2011census/dchb/2205_PART_B_DCHB_KORBA.pdf
3. Labour Bureau, Ministry of Labour and Employment. (2015). Employment in Informal Sector and Conditions of Informal Employment. Volume IV, 2013-14. Government of India.
4. As per information provided by SECL in October, 2021.
5. As per information provided by SECL officials during interviews held periodically between September to November, 2021.
6. As per interview with Labour Union representatives in September 2021.
7. Coal Miners Provident Fund Organization (CMPFO). <http://cmpfo.gov.in/employees.html>
8. As per RTI query responses of South Eastern Coalfields Limited (SECL). October, November, 2021
9. Ministry of Labour and Employment. (2021). Notification No. RP-92(01)/2021-ES.IV. dated 29 October, 2021. Government of India.
10. National Thermal Power Corporation (NTPC), RTI response September 29, 2021
11. As per FGDs with Korba Truck and Trailer Owner Association and individual interviews with drivers held in Korba in September, 2021.
12. Ibid.
13. Ibid.
14. District Industry Department, Korba. (2021). Government of Chhattisgarh
15. Ibid.

Chapter 5: Social infrastructure and community resilience

1. Global Sustainable Development Report. (2016). The Infrastructure – Inequality – Resilience Nexus. Chapter 2. United Nations. https://sustainabledevelopment.un.org/content/documents/10822Chapter2_GSDR2016_booklet.pdf
2. NITI Aayog. (2021). National Multidimensional Poverty Index Baseline Report. Government of India. https://www.niti.gov.in/sites/default/files/2021-11/National_MPI_India-11242021.pdf
3. Ibid.
4. Champions of Change. NITI Aayog. Government of India. <http://championsofchange.gov.in/site/coc-home/>
5. Aspirational Districts Programme, NITI Aayog. Government of India. <https://www.niti.gov.in/aspirational-districts-programme>
6. Medical Attendance Rules. Coal India Limited. <http://www.easterncoal.gov.in/rightstoinfo/medicalattrules.pdf> ; National Thermal Power Corporation (NTPC). HR Policy Manual Medical Attendance & Treatment Rules. (2020). https://www.ntpc.co.in/sites/default/files/downloads/0203-Medical_Attendance_n_Treatment_Rules.pdf
7. National Health Mission, Ministry of Health and Family Welfare. Government of India. <http://nhm.gov.in/index1.php?lang=1&level=2&sublinkid=971&lid=154>
8. Ibid.
9. Ibid.
10. Ibid.
11. Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB-PMJAY). (2021). Ministry of Health and Family Welfare. Government of India. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1738169>
12. Health and Family Welfare Department. Dr. Khubchand Baghel Health Assistance Scheme. Detailed guidelines. Government of Chhattisgarh. https://dkbssy.cg.nic.in/dkbssydoc/DKBSSY_Final_Guidelines_Signed_rotated.pdf
13. District Health Department, Korba. (2021). Government of Chhattisgarh
14. International Institute for Population Sciences (IIPS), ICF. (2021). National Family Health Survey (NFHS-5), 2019-20. Government of India. http://rchiips.org/nfhs/NFHS-5_FCTS/CT/Korba.pdf
15. Government of India. The Constitution (Eighty-sixth Amendment) Act, 2002. <https://www.india.gov.in/my-government/constitution-india/amendments/constitution-india-eighty-sixth-amendment-act-2002>
16. District Education Department, Korba. (2021). Government of Chhattisgarh
17. South Eastern Coalfields Limited (SECL). (2021). 35th Annual Report 2020-21. SECL provides scholarships on merit for children beyond primary class level and financial assistance to employees' children pursuing professional education in government. engineering and medical college. http://www.secl-cil.in/writereaddata/AR_ENGLISH_2020-21.pdf
18. Department of Drinking Water and Sanitation. (2019). Jal Jeevan Mission. Ministry of Jal Shakti. Government of India. https://jalshakti-ddws.gov.in/sites/default/files/JJM_note.pdf
19. Ibid.
20. Drinking Water Department, Korba Municipality. (2021). Note: The supply has been largely supported by the Centre's Atal Mission for Rejuvenation and Urban Transformation (AMRUT) scheme (and earlier the Urban Infrastructure Development Scheme for Small and Medium Towns, which was subsumed in AMRUT in 2015).
21. Interview with Katghora and Dipka NP officials, Korba district. October 2021.
22. Food Supplies Department, Korba. (2021). Government of Chhattisgarh.
23. Pradhan Mantri Sahaj Bijli Har Ghar Yojana dashboard. Government of India. <https://saubhagya.gov.in/>
24. Ibid.
25. Directorate of Economics and Statistics, Government of Chhattisgarh. Socio-economic indicator, 2015. http://descg.gov.in/pdf/publications/latest/Socio_Economic_Indicator_2015.pdf
26. Department of Science and Technology. (2020). Climate Vulnerability Assessment for Adaptation Planning in India Using a Common Framework. Government of India. <https://dst.gov.in/sites/default/files/Full%20Report%20%281%29.pdf>

Chapter 6: Planning a Just Transition for Korba

1. Banerjee, S. (2021). Defining and Framing Just Transition for India. Working Paper. International Forum for Environment, Sustainability & Technology, New Delhi, India. <https://iforest.global/wp-content/uploads/2021/11/Working-paper-1.pdf>
2. Bhushan, C., Banerjee, S. and Agarwal, S. (2020). Just Transition in India: An inquiry into the challenges and opportunities for a post-coal future. International Forum for Environment, Sustainability & Technology (iFOREST), New Delhi, India.
3. Central Electricity Authority (CEA), Ministry of Power. (2020). Guidelines for renovation and modernisation/ life extension works of coal/lignite based thermal power stations. Government of India. https://cea.nic.in/old/reports/others/thermal/trm/R_ampGuideline.pdf
4. European Economic and Social Committee. (2021). Just transition: targeted training of workers can turn challenges into opportunities. <https://www.eesc.europa.eu/en/news-media/news/just-transition-targeted-training-workers-can-turn-challenges-opportunities>
5. The categories are on the basis of the Minimum Wage Act (1948), and as has been defined subsequently based on dissension of duties and responsibilities.
6. Ministry of Rural Development. National Rural Livelihood Mission. Government of India. <https://aajeevika.gov.in/en/content/mission>

7. Ministry of Housing and Urban Affairs. National Urban Livelihood Mission. Government of India. https://nulm.gov.in/PDF/NULM_Mission/NULM_mission_document.pdf
8. Government of Chhattisgarh. Narwa, Garuwa, Ghurwa and Badi scheme. <https://nggb.cg.nic.in/#/home>
9. The Energy Transitions Commission. (2019). Mission Possible: Reaching net-zero carbon emissions from harder-to-abate sectors by mid-century. https://www.energy-transitions.org/wp-content/uploads/2020/08/ETC-sectoral-focus-HeavyRoadTransport_final.pdf
10. Central Ground Water Board, Ministry of Jal Shakti. Aquifer mapping and management of ground water resources, Korba block, Korba district, Chhattisgarh. Government of India. http://cgwb.gov.in/AQM/NAQUIM_REPORT/Chhattisgarh/KORBA/6-Korba%20Block%20NAQUIM%20Report-%20Korba.pdf
11. Water Resources Department, Government of Chhattisgarh. <https://cgwrd.in/organisation/activities/irrigation-potential.html>
12. Central Ground Water Board, Ministry of Jal Shakti. Aquifer mapping and management of ground water resources, Korba block, Korba district, Chhattisgarh. Government of India. http://cgwb.gov.in/AQM/NAQUIM_REPORT/Chhattisgarh/KORBA/6-Korba%20Block%20NAQUIM%20Report-%20Korba.pdf
13. Agriculture Department. District Irrigation Plan Korba 2015-20. Government of Chhattisgarh. <https://pmksy.gov.in/mis/Uploads/2016/20160505060349246-1.pdf>
14. Ibid.
15. Ibid.
16. Strategy Paper for promotion of 10,000 Farmer Producer Organisations (FPOs). (2019). Small Farmers' Agribusiness Consortium (SFAC). <http://sfacindia.com/UploadFile/Statistics/Strategy-Paper-on-Promotion-of-10,000-FPOs.pdf>
17. Government of Chhattisgarh. Rajiv Gandhi Kisan Nyay Yojana. <https://pmmodiyojana.in/rajiv-gandhi-kisan-nyay-yojana/>
18. Government of Chhattisgarh. Narwa, Garuwa, Ghurwa and Badi scheme. <https://nggb.cg.nic.in/#/home>
19. Ibid.
20. TRIFED, Chhattisgarh, Ministry of Tribal Affairs, Government of India. <https://trifed.tribal.gov.in/Chhattisgarh-0>
21. Interviews with organisations, such as , Ekta Prishad, Vasundhara and Pradan (Professional Assistance for Development Action), held in October and November 2021.
22. Ibid.
23. Interview with NGOs working with forest-dependent communities. October and November, 2021.
24. Ministry of Tribal Affairs. Press Information Bureau. 200 Van Dhan Producer companies planned to be set up during 2020-21 to 2025-26 with priority in Aspirational Districts (2021). Government of India. <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1745434>
25. Agarwal, S. and Saxena, A. K. (2018). People's forests: Is community forest resource governance the future of India's jungles?. Centre for Science and Environment (CSE). New Delhi, India. <https://www.cseindia.org/people-s-forests-8540>
26. Korba and Katghora Forest Division Office, Korba district. (2021). Government of Chhattisgarh.
27. Interview with NGOs working with forest-dependent communities. October and November, 2021.
28. Interview with PRADAN. November, 2021.
29. Water Bodies in Korba. Department of Fisheries. Agriculture Development and Farmer Welfare and Bio-technology Department. Government of Chhattisgarh. http://agriportal.cg.nic.in/fisheries/pdf/Water%20Bodies/Korba_water_bodies.pdf
30. Interview with Chhattisgarh State Minor Forest Produce (Trading and Development) Cooperative Federation Limited, Managing Director, December 2021.
31. Meinhold, K. and Darr, D. (2019). The Processing of Non-Timber Forest Products through Small and Medium Enterprises—A Review of Enabling and Constraining Factors. *Forests*. 10(11):1026.
32. Ministry of Food Processing Industries. (2021). Approved List of One District One Product (ODOP). Government of India. https://pmfme.mofpi.gov.in/pmfme/assets/PDF/other-downloads/ODOP_LIST_OF_35_STATES_&_UTs.pdf
33. Amendments in the Agriculture and Food Processing Industries' Policy, 2012. (2017). Department of Commerce and Industries. Government of Chhattisgarh. https://industries.cg.gov.in/pdf/policy2014-19/FoodPolicy_09102017.pdf
34. Government of Chhattisgarh. Industrial Policy, 2019-2024. <https://csidc.in/ip1924.pdf>
35. NITI Aayog. Report of the Sub-Group-II on NTFP and their Sustainable Management in the 12th 5-Year Plan. https://niti.gov.in/planningcommission.gov.in/docs/aboutus/committee/wrkgrp12/enf/wg_subntfp.pdf
36. Indian Council of Agricultural Research, Ministry of Agriculture and Farmers Welfare, Government of India. <https://icar.org.in/node/416>
37. Damodaran, H., Krishnamurthy, M. and Agarwal, S. (2021). Agricultural Households and Farming Income: An initial analysis of variations in income from farming and other sources among agricultural households in India. Centre for Policy Research. <https://www.cprindia.org/news/agricultural-households-and-farming-income-initial-analysis-variations-income-farming-and-other>
38. Press Information Bureau. (2021). Union Minister Shri Narendra Singh Tomar virtually inaugurates Indus Best Mega Food Park at Raipur, Chhattisgarh. Ministry of Food Processing Industries. <https://www.pib.gov.in/PressReleaseDetailm.aspx?PRID=1724026>
39. Ministry of Food Processing Industries. Agro Production Cluster Scheme. Government of India. <https://www.mofpi.gov.in/Schemes/about-agro-processing-cluster-scheme>

-
40. Ibid.
 41. Draft National Food Processing Policy. (2019). Ministry of Food Processing Industries. Government of India. <https://www.mofpi.gov.in/sites/default/files/draft-nfpp.pdf>
 42. State wise Estimated Solar Power Potential in the Country. (2015). Ministry of New & Renewable Energy. Government of India. <https://www.scribd.com/doc/262694640/Statewise-Solar-Potential-NISE-pdf>
 43. Ministry of New and Renewable Energy. (2021). Annual Report 2020-2021. Government of India. https://mnre.gov.in/img/documents/uploads/file_f-1618564141288.pdf
 44. Government of Chhattisgarh. Industrial Policy, 2019-2024. <https://csidc.in/ip1924.pdf>
 45. Ibid.
 46. Industrial Infrastructure. Department of Commerce and Industries. Government of Chhattisgarh. https://industries.cg.gov.in/Industrial_Infrastructure.aspx
 47. Bhushan, C. and Banerjee, S. (2021). Five R's: A Cross-sectoral landscape of Just Transition in India, International Forum for Environment, Sustainability and Technology (iFOREST), New Delhi.
 48. Chhattisgarh Solar Energy Policy, 2017 – 2027. https://allaboutrenewables.com/get_pdf_portal_content.php?q=272
 49. Ibid.
 50. Eerd, R. and Guo, J. (2020). Jobs will be very different in 10 years. Here's how to prepare. World Economic Forum. <https://www.weforum.org/agenda/2020/01/future-of-work/>
 51. Press Trust of India. (2018, March 11). Health sector could create jobs on massive scale: PHFI. Business Standard. https://www.business-standard.com/article/pti-stories/health-sector-could-create-jobs-on-massive-scale-phfi-118031100452_1.html
 52. Korba District. Tourist Place. Korba District Administration. Government of Chhattisgarh. <https://korba.gov.in/tourism/tourist-places/>
 53. As per ground documentation of DMF projects by iFOREST team.
 54. Korba District. Tourist Place. Korba District Administration. Government of Chhattisgarh. <https://korba.gov.in/tourism/tourist-places/>
 55. Government of India. Fifth Schedule of the Constitution of India. <https://www.panchayat.gov.in/documents/448457/0/Fifth+Schedule+of+the+Constitution.pdf/e475b31f-16c7-c18b-7dba-f9773edb1761?t=1632557366286>
 56. Ministry of Tribal Affairs. Land Governance under the Fifth Schedule. Government of India. <https://tribal.nic.in/downloads/FRA/5.%20Land%20and%20Governance%20under%20Fifth%20Schedule.pdf>
 57. Assessment based on review of post mine land use as indicated in environmental clearance and mines monitoring documents of Gevra, Dipka, Kusmunda and Manikpur.
 58. National Council of Applied and Economic Research (NCAER). (2018). The NCAER State Investment Potential Index. New Delhi, India.
 59. Ministry of Human Resource Development Department of School Education and Literacy. Samagra Shiksha. An Integrated Scheme for School Education. Framework for Implementation. Government of India. https://samagra.education.gov.in/docs/Framework_IISE%20_F.pdf
 60. Ministry of Mines. National Mineral Policy, 2019. Government of India. <https://mines.gov.in/writereaddata/Content/NMP12032019.pdf>
 61. UK Trade and Investment Department. (2015). Land remediation. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/425619/UKTI_Land_Remediation_REV1.pdf
 62. Central Pollution Control Board (CPCB). (2021). Environmental Guidelines for Decommissioning a Coal/Lignite-Fired Power Plant (Draft). Government of India
 63. Tandon, S., Mitra, A. and Robins, N. (2021). Towards a Just Transition Finance Roadmap for India: Laying the foundations for practical action. https://assets.cdcgroup.com/wp-content/uploads/2021/07/09130404/Towards-a-just-transition-finance-roadmap-for-India_July-2021.pdf
 64. Ibid
 65. Singh, M. (2021). An International Cooperation Framework for Just Transition. Working Paper. International Forum for Environment, Sustainability and Technology (iFOREST). New Delhi, India.
 66. Ministry of Mines. (2015). Pradhan Mantri Khanij Khestra Kalyan Yojana. Government of India.
 67. District Mineral Foundation Portal, Government of Chhattisgarh, and information as obtained from the District Administration of Korba, 2021.
 68. Ministry of Corporate Affairs. The Companies Act, 2013. Government of India. <https://www.mca.gov.in/Ministry/pdf/CompaniesAct2013.pdf>
 69. Ibid
 70. National CSR Portal, Ministry of Corporate Affairs. (2021). Government of India. https://www.csr.gov.in/district.php?csr_spent_range=&act=&year=&compCat=&state=Chhattisgarh&mact=&district=Korba
 71. International Institute for Sustainable Development (IISD). (2018). The Evolution of the Clean Energy Cess on Coal Production in India. <https://www.iisd.org/system/files/publications/stories-g20-india-en.pdf>
 72. Ministry of Rural Development. National Rural Livelihood Mission. Government of India. <https://aajeevika.gov.in/en/content/convergence-partnerships>

-
73. Government of Chhattisgarh. Rajiv Gandhi Kisan Nyay Yojana. <https://pmmodiyojana.in/rajiv-gandhi-kisan-nyay-yojana/>
 74. Government of Chhattisgarh. (2021). Pauni Pasari Yojana. <https://www.yojanahindipm.in/pauni-pasari-yojana-chhattisgarh/>
 75. Government of Chhattisgarh. (2020). Indira Van Mitra Yojana. <https://cscportal.in/indira-van-mitan-yojana/>
 76. Tandon, S., Mitra, A. and Robins, N. (2021). Towards a Just Transition Finance Roadmap for India: Laying the foundations for practical action. https://assets.cdcgroup.com/wp-content/uploads/2021/07/09130404/Towards-a-just-transition-finance-roadmap-for-India_July-2021.pdf
 77. Banerjee, S. (2021). Defining and Framing Just Transition for India. Working Paper. International Forum for Environment, Sustainability and Technology (iFOREST). New Delhi, India.
 78. Coal India Limited (CIL). (April 16, 2021). Incorporation of two wholly-owned subsidiaries of Coal India Limited. <https://www.coalindia.in/media/documents/REG30.pdf>
 79. Ibid
 80. National Thermal Power Corporation Limited (NTPC). (2022). <https://www.ntpc.co.in/en/about-us/business-development/Joint-Ventures-and-Subsidiaries-for-various-sectors>
 81. National Thermal Power Corporation Limited (NTPC). (2022). Power Generation, Renewable Energy. <https://www.ntpc.co.in/en/power-generation/renewable-energy>

Chapter 7: Conclusion

- 1 Bhushan, C., Banerjee, S. and Agarwal, S. (2020). Just Transition in India: An inquiry into the challenges and opportunities for a post-coal future, International Forum for Environment, Sustainability & Technology, New Delhi, India.
- 2 Banerjee, S. (2021). Defining and Framing Just Transition for India. Working Paper. International Forum for Environment, Sustainability and Technology (iFOREST). New Delhi, India.
- 3 Library of Congress, Washington DC, USA. (2020). <https://www.loc.gov/item/global-legal-monitor/2020-08-31/germany-law-on-phasing-out-coal-powered-energy-by-2038-enters-into-force/>
- 4 Ministry of Natural Resources, Government of Canada. (2021). <https://www.rncanengagenrcan.ca/en/collections/just-transition>
- 5 Executive Order on Tackling the Climate Crisis at Home and Abroad, Section 219. (2021, January 27). The White House, USA. <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/>
- 6 The European Commission. (2021). The territorial just transition plans. https://ec.europa.eu/regional_policy/en/information/publications/communications/2021/the-territorial-just-transition-plans#:~:text=it%20includes%20the%20Just%20Transition,force%20on%201%20July%202021.
- 7 Galgoczi, B. (2014). The long and winding road from black to green—decades of structural change in the Ruhr region. *International Journal of Labour Research*, 6:2, 217-240
- 8 Pao-Yu, O., Brauers, H., and Herpich, P. (2020). Lessons from Germany's hard coal mining phase-out: policies and transition from 1950 to 2018. *Climate Policy*, 20:8, 963-979
- 9 Banerjee, S. (2021). Defining and Framing Just Transition for India. Working Paper. International Forum for Environment, Sustainability & Technology, New Delhi, India. <https://iforest.global/wp-content/uploads/2021/11/Working-paper-1.pdf>
- 10 Bhushan, C. and Zeya Hazra, M. (2008). Rich Land Poor People: Is Sustainable Mining Possible? Centre for Science and Environment, New Delhi.
- 11 International Union for Conservation of Nature. https://www.iucn.org/sites/dev/files/import/downloads/glossary_04.pdf
- 12 Belcher, B. and Palenberg, M. (2018). Outcomes and Impacts of Development Interventions: Toward Conceptual Clarity. *American Journal of Evaluation*. 39(4): 478-495.
- 13 International Labour Organization (ILO). (2017). Active labour market policies. https://www.ilo.org/wcmsp5/groups/public/—ed_emp/—gjp/documents/publication/wcms_614301.pdf
- 14 Singh, M. (2021). An International Cooperation Framework for Just Transition. Working Paper. International Forum for Environment, Sustainability and Technology (iFOREST). New Delhi, India.
- 15 Bhushan, C. and Banerjee, S. (2021). Five R's: A Cross-sectoral landscape of Just Transition in India, International Forum for Environment, Sustainability and Technology (iFOREST), New Delhi.
- 16 Ibid
- 17 Ministry of New and Renewable Energy. (2021). Annual Report 2020-21. Government of India. https://mnre.gov.in/img/documents/uploads/file_f-1618564141288.pdf

iFOREST

INTERNATIONAL
FORUM
FOR ENVIRONMENT,
SUSTAINABILITY
& TECHNOLOGY

<https://iforest.global/>

International Forum for Environment, Sustainability & Technology (iFOREST) is an independent non-profit environmental research and innovation organisation. It seeks to find, promote and scale up solutions for some of the most pressing environment-development challenges. It also endeavours to make environmental protection a peoples' movement by informing and engaging the citizenry on important issues and programs.