COMPENDIUM OF ASSET ACCOUNTS ON MINERAL AND ENERGY RESOURCES

FOR THE YEAR 2021-22

SUPREME AUDIT INSTITUTION OF INDIA
लोकहितार्थ सत्यनिष्ठा
Dedicated to Truth in Public Interest

COMPENDIUM OF ASSET ACCOUNTS ON MINERAL AND ENERGY RESOURCES

FOR THE YEAR 2021-22

An initiative of
Government Accounting Standards Advisory Board
under the aegis of
COMPTROLLER AND AUDITOR GENERAL OF INDIA

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Abbreviations

A&E	Accounts and Entitlement
COP	Conference of the Parties
ECOSOC	Economic and Social Council
DMF	District Mineral Foundation
GDP	Gross Domestic Product
GHG	Green House Gas
GoI	Government of India
GW	Giga Watt
IBM	Indian Bureau of Mines
ICAI	Institute of Chartered Accountants of India
IPCC	Inter-Governmental Panel on Climate Change
IPSAS	International Public Sector Accounting Standards
INTOSAI	International Organisation of Supreme Audit Institutions
MMDR Act	Mines and Minerals Development and Regulation Act
MCDR	Mineral Conservation Development Rules
MoM	Ministry of Mines
MoEFCC	Ministry of Environment, Forest and Climate Change
MoSPI	Ministry of Statistics and Programme Implementation
MoPNG	Ministry of Petroleum and Natural Gas
MNRE	Ministry of New and Renewable Energy
MSS	Mining Surveillance System
MH	Major Head
MU	Million units of energy
MW	MegaWatt
NASA	National Aeronautics and Space Administration
NMI	National Mineral Inventory
NMET	National Mineral Exploration Trust
NRA	Natural Resource Accounting
NRSC	National Remote Sensing Centre
SAI	Supreme Audit Institution
SDG	Sustainable Development Goals
SEEA – CF	System of Environmental-Economic Accounting – Central Framework
SOPs	Standard Operating Procedures
TERI	The Energy and Resources Institute
UN	United Nations
UNSTAT	United Nations Statistical Division
UNFCCC	United Nations Framework Convention on Climate Change
UNSC	United Nations Statistical Commission
UT	Union Territory
WGEA	Working Group on Environmental Auditing of INTOSAI
BISAG	Bhaskaracharya Institute for Space Applications and Geoinformatics
GNSS	Global Navigation Satellite System

Foreword

Shri Girish Chandra Murmu,
Comptroller and Auditor General of India

Over the years, there has been increasing awareness about global environmental issues and growing concern about the depletion and degradation of natural resources and the environment. The United Nations is leading the endeavor and has brought out the System of Economic and Environmental Accounting – Central Framework in 2012, the latest internationally accepted framework for resource accounting. Therefore, the first stage implementation strategy commences with preparing Asset Accounts of natural resources.

The Government Accounting Standards Advisory Board (GASAB) of my institution came out with a Concept Paper on Natural Resource Accounting in July 2020, which set out action plans in convergence with the Sustainable Development Goals target of 2030. A Compendium of Asset Accounts on Mineral and Energy Resources in States for 2020-21was released in October 2022. Now GASAB has prepared Asset Accounts on Mineral and Energy Resources for the year 2021-22.

CAG of India is a member of INTOSAI, an international organisation of all Supreme Audit Institutions which recommended that Supreme Audit Institutions should assist their country in preparing NRA. Accordingly, CAG of India decided to take this initiative of compiling Natural Resource Accounting. GASAB, a multi-organisational body functioning under our auspices to offer advice on accounting matters, rose to this challenge.

In respect of selected resources, NRA has to be prepared by the countries who are signatories to SDG declaration 2015. India is a signatory to the SDGs, which makes it important to follow up on the targets for their timely achievement.

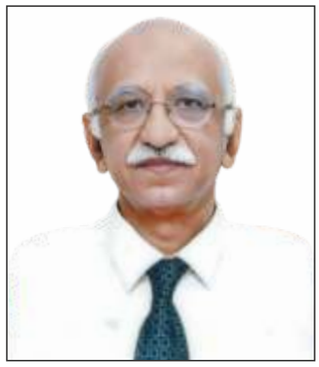
I am pleased to share that we have achieved the first goal within the targeted timeline through collaborative efforts and the active involvement of the State Governments. GASAB has successfully led in 28 States and 3 UTs to build another Asset Accounts on Mineral and Energy Resources for 2021-22. Based on these Asset Accounts prepared in the States, GASAB has come out with a Compendium containing the stock and flow of resources across States and their sustainability along with other inter-related issues like collections of District Mineral Foundation. The Compendium also outlines the areas of focus and possible remedies to improve the overall management of natural resources further.

I congratulate the GASAB team on their achievement. I also convey my gratitude to the members of the State Governments for their constant support, without which this Compendium would not have been possible.

November 2024
New Delhi

(Girish Chandra Murmu)
Comptroller and Auditor General of India

From the desk of the Deputy CAG & Chairperson, GASAB



The Government Accounting Standards Advisory Board (GASAB) was established in August 2002 by the Comptroller & Auditor General of India with the support of the Government of India. In addition to its endeavor to formulate Government Accounting Standards, GASAB has also been working on natural resource accounting for nearly four years.

The Concept Paper released in 2020 envisaged a three-pronged action plan to prepare Asset Accounts on targeted resources, namely mineral and energy resources, water resources, forestry, and wildlife and land resources.

GASAB previously prepared Guidelines/SOPs and handheld the States in finalising the draft of Asset Accounts for 2020-21 on a sustained basis. In addition, we developed a two-stage validation and verification process to ensure that figures included in the Asset Accounts were accurate, viz. a validation of the State Governments and a limited verification/test check by the Field Offices of the CAG. It resulted in a set of Asset Accounts on Minerals and Energy Resources in States for the year 2021-22.

GASAB has, now come up this Compendium of State Asset Accounts on Mineral and Energy Resources for the year 2021-22. The Paper compiles the minerals and energy resources into categories like major and minor minerals and fossil fuels and includes other related matters. In addition, we have included the innovations and good practices observed during the study and suggested improvements for better management of resources.

I would like to place on record my appreciation for the effort put in by the GASAB team, especially Shri Pramod Kumar, Additional Deputy CAG, and Mohd. Parwez Alam, Principal Director/GASAB-II in the finalization of this Compendium.

I sincerely hope the stakeholders will find the Compendium useful, and it acts as a stimulus for further work on the subject. I request that the States and other authorities in GoI take the opportunity to look into the observations and offer suggestions. I am sure that this document will also aid in optimising revenue realisation and ensuring sustainability in economic management.

November 2024
New Delhi

(Jayant Sinha)
Deputy CAG & Chairperson, GASAB

Subject Matter Expert's Take

(Mukul Sanwal)
IAS 1971 (retd.)
Hon'ble Member of Consultative Committee on NRA

The second Accounts on Mineral and Energy Resources, which are for the year 2020-2021, demonstrate how sustained effort can lead to steady improvements in an area where data is fragmented.

The manner in which these accounts have been generated by the States and good practices shared under the technical guidance of the officers of the Comptroller and Auditor General, is a testimony to cooperative federalism.

In a landmark judgment on July 25, 2024, the Supreme Court ruled that states have the power to tax mining activities and collect royalties from mining leaseholders. This clarification will benefit States more with some uniformity in approach amongst States for which these accounts provide a good basis.

Building these accounts capturing the data at the mine/licensee level is path-breaking. It links the District, State and national levels seamlessly. It also enables end-to-end tracking linking supply and demand with value. These accounts place mining central to economic growth and societal development in a number of ways.

First, they enable scientific assessment of royalties. This is an area where not just the quantity but also the grades of the ores is relevant, as the value depends on the grade.

Second, the Assessment points to the need for GOI and State Governments to reconcile the aggregate data reported to the Indian Bureau of Mines with mine level data, which could begin starting with select States and Sectors.

Third, the States would do well to compare sale prices for different grades to identify variations and plug leakages.

Fourth, a legacy issue is that the classification of major and Minor Minerals depends on end-use, for example, in limestone, used in the production of cement which is rapidly growing. Similarly, sand mining in riverbeds will grow with urbanization with implications for water flow in rivers and has been a neglected area. These accounts will lead to better decision-making by the States in areas that are of direct benefit to them.

Fifth, coal has its own unique arrangement and needs to be part of the common framework.

The message of the report is that with a national market, as in the case of GST, for revenue enhancement in States there is a need to develop a central reporting and assessment system to cover all the stages, supplemented with the use of geo-tagging, drones and satellite monitoring.

Urbanization will increase from the present levels of less than 50 percent to 75 per cent when we become a developed country by 2047. To support this transformation mining activity and its importance for revenue, economic growth and the environment will increase rapidly. The CAG has made a significant contribution to the national effort by focusing on a vital but neglected aspect, that is, the accounting framework for evidence-based decision-making in a cooperative frame.

Message of Director General, TERI

Natural Resources Accounting for Mineral and Energy Resources is an important first step towards understanding issues relating to sustainable consumption and production in this sector.

TERI has been engaged with GASAB from the year 2020 in its work relating to Natural Resource Accounting. It has worked with GASAB in the preparation of Concept paper on Natural Resource Accounting in India and was .also involved in preparation of Compendium of Asset Accounts on Mineral and Energy Resources for the year 2020-21.

I would like to take this opportunity to compliment the Government Accounting Standards Advisory Board (GASAB) under the aegis of Comptroller and Auditor General of India for the continued focus on Natural Resources Accounting, leading to the next edition of the Compendium of Asset Accounts on Mineral & Energy Resources for the year 2021-22. It is also heartening to note that GASAB has also engaged in working towards capacity building for all concerned stakeholders including the State Government in the field of Natural Resource Accounting. GASAB's efforts have resulted in the compilation of Asset Accounts on Mineral and Energy Resources for two consecutive years. Against 28 States and 1 UT of J&K for the year 2020-21, GASAB has also expanded the Asset Accounts to include 28 States and 3 UTs for the year 2021-22. TERI is happy to part of India's Natural Resources Accounting Canvas, which dovetails with the internationally accepted System of Environmental-Economic Accounting — Central Framework.

I once again congratulate GASAB and CAG for this pathbreaking work which truly has the potential to bring paradigm shift in policies and perceptions to protect nature and the planet.

(Vibha Dhawan)
Director General
The Energy and Resources Institute.

November 2024
New Delhi

Preface

Natural Resource Accounting intends to capture the intimate interplay between various components of the natural environment and the economy. This would not only enable the measurement of resources thereby leading to its better management but would also help to quantify the adverse impact of economic development on environment resulting in sustainable development.

The Concept Paper prepared by GASAB was released in July 2020. This laid down the road map for implementation of NRA in India with its unique three-pronged strategies in consonance with the SEEA – CF (latest UN mandated internationally accepted framework) for achieving the targets set under SDGs 2030.

The final templates were released to the State Governments in October 2021 for implementation and preparation of the Asset Accounts on Mineral & Energy Resources of States. This year one mother table and nine additional tables were communicated to the States for preparation of the Asset Accounts for the year 2021-22.

We have constantly monitored the progresses in the States in preparation of Asset Accounts through Quarterly meetings of NRA cells (constituted in each state having representation from State Governments and CAG field offices) of 28 States and 3 UTs involved in this project. This provided a unique platform for regular exchange of ideas, concerns and quick resolution of issues. Previously we have also issued numerous advisories and Guidelines assisting the States in filling up the templates. In order to guide the NRA cells and streamline the procedures, previously Standard Operating procedures (SOPs) were also released and the Quarterly meetings with the Officers and staff of not only the State Accountants General but also for the State Government.

Collaborative efforts brought results as we could complete the preparation of Asset Accounts for the year 2021-22 in 28 States and 3 UTs. These accounts have been validated by the State Governments to ensure correctness of the facts and figures and then test checked by our field offices to ensure that the figures included in the Asset Accounts are based on supporting documents available on record of the State Government departments.

I am sure that this novel effort to build the Asset Accounts of Mineral and Energy Resources for the year 2021-22 in the Country will be taken forward by the Union as well as the State Governments in right earnest till it settles down in a couple of years as envisaged by SEEA framework for new entrants in this arena.

I would like to acknowledge the efforts put in by the State Government Departments Offices and the offices of Accountants General for making this huge exercise possible. Hope that it will be continued in future years also.

(Pramod Kumar)
Additional Deputy CAG (Staff & GASAB)

November 2024
New Delhi

Officers Associated with the Project

National Compilation on Asset Accounts of Mineral & Energy Resources in States for the Year 2021-22

Shri Jayant Sinha, Dy. CAG & Chairperson, GASAB
Shri Pramod Kumar, Additional Deputy CAG, GASAB
Mohd. Parwez Alam, Principal Director, GASAB
Ms. Krishna Chaki, Sr. Admin Officer, GASAB/NRA

National Compilation on Asset Accounts of Mineral & Energy Resources in States for the Year 2020-21

Shri K Srinivasan, Dy. CAG & Chairperson, GASAB
Shri R M Johri, Additional Deputy CAG, GASAB
Shri S N Biswas, Sr. Admin Officer, GASAB/NRA
Ms. Krishna Chaki, Asst. Admin Officer, GASAB/NRA

Guidelines and SoPs on continuous data collection and end-to-end mapping of supply and use of resources

Ms Parveen Mehta, Dy. CAG & Chairperson, GASAB
Shri R M Johri, Additional Deputy CAG, GASAB
Shri S N Biswas, Sr. Admin Officer, GASAB/NRA

The booklet on templates of Asset Accounts on Mineral & Energy Resources

Ms Parveen Mehta, Dy. CAG & Chairperson, GASAB
Shri R M Johri, Additional Deputy CAG, GASAB
Shri S N Biswas, Sr. Admin Officer, GASAB/NRA

Concept Paper on implementation of NRA in India

Ms Anita Pattanayak, Dy. CAG & Chairperson, GASAB
Shri K. K. Srivastava, Additional Deputy CAG, GASAB
Shri Ashok Sinha, Principal Director, GASAB
Shri S N Biswas, Sr. Admin Officer, GASAB/NRA

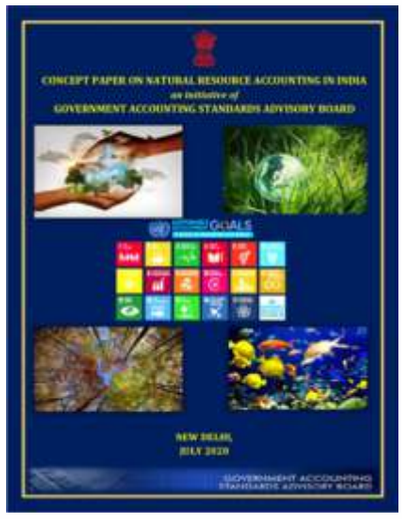
Disclaimer

Preparation of Asset Accounts is part of four-stage implementation strategy coined by the System of Environmental-Economic Accounting – Central Framework. This in turn is part of the Sustainable Development Goals to which India is a signatory. Thus, preparation of Asset Accounts on selective resources is an obligation for the country to be able to meet the international commitments.

The Government Accounting Standards Advisory Board under the aegis of institution of Comptroller and Auditor General of India provided technical guidance and support in this endeavour. The Accounts were prepared by the States and then validated by them and test checked by the State Offices of CAG of India. The endeavour of GASAB through its Accountants General Offices in States is only aimed at handholding the States in implementing Natural Resource Accounting commencing with the preparation of the Asset Accounts on Mineral and Energy Resources in a robust manner at par with the requirements of internationally accepted SEEA-CF framework. It is expected that the Asset Accounts would be prepared by the State Governments on regular basis, once the process is stabilised.

The Compendium of Asset Accounts for the year 2021-22 has been prepared solely based on information/data provided by the concerned State Governments concerned and GASAB/CAG of India does not take any responsibility in this regard.

Previous Publications on NRA

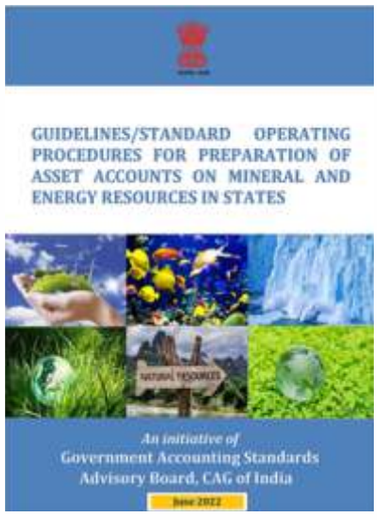


Concept Paper (7/20)

https://gasab.gov.in/gasab/pdf/NR-Accounting-final.pdf

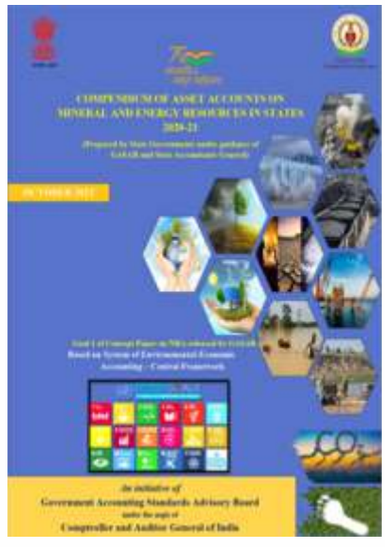
Booklet on templates (10/21)

https://gasab.gov.in/gasab/pdf/TemplateAssetAc.pdf



Guidelines/ SOPs for filling the templates and way forward (6/22)

https://gasab.gov.in/gasab/pdf/Guidelines_June2022.pdf



Compendium of Asset Account in States on Mineral and Energy Resources (10/22)

https://gasab.gov.in/gasab/pdf/Compendium-of-Asset-final.pdf

Executive Summary

The GASAB Section in CAG's Office had come out with a Concept Paper on NRA in India in July 2020 which, inter-alia, envisaged a three-term plan for implementation of NRA in India in consonance with the strategy enshrined in the SEEA – CF of the UN. The GoI prioritised the resources namely mineral and energy, water, forestry & wildlife and land resources based on the international trends and good practices. Of these, mineral and energy resources were prioritised by GASAB based on their importance towards the economic activities, impacting directly the climate change and need for their sustainability for future generations due to their finite nature.

GASAB has also Consultative Committee consisting of stakeholder ministries in GoI, regulatory agencies, environmental resource centers, State Governments across the country to support the endeavor with technical knowhow and expertise.

In view of the national declaration at the Conference of the Parties (CoP) 26 at Glasgow, efforts were made by GASAB to incorporate templates for collating information on carbon emissions and progress in generation of renewable energy in States. These were intended to help the States and the Union to have a bird's eye view of the progress made towards meeting the targets committed by the country at the CoP 26.

Besides the overall implementation strategy, the SEEA – CF also allows flexibility to generate and design the framework keeping in view country specific needs. Accordingly, in addition to the Asset Accounts, some more information have been embedded into the framework while designing the tables like working out the sustainability of resources, collection of DMF, NMET etc. would extensively help the policy makers with evidence based decision making.

Key elements to be captured by the tables designed are:

Table 1

Mother table of Asset Accounts - retained the same as prescribed by SEEA - CF

Table 2

Physical flows and sustainability of resources. Extraction/use in different sectors - Government and Private Sector. Domestic vis-a-vis export data comparisons.

Table 2A/2B

Designed to capture riverine resources (physical and valutions) which often follow a system of accumulation and depletion - without stock availability.

Table 3

Two pronged valuation - revenues and average sale/market value - to ascertain revenue streams for future and analyse royalties vis-a-vis market value to optimise resource for State exchequer.

Table 3A

Data on illegal mining detected by Department

Table 4

Designed to capture actual extraction - production therefrom and dispatch - to analyse production losses.

Table 5A/5B

Designed to capture District Mineral Foundations/National Mineral Exploration Trust etc. recoveries vis-a-vis those recoverable.

Table 6

Designed to capture sector wise power requirement, energy generated within the state from non-renewable and renewable energy resources with their percentage contribution to monitor achievement of national target of attaining 50 per cent of energy generation from renewable energy resources by 2030.

The work on preparation of the Asset Accounts in the States commenced with joint efforts of the Accountants General Offices and the State Governments with formation of State NRA Cells. Presently, State NRA Cells are functional in all 31 States including UTs. GASAB continued to handhold the States through quarterly meetings to ensure that all States complete the project within the stipulated timeline. The joint effort bore results as all 31 States including UTs, completed the preparation of Asset Accounts on Mineral and Energy Resources for 2021-22. Delhi reported nil repository of mineral resources.

The Asset Accounts, once compiled, are designed to aid in evidence based decision-making and good governance by providing the following for the policy makers.

- ***Preparation of NRA in compliance to the requirements of SEEA Framework to meet the commitment made under SDGs and monitor progress on declarations under COP 26.***
- ***Resources at a glance - a one pager document on State-wise resources.***
- ***Compilation of physical and monetary values to enable cross verification of revenues vis-à-vis actual extractions.***
- ***Provide pace of exploitation to bring out sustainability of resources - in years.***
- ***Analysis of revenue vis-à-vis market value/export value will make it easier to assess and review the royalty rates to protect State's revenue interest.***
- ***Enable assessment of revenue streams for the future.***
- ***Mine-wise data on resources – pan India.***
- ***Enabler of identification of alternate resources (economic as well as energy),***

Salient features brought out in this publication are as follows:

Coverage

43 major minerals, 86 minor minerals and all 4 fossil fuels covered. The stock and flow of resources have been captured commencing with the opening stock as on 1 April 2021, additions and reductions during the year and the closing stock as on 31 March 2022. Details of stock and flow of significant resources are shown below while detailed physical flows are in **Annexures V to VII:**

Fossil Fuels (all)

Stock and flow	Break-up	Coal	Lignite	Crude Oil/Petroleum	Natural Gas
No of States involved		14	4	7	7
				In million tonnes	***In million cum***
Opening Balance		1,05,035.91	7,902.68	903.97	301575.19
Addition		468.86	7.03	3.98	5254.67
Upward Reappraisals		2882.89			
Extraction	Govt. Sector	723.94	36.94	14.24	6,815.08
	Private Sector	44.48	0.06	0.31	2,350.90
	Others	1.34	10.26	0.018	841.47
	Total	769.76	47.26	14.57	10,007.45
Downward Reappraisals				0.03	665
Closing Balance		1,07,617.90	7862.45	893.38	2,96,157.41

Major Minerals (significant ones)

Sl. No.	Name of Mineral	No. of States involved	Stock and Flow of resources				
			Opening Balance	Additions	Extractions		Closing Balance
					Breakup	Total	
					Government		
					Private		
					Others		
							In million tonnes
1.	Limestone	23	87,157.21	1,731.86	1.27	346.04	88,543.03
					245.81		
					90.64		
2.	Iron Ore	11	6615.27	683.63	91.64	227.84	7,071.06
					131.45		
					4.75		
3.	Magnesite	3	313.54	Nil	0.031	0.10	313.44
					0.069		
					0		
4.	Bauxite	8	440.18	680.60	10.97	21.89	1,098.89
					10.92		
					0		

Sl. No.	Name of Mineral	No. of States involved	Stock and Flow of resources				
			Opening Balance	Additions	Extractions		Closing Balance
					Breakup	Total	
					Government		
					Private		
					Others		
							In million tonnes
5.	Copper ore	3	152.95	5.21	2.44	5.32	152.84
					0		
					2.88		
6.	Manganese	8	105.06	62.58	0.78	2.39	165.25
					1.60		
					0.01		
7.	Rock Phosphate	2	79.47	Nil	0.01	1.02	78.45
					0.10		
					0.91		
8.	Silver	1	74.67	Nil	0	0.0004	74.67
					0		
					0.0004		
9.	Chromite	2	65.83	Nil	1.16	3.77	62.06
					2.61		
					0		
10.	Lead Zinc Ore	1	28.73	Nil	0	3.11	25.62
					0		
					3.11		

Innovations and good practices

A number of innovative approaches and good practices were observed during the course of the study ranging from amendments in the statutes to development of mining surveillance system and efforts to geo-tag and geo-fence the mining areas by MoM, GoI and States. satellite based monitoring methodologies in control and monitoring mining activities, IT enabled monitoring of mining and usage of resources. Some States have implemented the Automated Mineral Administration System- Online Mineral E-permit System (OMEPS) which mandates all district field offices to upload data into OMEPS ensuring uniform data entry and accessibility. The Vehicle Tracking System and Vehicle Tracking Devices based vehicle tracking system was also introduced by some States. A software to bring IT intervention to track the ore extraction and its transportation was implemented by some other States. The system tracks the production of mineral ore at the mining leases and provides for online payment of Royalty, DMF, GIOPF, NMET contributions.

Way Forward

While the compilation of Asset Accounts would be a continuing process, based on the efforts of the Central and State Governments/UT authorities, emerging challenges, good practices, the following are some of the areas/issues of importance needing attention in the near and long term.

- ***Implementation of Government of India's initiatives on –***

  - curbing illegal mining
  - checks on classification of grades at mine-head

- ***Streamlining and firming up the quarterly reporting framework designed by GASAB for generation of data and compilations of Asset Accounts***

- ***Proper Assessment of royalties based on grade-wise mineral reporting in States/UTs to prevent short collection of revenues***

- ***Expanding the control & monitoring on grade-wise reporting for major minerals for minor minerals as well for better control and monitoring of these resources***
- ***Variations in average sale prices – need for structured mechanism to prevent loss of revenue***
- ***Preparation of statement of receipts and expenditure on management of resources and mitigation of environmental degradations from Asset Account year 2022-23***
- ***Implementing the 360 degrees mapping of minerals as envisaged in Rule 45 of MCDR***
- ***Mapping of datasets of GST and Mining Departments***
- ***Development of a Pan-India application for capturing real time information on stock and flow of resources at the mine-head***

The suggested Way Forward are as follows:

Implementation of Government of India's initiatives

Suggested way forward: *These good initiatives need to be followed up with an outcome oriented system to ensure that the desired benefits of the programmes are accrued for closer monitoring on mineral extractions, productions, dispatches on correct measurement of grades, volume, sale prices and royalties till they are finally consumed or exported out of the territories.*

Firming up the quarterly reporting system

For correct measurement and reporting of the mineral extraction, production etc. at the mine-head, there is a need for a structured data capture and reporting mechanism with necessary controls and certifications. GASAB had designed a reporting mechanism aimed at capturing the data the mine-level with departmental certifications to ensure credibility and system of compilations at the Directorate level before transmitting the data to the Accountants General Offices for final consolidation.

During the preparation of Asset Accounts 2021-22, some delays were observed in various States with respect to timely furnishing of verified data.

Suggested way forward: *States with Electronic Data Processing Systems may modify the e-Permit system to incorporate the aforementioned procedures. Whereas, States with Manual Data Processing Systems may add appropriate manual reports or returns to integrate with the aforementioned data flow.*

Proper assessment of royalties based on grade wise mineral productions and correct disclosure of average sale prices

Suggested way forward: *There is a need for a more robust system of cross linking of datasets of IBM and the State Governments for major minerals in the interest of Government revenues.*

Also, the guidelines of MoM, GoI of October 2023 need to be implemented by the States/UT and closely monitored by the MoM, GoI.

Though under the purview of State Governments/UT authorities, there is a need for over-arching control of MoM, GoI on correct reporting of grade-wise productions/dispatches, mechanisms adopted for fixation of royalties for proper management of minor minerals in the country.

Preparation of Statement of receipts and expenditure on management of resources and mitigation of environmental degradation

Suggested way forward: *The statement on receipts from exploitation of resources and expenditure on management of resources and mitigation of environmental degradation needs to be prepared from next Asset Accounting year, i.e. 2022-23 by the State Governments/UT authorities.*

Implementation of 360 degrees mapping of minerals

Suggested way forward: *In order to harness the benefits of reporting requirements of Rule 45 of MCDR, MoM, GoI may institute a program for mapping the movement of all major minerals – licensee wise from mine-head till these are consumed/exported out of the territories to detect any variations/mis-reporting in the interest of improved management of resources and optimisation of revenues.*

Further, similar system of centralised reporting mechanism with scope for end to end mapping need to be instituted for minor minerals as well for their greater control, monitoring and policy decisions.

Ministry of Coal may also consider amending their reporting requirements in the lines of MCDR for preventing pilferage, if any, in greater interest of mineral management of the country.

Mapping the GST and Mining datasets

Suggested way forward: *The departments of mining and GST, both at the State/UT level and at the Centre needs to coordinate and consider how the e-way bill and mineral movement challan modules could be mapped for harnessing the benefits of electronic reporting systems implemented by both the departments in mutual interest.*

This is another way forward for preventing pilferage of minerals, erroneous reporting on grades of minerals produced or their average sale values which would help assess the correct royalties as well as GST payable on minerals.

CHAPTER

I

NATURAL RESOURCE ACCOUNTING – THE CONCEPT, RELATION WITH SUSTAINABLE DEVELOPMENT, GOALS AND CLIMATE CHANGE

NATURAL RESOURCE ACCOUNTING – THE CONCEPT, RELATION WITH SUSTAINABLE DEVELOPMENT, GOALS AND CLIMATE CHANGE

1.1 NRA – The Concept

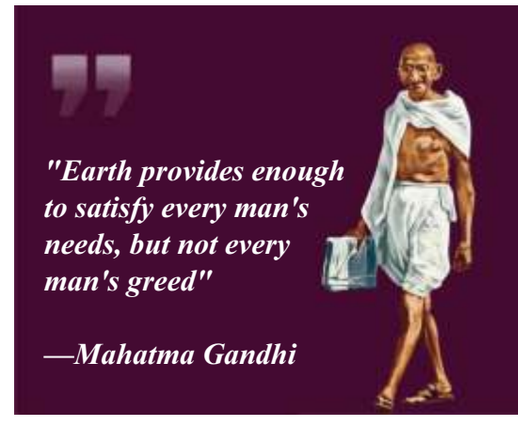
Natural resources play a crucial role in economic development of a country and their sustainable exploitation is critical to ensure inter-generational equity. In its quest for rapid economic development mankind has over exploited these resources resulting in harmful impact on the environment. There is a consensus among the governments that this cannot continue and hence there is an urgent need to devise mechanism for economic development which is sustainable.

"Measurement of resources leads to its better management."

The impact of climate change can be evidenced by extreme weather conditions. The impact is so severe that it has become a subject of discussions at all global and multilateral forums.

Growth is clearly the major engine to create livelihood options; yet, its increasing reliance on mineral resources leads to many negative externalities. The paradigm of resource-led economic development is not sustainable and hence it has become necessary to strike a balance between uses of natural resources vis-à-vis economic growth. Responding to these global concerns and to formulate 'a global agenda for change', the UN had set up (1983) the World Commission on Environment and Development known as the "Brundtland Commission" which, for the first time, coined (1987) the idea of "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" or 'Sustainable Development".

Degradation of earth over years

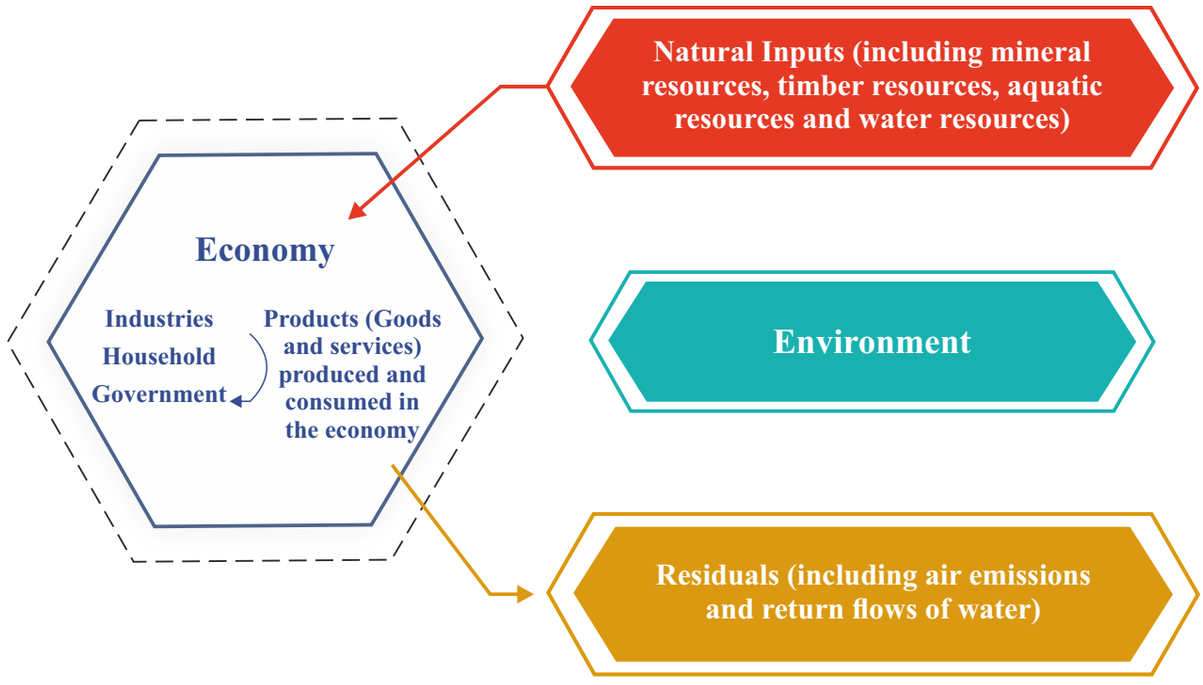


This was followed up in the Earth Summit held at Rio De Janeiro, Brazil in 1992. The historic Agenda 21 agreed upon by the 172 governments in attendance was adopted as a - *a first step towards the integration of sustainability into economic management is the establishment of better measurement of the crucial role of the environment as a source of natural capital and as a sink for by-products generated during the production of man-made capital and other human activities. As sustainable development encompassing social, economic and environmental dimensions, it is also important that national accounting procedures are not restricted to measuring the production of goods and services that are conventionally remunerated - A program to develop national systems of integrated environmental and economic accounting in all countries is proposed.*

Conventional accounting captures data only of the measurable economic activity and does not weigh the environmental inputs. On the other hand, the environmental statistics are often developed with a particular objective and neither caters to the larger picture, nor could be related to other datasets. To overcome this shortcoming and to capture the intimate interplay between the economic indices and the various components of the natural environment, the concept of NRA has emerged. The concept is depicted through the diagram below:

Eco-Environmental Accounting or NRA

- ✓ Intends to capture the **intimate interplay** between various components of the natural environment and the economy
- ✓ Can connect to other datasets to provide invaluable information on the larger picture **connecting environment with the economy**
- ✓ Able to help **quantify the adverse impact on environment** due to economic development and aid to sustainable growth



The idea is to quantify the environmental inputs of the economic development and expenditure incurred on mitigating environmental degradation due to exploitations and other activities and embed these input and output related costs while arriving at the economic parameters or the GDP to arrive at the Green GDP. While enabling attainment of the larger picture of amalgamation of economic and environmental accounting, it would assist mainly the policy makers in taking policy

decisions in respect of matters affecting environment directly and indirectly and bring us in a position to use our resources on a more sustainable basis and reducing the negative impact on the environment.

The idea emerging from the Earth Summit was followed up in 2002 (Rio+10), 2012 (Rio+20) giving birth to the System of Environmental-Economic Accounting – Central Framework (SEEA-CF) in 2012 which is the latest internationally accepted framework also known as the concept of NRA. Further, follow up towards all sustainable development was the adoption of SDG's in 2015. The development through the year are depicted in the block diagram below:

Important Milestones

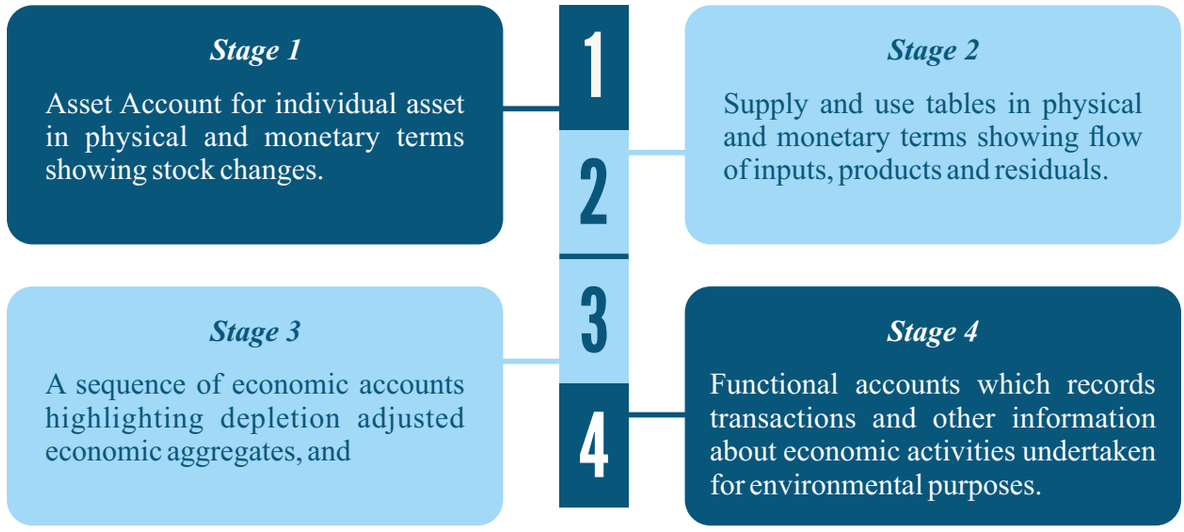
UN led framework since 1970s. Brundtland Commission Report - 1987

A global agenda for change- hinged on the concept of sustainable development as an alternative to unfettered economic growth

Defined sustainable development as development that meets the need of the present without compromising the ability of future generations to meet their own needs

This was followed up in the Earth Summit at Rio in 1992 and successive follow up meetings as shown alongside

The SEEA-CF prescribes a four-stage implementation process by compiling the following accounts as mentioned below:



However, while prescribing the aforesaid milestones for implementation of NRA across the world, the SEEA-CF has also envisaged constraints to be faced by the countries in implementing NRA. SEEA-CF, thus, prescribed for flexibility in designing the accounts based on the specific environmental issues faced by a government. Depending upon the specific environmental issues faced, a country may choose to implement only a selection of the accounts included in the SEEA-CF. The SEEA-CF provides that even if a country does not desire eventually to implement the full system, it may decide to focus its initial efforts on those accounts that are most relevant to current issues.

1.2 Purpose and aim of NRA

The main purpose of NRA is to provide a framework for the collection and organisation of information on the current status, and utilisation and value of natural resources and environmental assets during a particular timeframe for economic development. As such, it is an important link in the chain of sustainable development.

It also involves assessing the expenditures on initiatives undertaken for environmental protection and natural resource management. Further, NRA is needed to combine national income and product accounting concepts, with analysis of natural resources and environmental issues.

The aim of NRA is to provide information on the state of natural resources and the changes affecting them. As such, it is an important link in the chain of sustainable development. The term 'sustainable development' is taken to mean a form of development which is capable of meeting the needs of the present generation without jeopardizing the ability of future generations to meet their own needs.

Environmental accounting or NRA aims to provide a framework for organizing information on the status, use, and value of natural resources and environmental assets as well as expenditures on environmental protection and resource management. Natural resource accounts differ from other data as they are organized in terms of stocks and flows.

NRA also combines national income and product accounting concepts with analysis of natural resource and environmental issues. The development of resource accounting is generally perceived as having gone along two different paths; these are characterised as "physical" accounts and "monetary" accounts.

1.3 Linkage between SDGs & NRA

The Sustainable Development Goals (SDGs) established by the United Nations in 2015 having 17 goals and 169 associated targets provide a comprehensive framework for global efforts towards sustainable development. These goals encompass a wide range of social, economic, and environmental objectives aimed at addressing global challenges such as poverty, inequality, climate change, environmental degradation, peace, and justice. Natural Resource Accounting plays a crucial role in supporting and contributing to the achievement of these SDGs in several keyways:

SDG-6: Clean Water and Sanitation

Ensuring clean water and sanitation for all has placed "water" firmly on the global agenda. Without water, the other development goals such as ensuring healthy lives, ending hunger, boosting economic growth and others will not be achieved.

SDG 7: Affordable and Clean Energy

NRA supports the transition to affordable and clean energy (SDG 7) by assessing the environmental impacts and resource constraints associated with energy production and consumption. It helps in valuing renewable energy sources, evaluating energy efficiency measures, and integrating environmental considerations into energy policies and investments

SDG 8: Decent Work and Economic Growth

Connection with NRA: NRA contributes to sustainable economic growth (SDG 8) by integrating natural resource and environmental factors into economic planning and decision-making. It helps in valuing natural capital, assessing the economic impacts of resource depletion and environmental degradation, and promoting investments in sustainable technologies and industries. This supports the creation of green jobs and economic opportunities while ensuring long-term resource sustainability.

SDG 12: Responsible Consumption and Production

NRA helps in measuring and managing natural resource use and consumption patterns. By tracking resource extraction, consumption rates, and waste generation, NRA supports efforts to promote sustainable consumption and production patterns (SDG 12).

SDG 13: Climate Action

Climate change mitigation and adaptation efforts (SDG 13) are closely linked to natural resource management. NRA contributes by assessing the impacts of resource extraction and land use changes on greenhouse gas emissions. It helps in valuing carbon sinks, such as forests and wetlands.

SDG 14: Life Below Water

Conserve and sustainably use the oceans, seas and marine resources for sustainable development. NRA contributes by valuing marine and terrestrial biodiversity, assessing ecosystem services (e.g., fisheries, pollination), and tracking changes in ecosystem health and biodiversity loss.

SDG 15: Life on Land

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation and halt biodiversity loss.

1.4 Climate Change –Its Connect with NRA

Climate change is a major challenge which directly impacts the environment, economy and social wellbeing of every person on Earth and of future generations. The Paris Agreement, a landmark pact to combat climate change, signed by 184 countries in April 2016, launched an ambitious global effort to reduce greenhouse gas emissions and adapt to a changing climate.

SEEA accounts are well-suited to support climate policy at all levels of government. Its integrated approach, building on existing greenhouse gas emission inventories along with other climate change data, provides a complement to the existing Intergovernmental Panel of Climate Change (IPCC) framework. The SEEA's alignment with the System of National Accounts makes it helpful for understanding issues like the climate footprint of different economic activities, the vulnerabilities of different economic sectors to climate impacts, and the current levels of expenditure on climate mitigation and adaptation.

International Reporting: Countries use natural resource accounting to report on environmental sustainability and progress towards international agreements like the Sustainable Development Goals (SDGs) and the Paris Agreement on climate change. These frameworks emphasize the importance of integrating climate change considerations into national accounting systems.

Climate-related uses of the SEEA, include:

- Assessing the role of economic activities and household consumption in generating emissions and informing mitigation strategies by providing consistent information by economic sector on energy use (by type) and the resulting air emissions from agriculture and changes in land use, the value of investments in mitigating technologies, as well as the distribution of emission (or carbon) credits.
- Informing adaptation strategies by tracking expenditures and investments on adaptation by economic sectors or household and analyzing impacts in terms of changes in condition of ecosystems, disasters, and reduced production, for example of crops.
- Providing a comprehensive overview of how much carbon is stored per ecosystem type (and in carbon pools) and how this develops over time due to sequestration, deforestation and afforestation, as well as harvesting, forest fires etc.
- Assessing how climate change impacts economic activities and households, through the effects it has on ecosystems and the services they provide. The accounts can also be used to assess issues such as land degradation, water shortages and biodiversity. They can serve as inputs into scenario modelling linking economic activities and the environment.
- The SEEA complements some of the approaches used by the IPCC framework to provide a comprehensive picture of the economy-environment relationship. For example, the air emission accounts are constructed differently to the national emission inventories established under the international conventions, such as the UN Framework Convention on Climate Change UNFCCC and the Convention on Long-Range Transboundary Air Pollution (CLRTAP). This is because the SEEA uses the classifications, definitions and concepts of the System of National Accounts, which in turn allows the information in the SEEA to be coherently linked to indicators such as GDP.

1.5 Conclusion

NRA is integral to achieving the SDGs by providing the data, analysis, and insights needed to integrate environmental sustainability into economic decision-making. By valuing natural capital, assessing resource depletion, and monitoring environmental impacts, NRA supports policies and strategies aimed at promoting sustainable development, combating climate change, protecting biodiversity, ensuring resource efficiency, and fostering inclusive growth. Thus, NRA plays a crucial role in advancing global efforts towards a sustainable future as outlined by the SDGs.

CHAPTER

II

GASAB'S ROLE IN IMPLEMENTING NRA

GASAB'S ROLE IN IMPLEMENTING NRA

2.1 About GASAB

The Government Accounting Standards Advisory Board (GASAB) established in August 2002 by the Comptroller and Auditor General of India is a representative body of the Central and State Governments with the responsibility of formulating, proposing and improving standards of government accounting and financial reporting. It, *inter-alia*, includes representatives of heads of all accounting services, Additional Secretary/Joint Secretary Budget, Government of India, four State Governments in rotation, heads of ICAI, TERI among others and is headed by Deputy Comptroller & Auditor General as the Chairperson.

The accounting systems, the world over, are being revisited with an emphasis on the transition from rule to principle-based standards and migration from cash to the accrual-based system of accounting. **GASAB, as a nodal advisory body in India**, is taking similar action to formulate and improve standards of government accounting and financial reporting and enhance accountability mechanisms.

2.2 Initiative of GASAB under the aegis of CAG of India in implementing NRA

Constitutional Provisions of CAG of India/ INTOSAI/WGEA: Under the Constitution, CAG of India has been given a constitutional mandate to advice on the accounting principles, formats standard operating procedures and guidelines for the preparation of accounts.

The CAG's institution is a member of the INTOSAI (International Organisation of Supreme Audit Institutions), which is an autonomous, independent and non-political organisation. This gives an opportunity to have access to the best practices being followed world over in respect of accounting and auditing practices. The Working Group on Environmental Auditing (WGEA) in its report – 'Environment Accounting – current status and options for SAIs' has stated that SAIs can assist in the development of environment accounts by:

- Identifying challenges to applying environmental accounting in their country;
- Recommending strategies to overcoming challenges;
- Identifying goals for developing environmental accounts;
- Identifying agencies and organisations that compile information useful for NRA, and/or
- Identifying best practices in NRA.

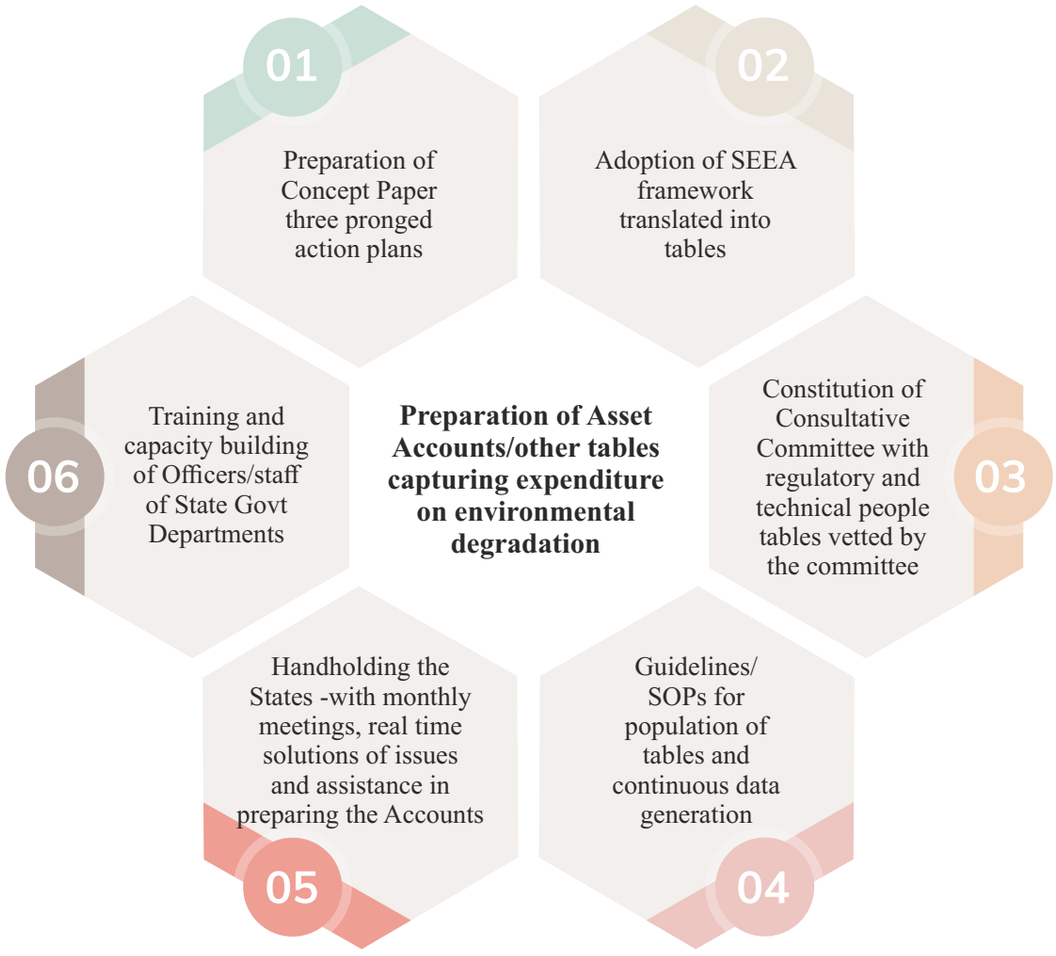
CAG being the supreme auditor for the nation has the responsibility to –

- Use environmental accounts in program audits to assess the effectiveness of environmental policies and programs, whether or not government programs are complying with national laws;
- Use environmental accounts to determine the government's compliance with the reporting requirements of international conventions.
- Natural resource accounts on mineral and energy resources can only be initiated at the State Government level as the production and excavation happens only at the mine level which is necessary to be captured for the preparation of natural resource accounts on minerals and energy resources.

CAG is in a unique position to play a critical role to enable the process of preparation of environmental accounts as it not only has the access to internationally accepted best practices but have constitutional mandate to advise and assist in accounting matters.

Moreover, CAG institution has a Pan-India presence in every State which can play vital role in training and hand holding the officers/staff involved in generation of data which will become the basis of preparation of natural resource accounts.

The processes involved in GASAB, endeavour is depicted through the block diagram below.



The action plans- unique features of our framework

Flexibility

- Cut off of Asset A/c year- (enable co- relation and authenticity of stock)
- States collaborated to select the minerals- to start with imp minerals - to be expanded to cover all (SEEA allows)
- Riverine resources covered separately

01

Country specific needs

- Sustainability of resources
- Comparison between revenues and market prices
- Analyse production losses revenue yields
- System driven to plug loopholes, if any

02

Others

- Map supply and use of resources
- Incorporate ancillary data like DMF, NMET etc to make the datasets complete
- Data required for monitoring national declaration at COP 26 carbon emission and generation of renewable energy

03

The three term goals designed by GASAB in consonance with the four-stage strategy suggested by the SEEA-CF of the United Nations, are mentioned below:

Short term goals

- Preparation of Asset Accounts on Mineral and Non-Renewable Energy Resources in States
- Initiation and preparation of disclosure statement on revenues and expenditure related to natural resources

(2019-20 to 2021-22)

Mid-term goals

- Preparation of National Asset Accounts on Mineral and Non-Renewable Energy Resources
- Preparation of Asset Accounts in respect of other four resources namely water, land and forestry & wildlife resources in the States
- Preparation of supply and use tables in physical and monetary terms showing flow of natural resource inputs, products and residuals

(2022-23 to 2024-25)

Long term goals

- Preparation of the economic accounts highlighting depletion adjusted economic aggregates; and
- Preparation of functional accounts recording transactions and other information about economic activities undertaken for environmental purposes.

(2025 - 26 onwards)

2.3 Stakeholder on boarding and consultation process

Stakeholder Analysis Stepwise Process

In order to take the stakeholders, subject experts and academia onboard, GASAB has constituted a broad based Consultative Committee consisting of representatives of stakeholder ministries in Government of India like MoMines, MoEFCC, MoSPI, MoPNG, MNRE, MoJal Shakti, Department of Land Resources, specialist agencies like IBM, ICAI, ICMAI, TERI, NRSC among others and five State Governments and Accountants General in these five States (Gujarat, Karnataka, Meghalaya, Jharkhand and Uttarakhand) and eminent environmentalist and retired bureaucrat Shri Mukul Sanwal, IAS 1971, to continuously get the works vetted and additional suggestions/ comments to make the process inclusive and robust.

In addition to the Consultative Committee of NRA Cell as stated above, GASAB Secretariat has formed NRA Cells in the States consisting of the Audit, Accounts & Entitlements (A&E) Offices of CAG of India in States and State Government Departments like Finance, Geology and Mines etc. to enable co-ordination between the Accountants General Offices in the States with the local State Governments for effective and closer coordination and steering the project at the state level.

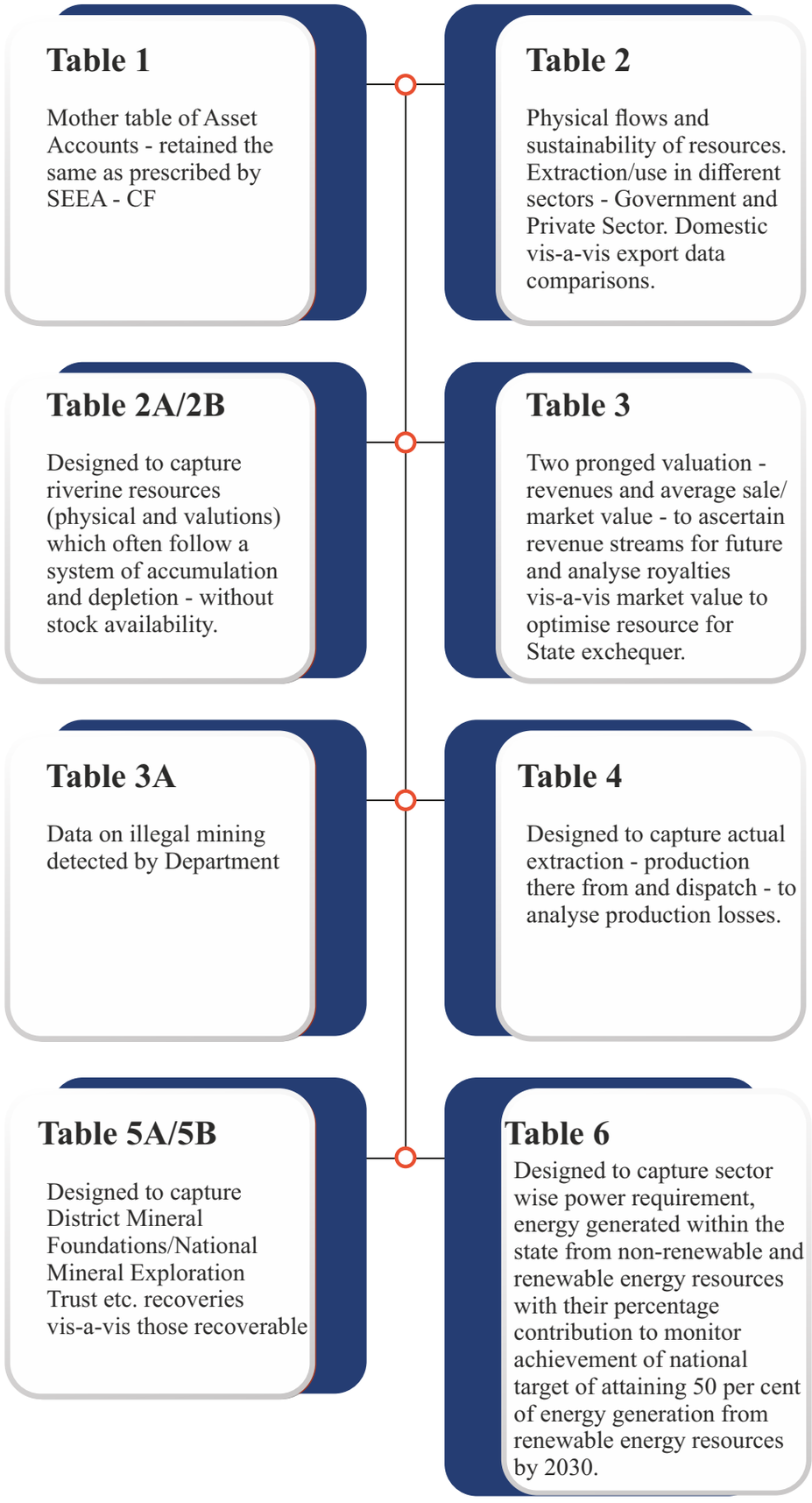
2.4 Capacity building/trainings/workshops

Parallel to the above efforts, GASAB has been holding workshops under the aegis of Regional Capacity Building and Knowledge Institute of the Comptroller and Auditor General of India at Prayagraj. GASAB has also conducted State specific workshops involving the concerned Departmental Officers/staff besides participation from the State Accountant General Offices. These handholding exercise has also helped to instil confidence in the State Governments to enable the country become compliant to the SEEA – CF framework. It also provided a platform for effective discussions and obtain clarifications. The State AsG Offices are continuously holding meetings and organising workshops/trainings for the State Government departments.

In order to hand hold and guide the States, monthly/quarterly meetings are being held with the State Accountants General since September 2021 to monitor the progresses of preparation of Asset Accounts on Mineral and Energy Resources and to clarify/mitigate the queries/challenges. Along with the State AsG Offices, the State Government departments are also participating in these meetings making them more effective and result oriented.

2.5 The Tables – what do they intend to capture

In view of covering the items required by the SEEA framework, country specific needs embedded into the framework, interrelated issues like District Mineral Foundation/National Mineral Exploration Trust etc. recoverable and the *Panchamrits*, a total ten tables have been designed for implementation in the States. The key elements of each of the tables are discussed as follows:



The snapshots of input tables are in **Annexure – II**.

2.6 Institution of Quarterly Reporting Framework for ease of data generation and Compilation

A strong MIS mechanism is essential to a functioning control and monitoring system. In June 2022, the GASAB released guidelines/SOPs that recommended the implementation of Quarterly Reporting Frameworks for the purpose of gathering information from the lowest echelon of the hierarchy, i.e., district mining, petroleum, and forest offices, to the Directorates. This will help to ensure that State Governments have more effective control over mining activities, revenues generated by them, market prices of the produces, revenue optimization and resource sustainability for future generations.

Since district officers in charge of mining, petroleum, and forests are the most crucial layers of control when it comes to monitoring resource extractions, data compilers, and generators, GASAB suggested initiation of the reports from the district offices, resource-wise and mine-wise and provide it to the directorates on a quarterly basis, preferably within 30 days of each quarter's end. Details are in Paragraph 3.3 of Guidelines/SoPs issued by GASAB (available at https://gasab.gov.in/gasab/pdf/Guidelines_June2022.pdf).

"States like Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Jharkhand, Jammu & Kashmir, Karnataka, Kerala, Ladakh, Madhya Pradesh, Maharashtra, Mizoram, Odisha, Punjab, Rajasthan, Sikkim, Telangana, Tripura and Uttarakhand have agreed to implement the quarterly reporting framework."

2.7 Benefits of creation of Asset Accounts

Thus, the previous paragraphs provide a glimpse of works done by GASAB in conceiving and implementing NRA in the country commencing with the Concept Paper, laying down templates and guidelines for filling them, handholding the States and helping them prepare the first ever Asset Accounts for the year 2020-21. The Asset Accounts will help with the following:

- Implementation of NRA in compliance to the requirements of SEEA Framework to meet the commitment made under SDGs and monitor progress on declarations under COP 26.
- Stock and flow of resources along with their values at a glance - a one pager document on State-wise resources.
- Compilation of physical and monetary values to enable cross verification of revenues vis-à-vis actual extractions.
- Provide pace of exploitation to bring out sustainability of resources - in years.
- Analysis of revenue vis-à-vis market value/export value will make it easier to assess and review the royalty rates to protect revenue interest.
- Enable assessment of revenue streams for the future.
- Mine-wise data on resources – pan India.
- Enabler of identification of alternate resources (economic as well as energy), and
- Close monitoring on illegal mining.

2.8 Other ongoing works

After assisting the country/States in generating the Asset Accounts on Mineral and Energy Resources, GASAB embarked upon streamlining the systems and processes to further fine tune the

process of accounting of resources by way of the following:

2.8.1 Ambitious plan of mapping the supply and usage of resources

A sizeable portion of a state's revenue comes from the exploitation of minerals and energy resources, which primarily supports the entities to fund the welfare and other planned activities of the States. Therefore, it is essential to establish a strong structure for end to end mapping of resources from extraction till their end-use.

GASAB's idea of implementing NRA in India and making a fool proof system of management of resources across the country, inter-alia, included an ambitious plan of mapping the supply and usage of resources or 360 degrees profiling of the mineral resources in the country through mapping of extraction, production, dispatch, usage/end use/export of minerals to reduce pilferage of minerals and optimization of revenue. This is possible thought implementation and mapping of the reporting requirements laid down by the Rule 45 of the MCDR as amended in 2011. The salient features of the Rule are mentioned below:

Mineral Conservation and Development (Amendment) Rules, 2011: Key Provisions of Rule 45:

- **Registration Requirement**
  - As per Rule 45 (1) - (5) of the Mineral Conservation and Development (Amendment) Rules, 2011, the owner, agent, mining engineer or manager of every mine, or any person or company engaged in trading or storage or end-use or export of minerals mined in the country, shall register with the IBM and get a registration number allotted to be used for all purposes of reporting and correspondence connected therewith.
- **Reporting Obligations**
  - The Rule 45 (6) provides for the miners and other parties involved in trading, end-usage, exports to report monthly and annually to the IBM and the State Governments about volume of mineral and energy resources dispatched, traded, exported or used during the period reported upon.
  - Importantly, the Rules mandate for registration-wise details of outward and inward movement of minerals.
  - This provides scope for one on one mapping of mineral extracted, produced, dispatched, used/exported.
- **Penalties for Falsification**
  - The Rules prescribed stringent penal measures like penalties of minimum ₹ 10,000 per day and cancellation of licences for falsification in reports submitted by the above parties.

The above Rules govern the management of major minerals. GASAB is continuously propagating the idea and impressing upon the Indian Bureau of Mines and the State Governments/UTs through the Accountants General to not only implement the noble provisions of Mineral Conservation Development Rules (as amended in 2011) which provided for monthly/annual reports from all lessees, miners, stockists, transporters, end-users, exporters relating to major minerals but also to replicate similar provisions for management of minor minerals at the State level.

2.8.2 Handholding the States in capturing grade-wise mineral productions

The royalties on major minerals are based on ad-valorem on the average sale price which is captured through the monthly reports of the mining lessees. On ascertaining that many lessees are not providing the same set of reports (which are submitted to the Indian Bureau of Mines) to the State Governments, GASAB had taken an initiative to impress upon the State Governments about the need for capturing the grade-wise mineral productions and dispatches This was fraught with the risk of revenue leakage as the State Governments/UT authorities are required to assess the royalties realizable and recover them from the lessees as part of their revenue.

In view of the above, GASAB initiated an endeavour to ensure compliance of the above Rules by the lessees in the interest of revenues of the States/UTs. State Governments/UT authorities were impressed upon to ensure that the same returns are submitted by the lessees and the mining authorities work out the revenues due based on the grade-wise mineral productions reported by the lessees. This was primarily for the major minerals. Simultaneously, GASAB had also taken up the matter with the States to implement similar reporting mechanisms for the minor minerals as 31 minerals previously listed under major minerals were re-classified as minor minerals from 2015 many of which involved grade-wise production and thus, attracted different rates of royalties based on ad-valorem system.

Besides handholding the States/UTs in ensuring compliance of the statutory provisions, GASAB had also endeavoured to carry out a study in some States to find out the gaps between the productions reported by the lessees to the IBM as part of the mandatory reporting mechanism enshrined in the MCDR and those reported to the State Governments/UT authorities.

GASAB has also carried out a study during 2023-24 to map the grade-wise mineral productions as reported by the lessees to the Indian Bureau of Mines with the mine-wise royalty collections which showed wide variations. For this, periodicity of three years ended March 2022 was covered. Data on grade-wise productions reported by the lessees to the IBM including details like mine code, mine name, lessee owner name, details of minerals, grades produced and year-wise productions were obtained. Parallelly, data on the same heads including mine-wise royalty, DMF and NMET were called for from the State Governments.

GASAB has prepared detailed guidelines on this and circulated to the States. This study is being run in the States under the guidance of GASAB.

2.8.3 Analysis of Average Sale prices - affecting Royalties

As per Rule 45 of MCDR, lessees of major minerals are mandated to report monthly on extractions, grade-wise productions, dispatches, stock, sale price of each grades of mineral produced, expenses and average pit-head price grade-wise minerals dispatched. As per the MMDR Act, royalty is payable on ad-valorem (major minerals) of the pit-head price.

Analysis of the ASP of a sample of minerals was carried out by GASAB to ascertain proper accounting of resources and disclosure of prices. The study indicated wide variations in respect of same grades of minerals across various States - having revenue implications as the royalties are paid on the ad-valorem prices disclosed by the lessees. The following table has the details.

Mineral	Range of ASP (in ₹)			No of States involved in analysis
	2019-20	2020-21	2021-22	
Iron Ore (fines below 55% fe)	582 - 837	582 – 1,274	600 – 1,829	Andhra Pradesh, Karnataka and Odisha
Iron Ore (lumps below 55% fe)	799–1,573	859 – 1,818	839 – 3,100	
Manganese Ore (35% to below 46%)	9,689 –18,239	9,669 – 14,477	12,386 – 17,203	

Thus, the sale prices disclosed by the lessees varied between ₹ 582 – ₹1829 per MT during the three year period ended March 2022 in respect of iron ore (fines below 55 per cent fe). This would translate into payment of royalty @ 10 per cent ad-valorem at varied rates of ₹ 58 and ₹ 182 by the lessees which will also impact the final prices of these industrially important inputs. Similar variations are also seen in respect of other two grades of minerals.

2.8.4 Mapping of GST and Mining datasets

As per the GST laws, no vehicle can move with taxable goods from one place to another without filling data into the e-way bill module of GST and printing the form. The inputs captured in the e-way bill module, inter-alia, are - *1) GSTIN of recipient, 2) Place of delivery 3) Invoice Number 4) invoice date 5) Value of goods 6) HSN code etc. shall be made available to the registered supplier on common portal who may utilize the same for furnishing details in FORM GSTR1.* Also, there are specific HSN codes for each grade of mineral and energy resources as enshrined in section V, XIV etc. of HSN categorization as per the GST laws.

The invaluable information captured in the e-way bill module, consignor/consignee, HSN code wise could be of immense use for the States/UTs to ensure control and monitoring on the dispatches of mineral and energy resources across the territory of the mining officers.

This will also enable the mining officers as well as the State GST authorities to ensure proper assessment and collection of revenues under mining and GST heads through data sharing.

In view of the above, the State Governments/UT authorities had been impressed (Dec. 2023) upon to explore the possibility of reconciling the datasets available with both the State Government Departments/UT authorities in the above lines.

The idea was to impress upon the State Governments/UT authorities to institute a regular system of extracting the data from the e-way bill module (on specific HSN items) related to movement of mineral resources in each districts from the datasets of State GST Offices to enable their cross verification with the dispatch registers maintained in the District Mining Offices and follow up the mismatches.

This will enable the mining officers as well as the State GST authorities to ensure proper assessment and collection of revenues under mining and GST heads through data sharing. This is an ongoing work.

"States like Bihar, Goa, Gujarat, J&K, Ladakh, Jharkhand, Karnataka, Maharashtra, Rajasthan, Tamil Nadu and Uttarakhand had taken up matter with State Government (GST Authorities). Uttarakhand and Gujarat reported that the Department has agreed to the suggestion."

2.8.5 Accounting for Environmental Damages

Parallel to the Asset Accounting and in view of the stage three of the SEEA-CF framework, GASAB has also outlined the accounting of receipts from resource exploitations and expenditure incurred on management of resources and mitigation of environmental damages. Pilot studies were run in Assam, Gujarat, Odisha, Tamil Nadu and Telangana during the year 2023-24 in five States which were successful and showed evidence that the tentative templates designed by GASAB to capture the above inputs are practical and implementable.

The template is finalised and rolled out to States/UTs for implementation as another table after 10 Mineral & Energy Resources Asset Accounts for 2022-23 Asset Accounting year. A model template is given below. This is another requirement to attain the targets set by the SEEA framework.

Disclosure Statement on Receipts from exploitation of Minerals and Expenditure on Management of Mineral Resources and Mitigation of Environmental Damages for the Year...

S. No.	Name of Department/ Agency	Name of Accounting Head	Major Head	Receipts during the year	Expenditure during the year			Total Expenditure (6+7+8)	Percentage of Expenditure vis-à-vis Receipts
					Expenditure on Management of Mineral Resources	Expenditure on Mitigation of Environmental Degradation	Other Capital Expenditure		
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1.	Geology and Mining Department	Petroleum							
		Coal and Lignite							
		Non-ferrous Mining and Metallurgical Industries							
2.	Forest and Environment Department	Forestry and Wild life							
3.	Irrigation Department	Major Irrigation							
		Medium Irrigation							
		Minor Irrigation							
		Water Supply and Sanitation							
4.	Energy and Petrochemical Department	Power							
		Petroleum							
		Non-Conventional Sources of Energy							
5.	State Pollution Control Board								

2.8.6 Accounting of Water Resources

After successfully laying down the system for capturing data and their consolidations regarding mineral & energy resources, GASAB had picked up another important resource for the mankind, i.e. water resources. Commencing in February 2023, GASAB designed tentative tables and a questionnaire and circulated to the States/UTs through the Accountants General for data collection. Also, GASAB had reached out to the concerned stakeholder ministries/agencies namely Ministry of Jal Shakti, Central Water Commission, Central Ground Water Board, and

Ministry of Drinking Water and Sanitation for taking them onboard on deciding the final formats.

As per the latest status, data on water resources as per the formats have been received from 28 States and UTs of Delhi, J&K, and Ladakh.

Upon receipt of the data and consultation with the stakeholder ministries and agencies, a separate Compendium is proposed for release on the subject.

CHAPTER

III

MINING SCENARIO IN THE COUNTRY – CONSTITUTIONAL PROVISIONS, MANAGEMENT, PROCESSES AND REVENUES

MINING SCENARIO IN THE COUNTRY – CONSTITUTIONAL PROVISIONS, MANAGEMENT, PROCESSES AND REVENUES

3.1 Constitutional provisions governing resources

In the federal structure, powers are vested in Union as well as State Governments regarding control and monitoring of mineral and energy resources as shown in the table below.

List I (Union list)	List II (State List)	List III (Concurrent List)
Regulation and Development of oilfields and mineral oil resources, petroleum and petroleum products (53)	Regulation of mines and mineral development subject to provisions of List I (23)	Forests, Protection of wild animals (17A and 17B)
Regulation of mines and mineral development to the extent to which such regulation and development under the control of the Union is declared by Parliament (54)	Taxes on mineral rights subject to such limitations Parliament may impose (50)	Stamp duties other than due duties or fees collected by judicial stamps not including rates of stamp duty (44)
Regulation of labour and safety in mines and oilfields (55)	Fees in respect of any of the matters in this list (except Court fees) (66)	Fees in respect of any of the matters in this List (47)
Fees in respect of any of the matters in this list (except Court fees) (96)		

3.2 Role of Centre and States in Mineral and Natural Resource Management: Why and How

The division of roles between the **Central Government** and the **State Governments** is crucial for the following reasons:

Strategic Importance of Resources

Minerals like **coal, petroleum, natural gas**, and **uranium** are essential for national energy security, defence, and economic development. These are often classified as **National Resources** and need central oversight.

At the same time, **Minor Minerals** such as sand, clay, and limestone are locally sourced and managed within state boundaries. The State Governments are better positioned to manage these resources for local development.

Scale and Scope of Regulation

The **Union Government** is responsible for the larger and more strategic aspects of resource management, such as international trade in minerals, foreign investment, large-scale mining projects, and the extraction of resources like **atomic minerals** and **offshore oil.**

State Governments, on the other hand, regulate **local-level mining** activities, grant licenses for minor minerals, and ensure environmental compliance for mining within their territories.

3.3 How the Centre and States Play Their Roles

3.3.1. Policy Formulation and Oversight (Centre's Role)

The **Union Government** formulates national-level policies, such as the **National Mineral Policy**, and oversees regulations concerning major minerals and resources with strategic importance, including **coal, petroleum, and atomic minerals**.

Central ministries like the **Ministry of Mines, Ministry of Coal,** and **Ministry of Petroleum and Natural Gas** develop policies for **resource exploration, extraction, production,** and **distribution.**

The Centre also oversees resource management for offshore resources (beyond state boundaries) and international trade in minerals.

3.3.2. Regulation and Licensing (States' Role)

State Governments have the authority to regulate and issue **mining licenses** for M**inor Minerals** (e.g., sand, clay, limestone) and for minerals that fall within their jurisdiction.

States also play a major role in **granting environmental clearances, land acquisition**, and **monitoring** the compliance of mining operations with state-specific laws and guidelines.

State-level bodies like **State Departments of Mines and Geology** work closely with the **Indian Bureau of Mines (IBM)** to ensure effective management and exploration of resources.

3.4 Revenue Sharing and Fiscal Management

- Mineral royalties and revenue sharing between the Centre and States are governed by central legislation but administered at the state level. This ensures that S**tates benefit economically** from the resources within their borders.
- States collect royalties on minor minerals, while the Centre oversees revenue from strategic resources and ensures the fair distribution of revenues between producing and consuming states.

3.5 Environmental Protection and Rehabilitation

- **State Governments** implement **environmental regulations** and manage local-level environmental impacts from mining, such as **deforestation, water resource depletion**, and **air pollution**.
- The **Centre**, through ministries like the **Ministry of Environment, Forest and Climate Change (MoEFCC),** sets national environmental standards and policies, but it is the states that execute **local rehabilitation** and **restoration projects** in affected mining areas.

***Key Examples of Centre-State Cooperation**:*

- **Coal Mining**: Coal India Limited (CIL), a **central PSU**, operates under central guidelines but collaborates with **state governments** for land acquisition, rehabilitation, and environmental clearances.
- **Oil and Gas**: The **Ministry of Petroleum and Natural Gas** oversees offshore exploration and production, while **State Governments** manage onshore activities and infrastructure development for local refineries.

3.6 Government regulations governing Mining Sector

Some key initiatives and frameworks governing Mining Sector are as follows:

1. National Mineral Policy (NMP)

India's National Mineral Policy provides a comprehensive framework for sustainable mining practices and mineral resource development. It emphasizes transparency, equitable distribution of benefits, and optimal utilization of mineral resources while ensuring environmental sustainability and social welfare.

2. National Mineral Inventory

The Indian Bureau of Mines (IBM) is responsible for maintaining a National Mineral Inventory that includes data on mineral reserves, resources, production, and exploration activities across the country. This inventory serves as a foundation for estimating the economic value and potential of mineral assets.

3. Sustainable Development Framework

The Ministry of Mines and other related departments promote sustainable development practices through guidelines and regulations. These frameworks encourage responsible mining practices, rehabilitation of mined-out areas, and adoption of technologies to minimize environmental impact.

4. Mining Surveillance System (MSS)

The Mining Surveillance System (MSS) uses satellite imagery and GIS technology to monitor mining activities and ensure compliance with environmental and regulatory norms. This system enhances transparency and accountability in mineral resource management.

5. National Mineral Exploration Policy (NMEP)

India's NMEP aims to accelerate mineral exploration through enhanced geoscientific data availability, transparent auction processes, and promotion of private sector participation. It includes provisions for incentivizing exploration activities to discover new mineral reserves.

6. Energy Accounting and Planning

India's energy sector initiatives include comprehensive energy accounting and planning frameworks. These efforts involve tracking energy production, consumption, reserves, and imports across various sources such as coal, oil, natural gas, renewables, and nuclear energy.

7. Geospatial Data Infrastructure

The government is developing a robust geospatial data infrastructure to support asset accounting and management of mineral and energy resources. This infrastructure integrates geological mapping, satellite imagery, and digital data platforms for effective resource planning and decision-making

8. International Collaboration

India collaborates with international organizations and agencies to align its asset accounting methodologies with global standards. This collaboration enhances credibility, comparability, and data interoperability in reporting mineral and energy resource information.

3.7 Importance of mining sector for States

Receipts from mineral and energy resources are collected and retained by the State Governments

while those arising out of extraction of petroleum products in ocean beds and those extracted from UTs accrues to the Union Government. State-wise receipts (Finance Accounts[1]) from mineral and energy resources in 10 major mineral rich States during 2021-22 were as under:

Sl.No.	State	Petroleum and Mining Receipts and percentage to total non-tax receipts of the State 2021-22	
		(₹ in crore)	*Per cent*
1.	Odisha	49,859	91.89
2.	Rajasthan	10,264	54.72
3.	Jharkhand	7,463	74.39
4.	Chhattisgarh	7,381	53.28
5.	Karnataka	6,304	53.52
6.	Maharashtra	4,907	25.41
7.	Gujarat	4,307	30.72
8.	Madhya Pradesh	3,760	24.56
9.	Andhra Pradesh	2,974	59.27
10.	Assam	2,514	70.22

Thus, the table shows that receipts from mineral and energy resources was more than 49,000 crore in Odisha. However, the importance of mineral and energy resources could be clear from the volume of receipts generated by the State Governments from these sources. Statement showing receipts of 28 States and 3 UTs is at **Annexure - III.**

3.8 Mining in India

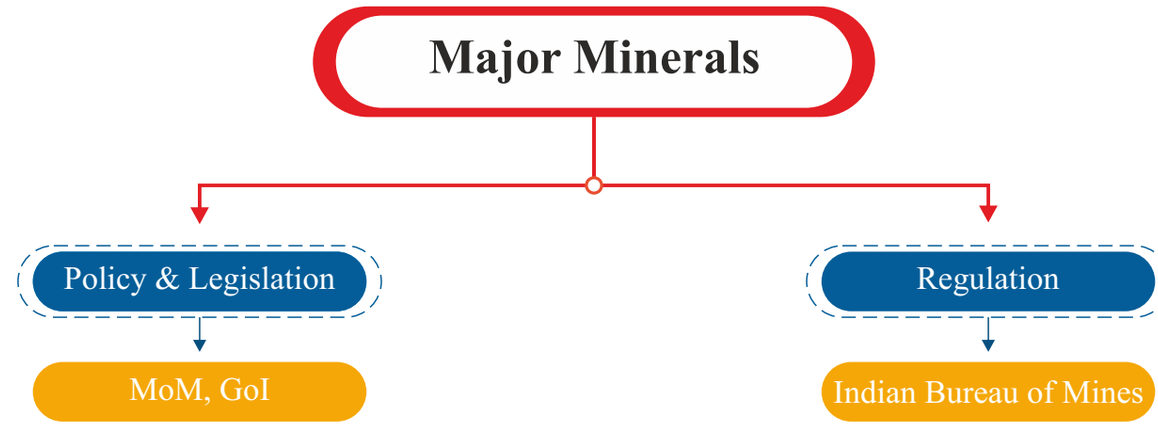
Mining sector is one of the core sectors of economy. It provides basic raw material to many important industries. Mining is expected to be a key industry to foster investments, both domestic and foreign, and therefore the prospects for growth and generation of employment is profound. The Ministry of Mines, Coal, Petroleum & Natural Gas governing the mining/exploration of minerals/natural gas. The function and responsibilities of the Ministries are broadly as follows:

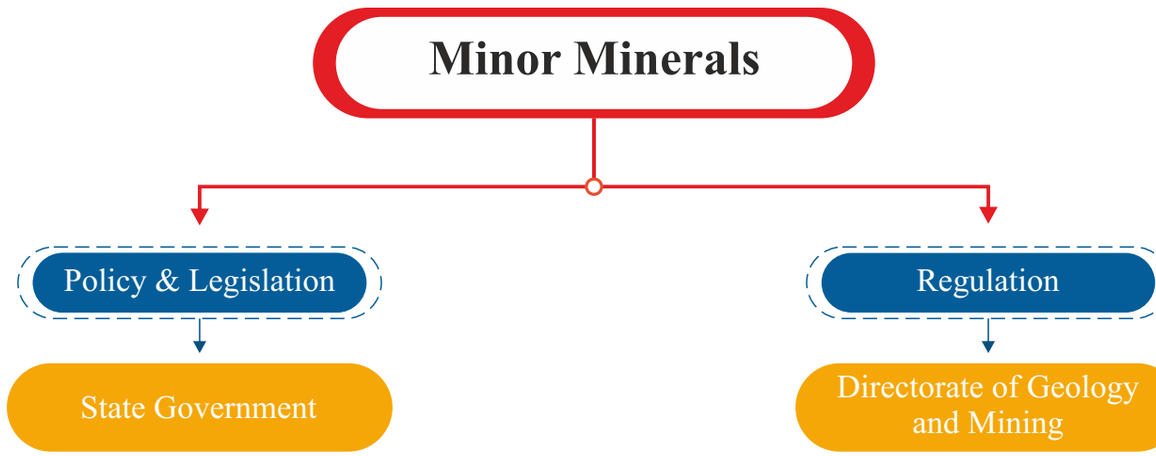
3.8.1. The Ministry of Mines (MoM)

[1] Major Head 0853 Non-ferrous Mining & Metallurgical Industries, 0802 Petroleum, 0803 Coal and Lignite – receipts from royalties, fees, rents etc.

Ministry of Mines is responsible for survey, exploration and mining of all minerals, other than natural gas, petroleum, atomic minerals and coal. In the case of atomic minerals and coal, activities of the Ministry are limited to regional exploration. The Ministry is responsible for the administration of the Mines and Minerals (Development and Regulation) Act, 1957 (67 of 1957) and rules made there under in respect of all mines and minerals other than coal (by the Ministry of Coal) natural gas and petroleum (by the Ministry of Natural Gas and Petroleum). In India, the minerals are classified as minor minerals and major minerals. The power to frame policy and legislation relating to minor minerals is entirely delegated to the State Governments while policy and legislation relating to the major minerals is dealt by the MoM.

MoM through its attached office, Geological Survey of India (GSI) facilitates exploration, geological mapping and mineral resource assessment in the country. Indian Bureau of Mines (IBM), a subordinate office of the MoM is mainly responsible for regulation of mining in the country. There are three Public Sector Undertakings under the Ministry of Mines, namely, (i) National Aluminium Company Limited (NALCO), Bhubaneswar (ii) Hindustan Copper Limited (HCL), Kolkata (iii) Mineral Exploration and Consultancy Limited (MECL), Nagpur. There are two Research institutions which are Autonomous Bodies of this Ministry, (i) Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC), Nagpur (ii) National Institute of Rock Mechanics (NIRM), Bengaluru. The management of major and minor minerals in the country is depicted through the following block diagrams:





The Mines and Minerals (Development and Regulation) Act (MMDR Act) has undergone several amendments, fostering a more competitive mining sector. Since the enactment of the MMDR Act in 2015, a total of 335 mineral blocks have been auctioned by states, with 227 (68%) auctioned since the MMDR Amendment Act in 2021-22. Some of the major features of the amendment are:

- *For regulation, the Act classifies mining-related activities into: (i) reconnaissance, (ii) prospecting, and (iii) mining.*
- *Reconnaissance operations includes: (i) aerial surveys, (ii) geophysical, and (iii) geochemical surveys.*
- *Types of concessions: (i) a reconnaissance permit for reconnaissance, (ii) a prospecting licence for prospecting, (iii) mining lease for undertaking mining, and (iv) a composite licence, for prospecting and mining.*
- *Auction for exploration licence.*
- *The exploration licence will be issued for five years.*
- *Under the Act, a prospecting licence allows activities in an area up to 25 square kilometres, and a single reconnaissance permit allows activities in an area up to 5,000 square kilometres.*
- *Submission of geological reports.*
- *Incentive for exploration licensee.*
- *Auction of certain minerals by the central government*

Ministry of Mines introduces the Critical Minerals for India in June 2023

Critical minerals are those minerals that are essential for economic development and national security. The lack of availability of these minerals or concentration of extraction or processing in a few geographical locations may lead to supply chain vulnerabilities and even disruption of supplies. The future global economy will be underpinned by technologies that depend on minerals such as lithium, graphite, cobalt, titanium, and rare earth elements. These are essential for the advancement of many sectors, including high-tech electronics, telecommunications, transport, and defence. They are also vital to power the global transition to a low carbon emissions economy, and the renewable energy technologies that will be required to meet the 'Net Zero' commitments of an increasing number of countries around the world. As an emerging global economic powerhouse, it is essential to understand and harness the potential of critical minerals to fuel the country's growth, competitiveness, and sustainable development.

The significance of critical minerals in the modern world cannot be overstated. These are the building blocks of the new economy. India's rapid industrialization has escalated the nation's reliance on these minerals. As the demand for these minerals continues to rise, understanding their availability, extraction, and utilization becomes crucial for countries seeking to secure their economic, technological, and environmental future. One of the key challenges in the critical mineral supply chain lies in the global market dynamics, which can result in price volatility and supply disruptions. To overcome these challenges, the Government of India has been working tirelessly to identify and develop domestic sources of critical minerals.

Most of the countries in the world have identified critical minerals as per their national priorities and future requirements. In India also, some efforts have been made in the past to identify the minerals, which are critical for the country.

The Ministry of Mines constituted a seven-member Committee in the year 2022. The Committee have a three-stage assessment to arrive at a list of critical minerals. Based on the three-stage assessment process, the Committee has identified a set of 30 critical minerals. These are as follows:

Sl.No.	Critical Minerals	Sl.No.	Critical Minerals
1.	Antimony	16.	Phosphorous
2.	Beryllium	17.	Potash
3.	Bismuth	18.	REE
4.	Cobalt	19.	Rhenium
5.	Copper	20.	Silicon
6.	Gallium	21.	Strontium
7.	Germanium	22.	Tantalum
8.	Graphite	23.	Tellurium
9.	Hafnium	24.	Tin
10.	Indium	25.	Titanium
11.	Lithium	26.	Tungsten
12.	Molybdenum	27.	Vanadium
13.	Niobium	28.	Zirconium
14.	Nickel	29.	Selenium
15.	PGE	30.	Cadmium

Mineral exploration projects almost doubled in four years

In FY 2024, mineral exploration projects in India have surged to 325, the Geological Survey of India (GSI), operating under the Ministry of Mines, has been actively engaged in mineral exploration nationwide to enhance resources for various mineral commodities.

Notably, GSI has successfully identified deposits of Iron ore, Manganese, Chromite, Gold, platinum group elements (PGE), Base metals, Rare Earth Elements, Molybdenum, Nickel, Tungsten, Lithium, Limestone, Bauxite, Graphite, Potash, and Phosphorite during in FY 2023-24.

Rajasthan leads in the number of projects, constituting nearly one-fifth of the total exploration initiatives.

The count of coal explorations has also risen to 17 in 2023-24 from 13 in the previous fiscal year. The surveys have augmented substantial resources, including 23.01 billion tonnes of coal, 16.6 billion tonnes of Limestone, and 1.83 billion tonnes of Iron ore. Among critical minerals, notable quantities of rare earth elements ore (136 million tonnes), lithium (5.9 million tonnes), Glauconitic Ore/Potash (812 million tonnes), and cobalt (275 tonnes) have been identified.

National Mineral Exploration Trust (NMET) has supported 270 mineral exploration projects, with 162 already completed and 88 proving successful. Odisha leads in the number of successful NMET-funded projects with 21, uncovering deposits of Iron, Copper, Manganese, Limestone, Bauxite, and Graphite in the state.

Containment of illegal mining

Government of India, Ministry of Mines have taken a number of initiatives to prevent illegal mining commencing with amendments in the MMDR Act in 2015 with a number of interventions like –

- *Introducing major deterrents through framing Rules under the MMDR Act – increasing penalty from ₹ 25,000 to ₹ 5,00,000 per hectare and imprisonment from 2 years to 5 years.*
- *Provisions for having special courts in States introduced providing speedy trial of the offences.*
- *Clarification on illegal mining further amended in March 2021 to broaden the coverage.*
- *Requests were made to State Governments to set up task forces at the State level and District level to control illegal mining.*
- *Quarterly reporting on illegal mining was introduced for the States along with action taken reports.*

3.8.2. Coal, petroleum and natural gas

Coal is the most important and abundant fossil fuel in India. It accounts for 55 *per cent* of the country's energy need. The country's industrial base was built upon indigenous coal.

Commercial primary energy consumption in India has grown by about 700 *per cent* in the last four decades. The current per capita commercial primary energy consumption in India is about 350 kg of oil/year, which is well below that of developed countries. Driven by the rising population, expanding economy and a quest for improved quality of life, energy usage in India is expected to rise. Considering the limited reserve potential of petroleum & natural gas, eco-conservation restriction on hydel project and geo-political perception of nuclear power, coal will continue to occupy an important place in India's energy scenario in the near/medium term.

Indian coal offers a unique eco-friendly fuel source to domestic energy market for the next century and beyond. Hard coal deposit spread over 27 major coalfields, are mainly confined to eastern and south-central parts of the country. The lignite reserves stand at a level around 36 billion tonnes, of which 90 *per cent* occur in the southern State of Tamil Nadu.

3.8.3. The Ministry of Coal

The Ministry of Coal has the overall responsibility of determining policies and strategies in respect of exploration and development of coal and lignite reserves, sanctioning of important projects of high value and for deciding all related issues. Under the administrative control of the Ministry, these key functions are exercised through the Public Sector Undertakings, namely, Coal India Ltd. and its subsidiaries and Neyveli Lignite Corporation India Limited (NLCIL). Other than Coal India Ltd. and Neyveli Lignite Corporation India Ltd., the Ministry of Coal also has a joint venture with Government of Telangana called Singareni Collieries Company Limited. Government of Telangana holds 51 *per cent* equity and Government of India holds 49 *per cent* equity.

Functions and Responsibilities

The Ministry of Coal is responsible for development and exploitation of coal and lignite reserves in

India. The subjects allocated to the Ministry, which include attached and sub-ordinate or other organizations including PSUs concerned with their subjects under the Government of India (Allocation of Business) Rules, 1961, as amended from time to time, are as follows:

Ministry of Coal mainly deals with matters relating to production, supply, distribution and prices of coal in addition to exploration and development of coking and non-coking coal. It is also responsible for development and operation of coal washeries, low temperature carbonisation of coal and production of synthetic oil from coal. As per the Government of India (Allocation of Business) Rules, 1961, the administration of subsidiary organisations like the Coal Mines Provident Fund Organisation, the Coal Mines Welfare Organisation is controlled by the Ministry of Coal. The implementation of administration of the Coal Mines Labour Welfare Fund Act, 1947, administration of the Coal Mines (Conservation and Development) Act, 1974 (28 of 1974), rules under the Mines Act, 1952 (32 of 1952) for the levy and collection of duty of excise on coke and coal produced and despatched from mines and administration of rescue fund are also covered by Ministry of Coal.

3.8.4. The Ministry of Petroleum & Natural Gas

The Ministry of Petroleum & Natural Gas is concerned with exploration and production of oil and natural gas, refining, distribution and marketing, import, export and conservation of petroleum products. Oil and gas being the important import for our economy, many initiatives have been taken by the Ministry for increasing production and exploitation of all domestic petroleum resources to address the priorities like energy access, energy efficiency, energy sustainability and energy security.

Role and responsibilities of the Ministry of Petroleum & Natural Gas:

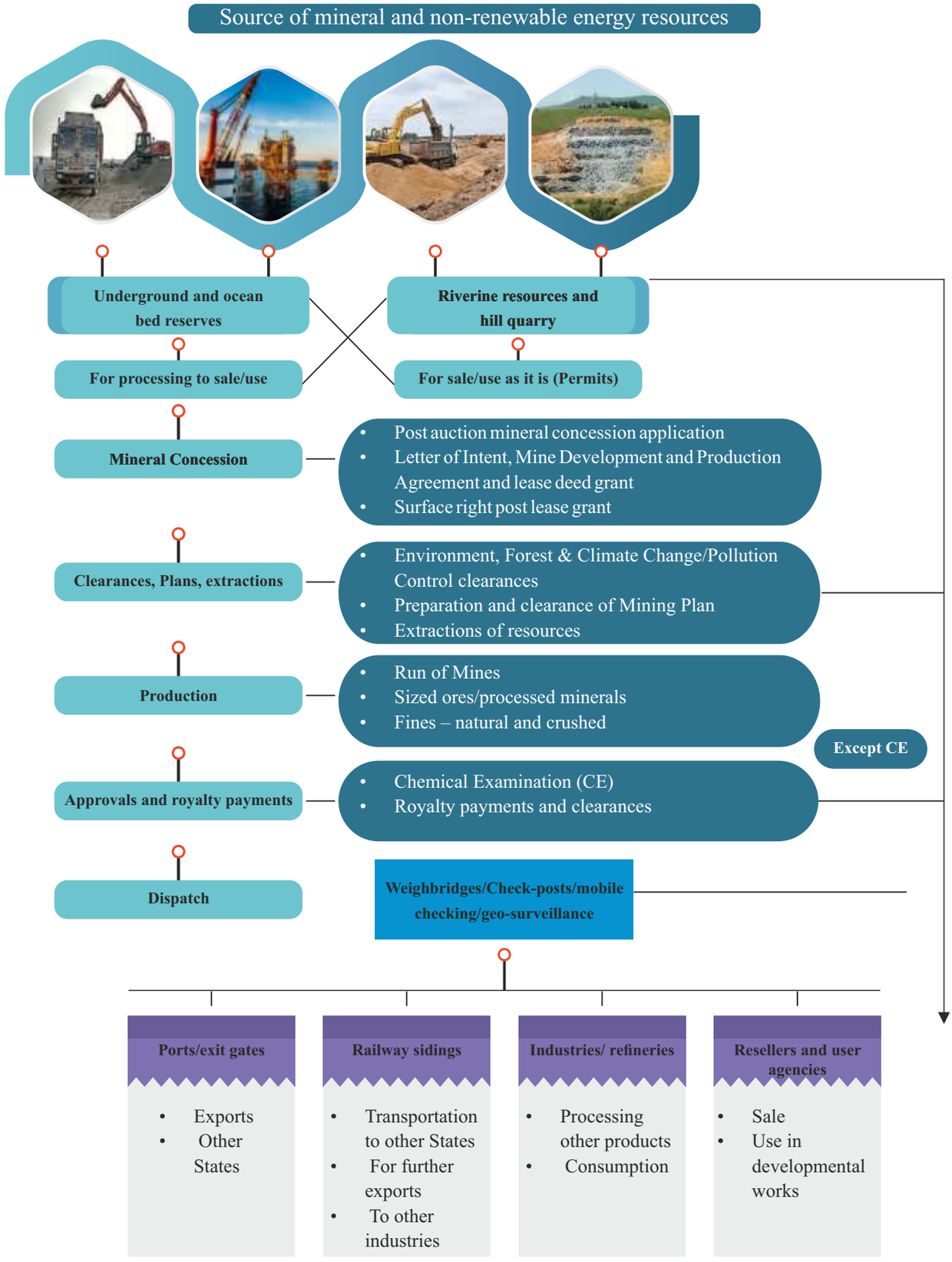
The Ministry of Petroleum & Natural Gas deals with:

- Planning, development, control and assistance to all industries dealt with by the Ministry.
- Strengthening energy security by acquiring oil and gas equity abroad
- Participation in transnational oil and gas pipeline project
- Planning, development and regulation of oilfield services.

The Ministry has taken up following initiatives:

1. Hydrocarbon Exploration Licensing Policy.
2. National Data Repository.
3. Discovered Small Field Policy.
4. 2D Seismic Survey.
5. Natural Gas Grid and City Gas Distribution. Since 2014, India has increased the operational Natural Gas pipeline length from 15340 km to 24623 km (as on 30-09-2023). Further about 10860 kms Natural Gas pipeline are under execution.
6. Refineries and Auto Fuel Vision and Policy.
7. Implementation of BS-IV & BS-VI. BS-VI grade of auto fuel have been supplied w.e.f. 01-04-2020 on pan India basis. With BS-VI fuel, Sulphur emission have been reduced by 80% vis-à-vis- BS-IV level.
8. Pradhan Mantri Ujjwala Yojana and PAHAL Since launch in 2016 more than 10 crore free gas connections have been given to women from poor families. In addition, more than 1.14 crore customers have given up their LPG Subsidy.
9. Gram Swaraj Abhiyan and Extended Gram Swaraj Abhiyaan.
10. Direct Benefit Transfer Kerosene.
11. National Policy on Biofuels 2018.
12. Compressed Bio Gas Plants.
13. Neighbourhood First Policy.

The operational structure of the mining mostly followed in the country is depicted through the following diagram:



(Source: Websites of Ministries and https://indbiz.gov.in/mineral-exploration-projects-almost-doubled-in-four-years/)

CHAPTER IV

COMPILATION OF ASSET ACCOUNTS OF STATES – MINERAL AND ENERGY RESOURCES

COMPILATION OF ASSET ACCOUNTS OF STATES – MINERAL AND ENERGY RESOURCES

4.1 Mineral and Energy Resources covered across the Country

India is a mineral rich country and has favourable geological milieu, which is yet to be fully explored, assessed, and exploited. Its geological setup is similar in many ways to that of resource rich countries like Canada, Australia, Brazil, South Africa, Chile and Mexico etc.

As the State Governments are the owners of mineral and energy resources in their territories, States were requested to prioritize the resources for the Asset Accounts for the year 2020-21 and thereafter on board the remaining resources gradually in subsequent years. However, this being study in the country, there were justifiable challenges for the State Governments to collect and collate such huge set of information on all the resources, which were available but scattered in the district level offices. Accordingly, the Asset Accounts in the States were prepared with mineral and energy resources as prioritized by the respective State Governments. Undoubtedly, this task achieved by the States in collecting and providing information/data on almost all the resources in States is praiseworthy. Some other resources, comparison to previous year (2020-21) had been included this year. Notably, UT of Ladakh become the 3rd UT to come on board in 2021-22, in addition of 28 States and 2 UTs during 2020-21. As foreseen and allowed by the SEEA framework, countries commencing with the study would need a couple of years to settle down. The input tables intend to capture proved reserves as stock and the entire cycle from extraction, production and dispatch. All States could not provide the desired inputs (Details in **Annexure – IV).** The State-wise list of mineral and energy resources covered by this study is depicted through the following table:

Table showing mineral and energy resources across States covered in the Asset Accounts 2021-22

State	Types of resources		
	Major Mineral	Minor Mineral	Fossil Fuel
Andhra Pradesh	Iron Ore, Lime Stone, Manganese Ore, Vermiculite, W. Shale, W.Clay	Ball Clay, Barytes, Black Granite, Calcite, China Clay, C. Granite, Cubes & Kerbs, Dolomite, Feldspar, Fire clay, Gravel/ Earth/Murram, Laterite, L. Stone Slabs, Limestone, Limekankar, Mosaic Chips, Marble, Mica, Natural clay/others, Pyrophylite, Quartz, Quartzite, Road Metal/Building stone/Rough stone, Silica Sand, Steatite, Slate, Yellow Ochre, Ordinary Sand.	Crude Oil & Natural Gas
Arunachal Pradesh	Limestone, Iron Ore & Sillimanite	Dolomite	Coal, Crude Oil & Natural Gas
Assam	Limestone, Iron Ore & Sillimanite	Granite & Quartzite	Coal, Crude Oil & Natural Gas
Bihar	Limestone	Sand, Stone & Jalwa Quartz	
Chhattisgarh	Bauxite, Iron Ore, Limestone, Tin Ore, Tin- Metal & Graphite	China Clay, Dolomite, Fire clay, Quartz, Quartzite & Soapstone	Coal
Goa	Bauxite, Iron Ore, & Manganese	Basalt, Laterite Stones & Dolomite	
Gujarat	Bauxite, Limestone, Manganese, Fluorite, Graphite, Siderite, vermiculite & Wollastonite	Bentonite, Calcite, Chalk, China Clay, Dolomite, Fire clay, Granite, Gypsum, Marble, Quartz, Sandstone, Silica Sand, Diatomaceous Earth, Nepheline Syenite & Steatite	Crude Oil, Lignite, & Natural Gas
Jammu and Kashmir	Bauxite, Limestone, & Magnesite	Dolomite, Granite, Gypsum, Marble, Quartzite, RBM & Sapphire	Coal & Lignite
Ladakh	Limestone	Marble, Granite, RBM & Borax	
Haryana		Road Metal & Masonry Stone, Slate, Boulder-Gravel-Sand, Sand, Dolomite & Beryte & Marble	
Himachal Pradesh	Limestone & Salt	Boulder, Building Stone, Murram, Rough Stone, Sand, Pulverized Sand, Aggregate, Shale & Slate	
Jharkhand	Bauxite, Iron Ore, & Limestone	Granite, Quartzite, Murum & Stone	Coal
Karnataka	Aluminous Laterite, Bauxite, Chromite,	Aluminous Clay, Barytes, Black Granite, Brick Earth, China Clay,	

State	Types of resources		
	Major Mineral	Minor Mineral	Fossil Fuel
	Copper Ore, Gold, Iron Ore, Kyanite, Limestone, Manganese, Magnesite, Martilised Magnetic Iron Ore, Titaniferrous Magnetite, Limeshell & Sliver	Clay, Corundum, Curbes, Decorative Building Stone, Dolomite, Dunite, Feldspar, Fuller's Earth, Green Granite, Grey Granite, Import Sand, Kaolinc include ball clay white clay, Laterite, Lime shell, Multi Colour Granite, Murrum, Quartz, Quartzite, Sand stone, Silica Sand, Talc-Steatite-Soapstone, Felsite, Fire Clay, Ordinary Building Stone, Ordinary sand, Ornamental Building Stone, Pink Granite, Pink Porphry, Shahabad Stone, Shale, Tiger black, White Granite, White Quartz & Gypsum.	
Kerala	Illemenite, Leucoxene, Limestone, Monazite, Rutile, Sillimanite & Zircon	Granite Building Stone, Granite Dimension Stone, China Clay, Brick clay, Laterite (Building & Cement), Limeshell, Ordinary earth, Ordinary Sand, River Sand & Silica Sand	
Madhya Pradesh	Bauxite, Copper, Diamond, Iron Ore, Limestone, Manganese & Rock Phosphate		Coal
Maharashtra	Bauxite, Fluorite, Iron Ore, Kyanite, Limestone, Manganese, Sand Stowing & Sillimanite	Black Stone, Dolomite, Jambha Chira, Laterite, Murrum, Ordinary Clay, Ordinary Sand, RBM, Silica Sand, Slate & Stone	Coal
Manipur	Chromite & Limestone	Sand, Stone, Sandstone, Shale & Earth/Brick -earth	
Meghalaya	Iron Ore, Limestone & Clay	Boulder Stone, Brick Earth, Granite, Limestone & River sand	Coal
Mizoram		Sand & Stone	
Nagaland	Limestone & Ni-Co-Cr bearing Magnetite	Clay, Decorative Building Stone & Mud	Coal, Natural Gas & Petroleum
Odisha	Bauxite, Chromite, Graphite, Iron Ore, Limestone & Manganese ore	Dolomite, Mineral Sand, Pyrophylite, Quartz & Quartzite,	Coal
Punjab		Sand and gravel	
Rajasthan	Copper Ore, Garnet, Iron Ore, Lead-Zinc Ore, Magnesite, Limestone, Manganese ore,	Ball Clay, Barytes, Bentonite, Calcite, China Clay, Dolomite, Feldspar, Fire clay, Fuller's Earth, Granite, Gypsum, Laterite, Marble, Mica, Ochre, Phyllite,	Lignite, Natural Gas & Petroleum

State	Types of resources		
	Major Mineral	Minor Mineral	Fossil Fuel
	Rock Phosphate, Selenite, Siliceous earth, Silver Ore, Vermiculite & Wollastonite	Pyrophylite, Quartzite, Silica Sand & Talc-Steatite-Soapstone	
Sikkim	Base Metals, Graphite, Limestone & Talc	Boulder, Dolomite, Sand, Stone & Stone Chips	Coal
Tamil Nadu	Beach Sand Minerals, Graphite, Limestone, Marl, Magnesite & Vermiculite	Granite, Quartz, RBM, Rough stone, Feldspar, Fire Clay, Calcite, Lime kankar, Earth, Quartzite & Dunite	Lignite, Natural Gas & Petroleum
Telangana	Garnet, Iron Ore, Limestone, Manganese ore & Stowing Sand	Barytes, Black Granite, Colour Granite, Dolomite, Feldspar, Fuller's Earth, Gravel, white clay, Laterite, L. Stone Slabs, Mosaic Chips, Ordinary Sand, Quartz, Road Metal & Shale	Coal
Tripura		Sand	Natural Gas
Uttar Pradesh	Limestone	Diaspore, Granite, Pyrophylite, Silica Sand, Morrum, Ordinary Sand (Category-I) & (Category-II), Dolostone & Granite, Quartz, RBM, Red Morrum, Sand Stone & Quartzite, Sand Stone & Quartzite Ballast, Dolostone & Granite Ballast, Stone, Stone Dust & Bajri	Coal
Uttarakhand	Limestone & Magnesite	RBM & Soapstone	
West Bengal	Stowing Sand	Black Stone, China Clay, Feldspar, Fire Clay, Granite, Quartz, Sand Stone & Silica Sand	Coal

Thus, it can be seen from the table above, a total of 133 mineral and energy resources are covered in this compilation. Break-up of minerals/fossil fuels initiated in 2021-22 vis-a-vis 2020-21 are as follows:

Mineral	2020-21	2021-22
Fossil fuels	4	4
Major Minerals	40	43
Minor Minerals	63	86

Note: In view of data gaps, the data of Mineral Resources for the year 2021-22 for Karnataka is excluded from Compendium of Asset Accounts on Mineral and Energy Resources for the year 2021-22.

4.2 Asset Account of Fossil Fuels

During the course of the study, all four fossil fuels have been covered in 28 States and 3 UTs for the year 2021-22. The overall State-wise position of stock and flow of fossil fuels commencing with the opening stock, additions and extractions during the year, and closing stock at the end of the year 2021-22. The following table has the details.

Stock and flow	Break-up	Coal	Lignite	Crude Oil/Petroleum	Natural Gas
No of States involved		14	4	7	7
				In million tonnes	***In million cum***
Opening Balance		1,05,035.91	7,902.68	903.97	301575.19
Addition		468.86	7.03	3.98	5254.67
Upward Reappraisals		2882.89			
Extraction	Govt. Sector	723.94	36.94	14.24	6,815.08
	Private Sector	44.48	0.06	0.31	2,350.90
	Others	1.34	10.26	0.018	841.47
	Total	769.76	47.26	14.57	10,007.45
Downward Reappraisals				0.03	665
Closing Balance		1,07,617.90	7862.45	893.38	2,96,157.41

Note: The variations in stock and flow is due to variations in stock and flow of resources as reported by the States.

Details are in Annexure - V.

Thus, at the end of March 2022, the stock of fossil fuels in the States stood at 1,07,617.90 million tonnes of coal, 7,862.45 million tonnes of lignite, 893.38 million tonnes of crude oil and 2,96,157.41 million cum of natural gas.

The valuation of the closing stock of the resources is possible using the average sale price of the produces for the month of March 2022 captured by the IBM.

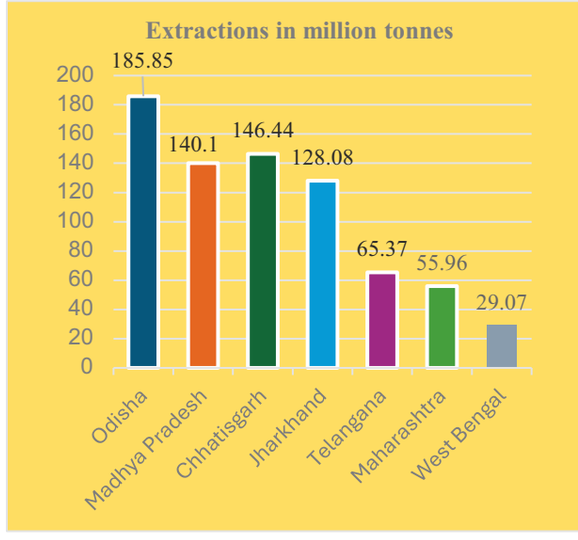
During the year, the flow of reserves involved additions of 468.86 million tonnes of coal, 7.03 million tonnes of lignite, 3.98 million tonnes of crude oil and 5,254.67 million cum of natural gas in the States which were new discoveries/newly declared as proved reserves; while at the same time, there was extraction of 769.76 million tonnes of coal, 47.26 million tonnes of lignite, 14.57 million tonnes of crude oil and 10,007.45 million cum of natural gas in the States. There is an upward reappraisals of 2882.89 in coal and downward reappraisals of 0.03 in crude oil and downward reappraisals of 665 in of natural gas in the States.

State-wise position of major extractors and availability of resources at the end of the year in descending order are given in the following table:

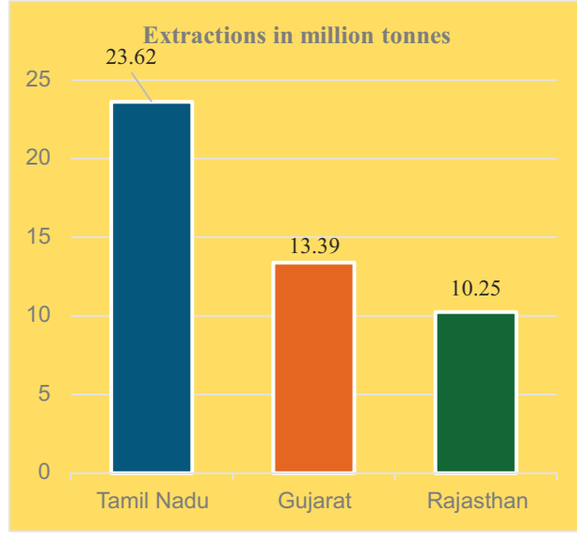
Highest extractions (State/qty.)				Closing stock March 2022 (State/qty.)			
Coal	**Lignite**	**Crude Oil**	**Natural gas**	**Coal**	**Lignite**	**Crude Oil**	**Natural gas**
				(Coal, Lignite and Crude Oil resources in million tonnes/natural gas in million cum)			
Odisha (185.85)	Tamil Nadu (23.62)	Rajasthan (5.87)	Assam (3,371)	Odisha (43,465.56)	Gujarat (3,470.78)	Nagaland* (598.98)	Assam (1,60,234)
Madhya Pradesh (140.10)	Gujarat (13.39)	Gujarat (4.55)	Rajasthan (2,622.67)	Chhattisgarh (17,218.31)	Tamil Nadu (3,271.60)	Assam (147.71)	Gujarat (56,517.80)
Chhattisgarh (146.44)	Rajasthan (10.25)	Assam (3.91)	Tripura (1,530)	West Bengal (17,016.06)	Rajasthan (1,115.07)	Gujarat (110.84)	Tamil Nadu (36,882)
Jharkhand (128.08)		Andhra Pradesh (0.16)	Tamil Nadu (1008)	Jharkhand (11,640.85)	Others (5.00)	Rajasthan (25.39)	Tripura (30,233)
Telangana (65.37)			Andhra Pradesh (793.52)	Telangana (9,378.87)		Tamil Nadu (9.04)	Rajasthan (12,214.85)
Maharashtra (55.96)			Gujarat (682.20)	Maharashtra (5,602.34)		Arunachal Pradesh (1.41)	Others (75.76)
West Bengal (29.07)				Others (3295.92)		Others (0.01)	

* Including Natural Gas.

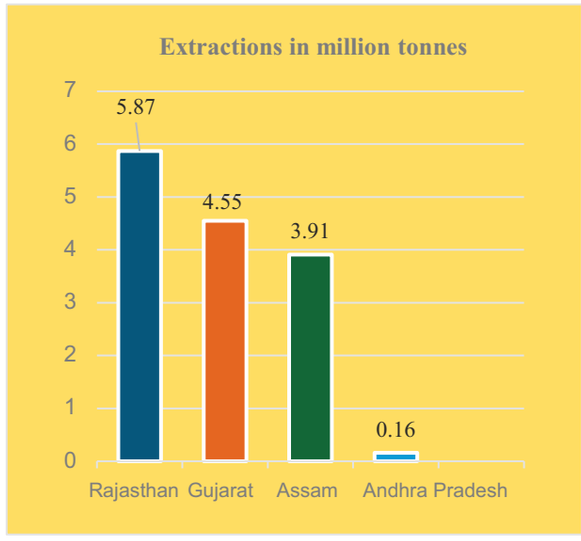
These are further depicted through the charts below.



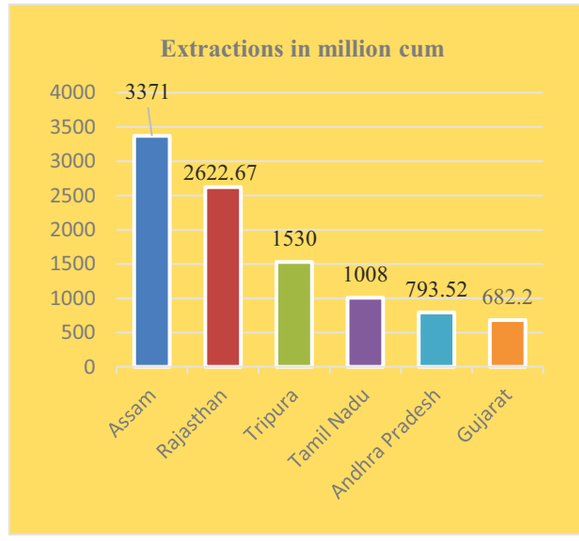
Coal (major extracting States)



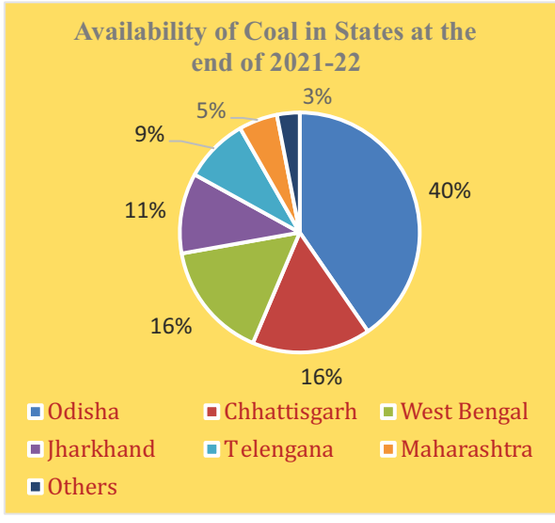
Lignite (major extracting States)

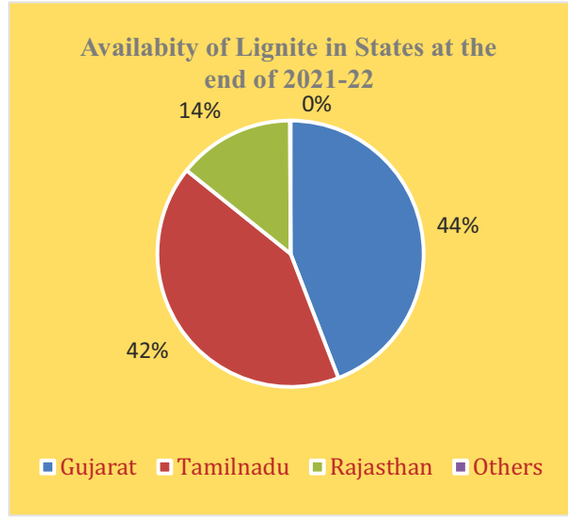


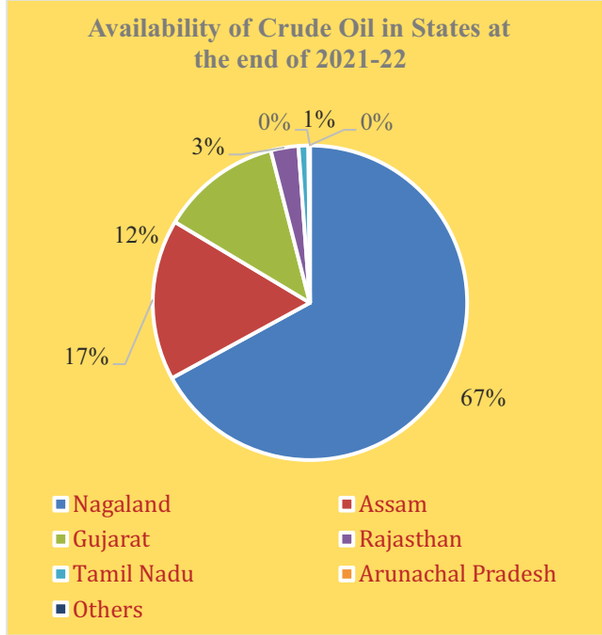
Crude Oil (major extracting States)

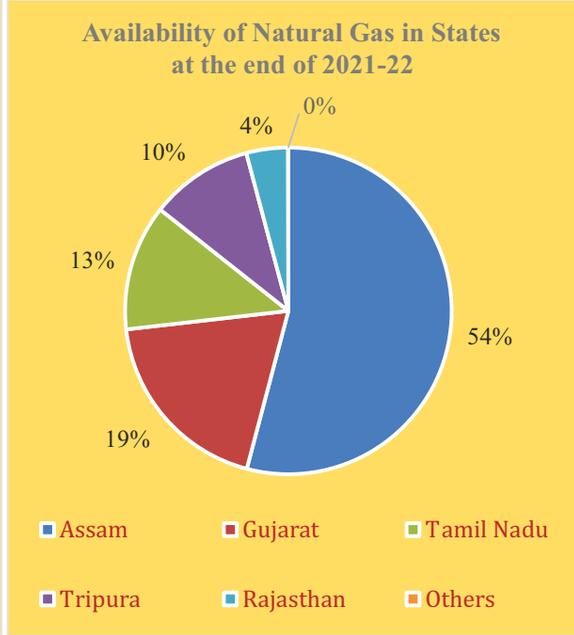


Natural Gas (major extracting States)









GASAB's endeavour ranged from assisting the country to prepare the basic Asset Accounts table as prescribed by the SEEA – CF and also generate further information which are country specific. It will help the policy makers in evidence based decision making. Thus, inputs like sustainability of resources have also been captured in addition to the stock and flow of resources as prescribed by the SEEA framework. The sustainability of resources are in paragraphs 4.5.1

Notes:

- ✓ ***The Opening balances are reckoned from the last years Closing Balances. Any Prior period accounting errors coming to fore during the year 2021-22, had been adjusted as upward/downward reappraisal as envisaged in SEEA-CF framework.***
- ✓ ***Additions are those new discoveries or opening-up of new blocks as proved reserves as reported by the State Governments.***
- ✓ ***Extractions have been further divided into extraction for/by Government sector, Private sector and others which includes illegal mining. Figures as reported by the State Governments have been adopted.***
- ✓ ***The resultant balance has been reckoned as the closing stock of resources.***

4.3 Asset Account of Major Minerals

In India, minerals are broadly classified into major minerals (non-minor) and minor minerals. During the course of the study, 43 major minerals have been covered in 28 States and 3 UTs for the year 2021-22. In August 2022, the National Mineral Inventory of major minerals as of 1 April 2020 was released. When analysed against the NMI, it is seen that not only all the major minerals against which proved reserves have been enumerated in the NMI have been covered, but the Asset Accounts prepared in States actually cover a number of other major minerals which have not been covered by the NMI. The overall State-wise position of stock and flow of significant major minerals commencing with the opening stock, additions and extractions during the year, and closing stock at the end of the year 2021-22 are depicted through the following table. The overall position of stock and flow of major minerals is in **Annexure - VI.**

Significant Major Minerals

Sl. No.	Name of Mineral	No. of States involved	Stock and Flow of resources				
			Opening Balance	Additions	Extractions		Closing Balance
					Breakup	Total	
					Government		
					Private		
					Others		
							In million tonnes
1.	Limestone	23	87,157.21	1,731.86	1.27	346.04	88,543.03
					245.81		
					90.64		
2.	Iron Ore	11	6615.27	683.63	91.64	227.84	7,071.06
					131.45		
					4.75		
3.	Magnesite	3	313.54	Nil	0.031	0.10	313.44
					0.069		
					0		
4.	Bauxite	8	440.18	680.60	10.97	21.89	1,098.89
					10.92		
					0		
5.	Copper ore	3	152.95	5.21	2.44	5.32	152.84
					0		
					2.88		
6.	Manganese	8	105.06	62.58	0.78	2.39	165.25
					1.60		
					0.01		
7.	Rock Phosphate	2	79.47	Nil	0.01	1.02	78.45
					0.10		
					0.91		
8.	Silver	1	74.67	Nil	0	0.0004	74.67
					0		
					0.0004		
9.	Chromite	2	65.83	Nil	1.16	3.77	62.06
					2.61		
					0		
10.	Lead Zinc Ore	1	28.73	Nil	0	3.11	25.62
					0		
					3.11		

Note: The variations in stock and flow is due to variations in stock and flow of resources as reported by the States.

There is an Upward Reappraisals and Downward Reappraisals in the States.

Other major minerals covered are Talc, Nickel-Cobalt-Chromium bearing Magnetite, Siliceous earth, Silimanite, aluminous laterite, auriferous quartz, base metals, beach sand minerals, diamond, fluorite, garnet, gold, graphite, illemenite, leucoxene, lime shell, marl, martilised magnetite iron ore, monazite, rutile, selenite, stowing sand, tin metal, titaniferous magnetite, tin ore, vermiculite, wollastonite, zircon etc. as shown in **Annexure - VI.**

Thus, at the end of March 2022, the stock of 4 major metallic minerals in the States stood at 1,098.89 million tonnes of bauxite, 62.06 million tonnes of chromite, 7,071.06 million tonnes of iron ore and 165.25 million tonnes of manganese ore. Other major reserves included that of limestone at 88,543.03 million tonnes, magnesite 313.44 million tonnes, and copper ore at 152.84 million tonnes.

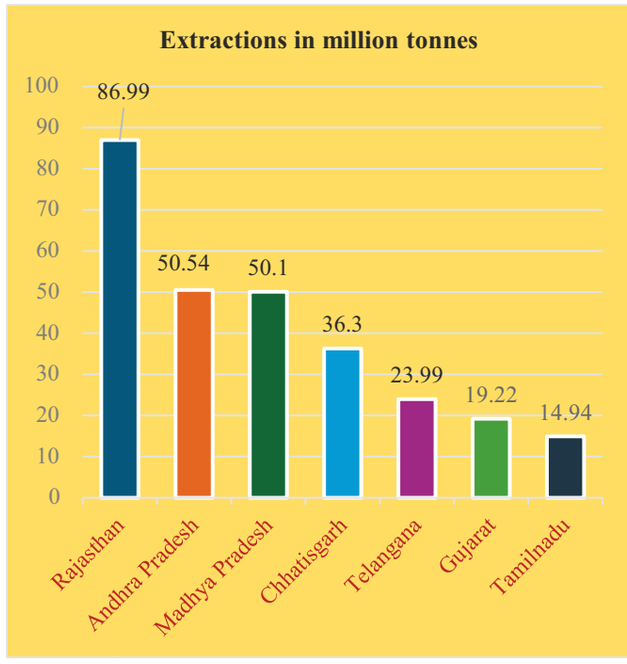
The valuation of the closing stock of the resources is possible using the average sale price of the produces for the month of March 2022 captured by the IBM.

Similarly, in respect of the above significant major minerals, the flow of reserves during the year involved additions of 1,731.86 million tonnes of limestone, 683.63 million tonnes of iron ore, 680.60 million tonnes of bauxite, 62.58 million tonnes of manganese in the States which were new discoveries/newly declared as proved reserves; while at the same time, there were extractions of 346.04 million tonnes of limestone, 227.84 million tonnes of iron ore, 21.89 million tonnes of bauxite, 3.11 million tonnes of lead zinc ore, 5.32 million tonnes of copper ore, 2.39 million tonnes of manganese and 3.77 million tonnes of chromite among others. There is an upward reappraisals and downward reappraisals in the States.

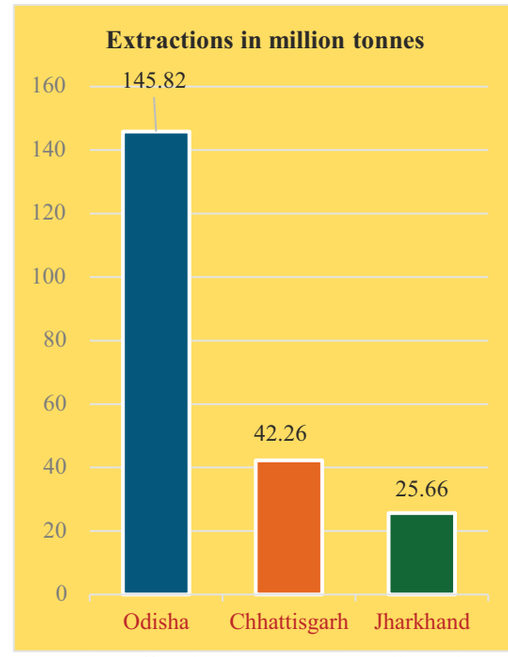
State-wise position of major extractors and availability of resources at the end of the year in descending order are given in the following tables:

Highest extractions (State/qty.)						
Limestone	**Iron Ore**	**Bauxite**	**Lead zinc ore**	**Copper ore**	**Chromite**	**Rock Phosphate**
						(In million tonnes)
Rajasthan (86.99)	Odisha (145.82)	Odisha (16.45)	Rajasthan (3.11)	Rajasthan (2.88)	Odisha (3.77)	Rajasthan (0.91)
Andhra Pradesh (50.54)	Chhattisgarh (42.26)	Jharkhand (1.80)		Madhya Pradesh (2.44)		Madhya Pradesh (0.11)
Madhya Pradesh (50.1)	Jharkhand (25.66)	Gujarat (1.35)				
Chhattisgarh (36.3)						
Telangana (23.99)						
Gujarat (19.22)						
Tamil Nadu (14.94)						

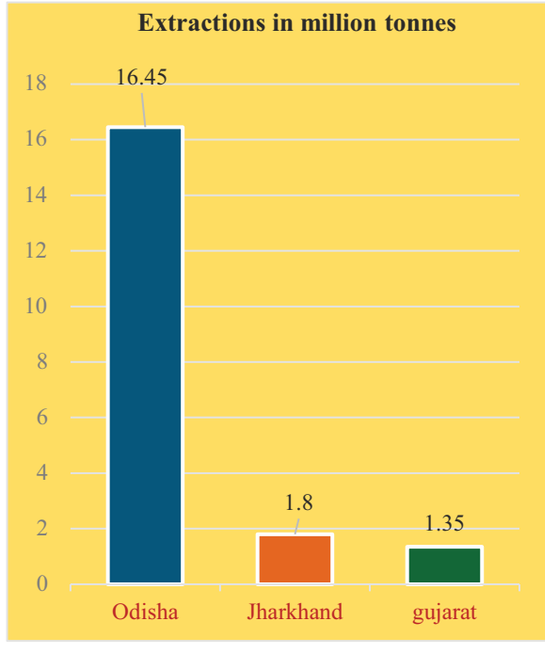
These are further depicted through the charts below.



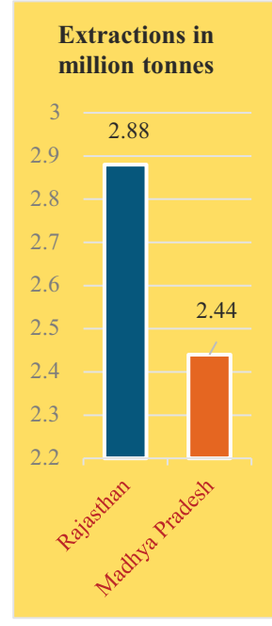
Limestone (major extracting States)



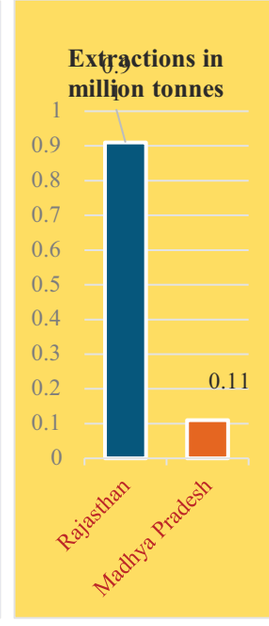
Iron Ore (major extracting States)



Bauxite (major extracting States)



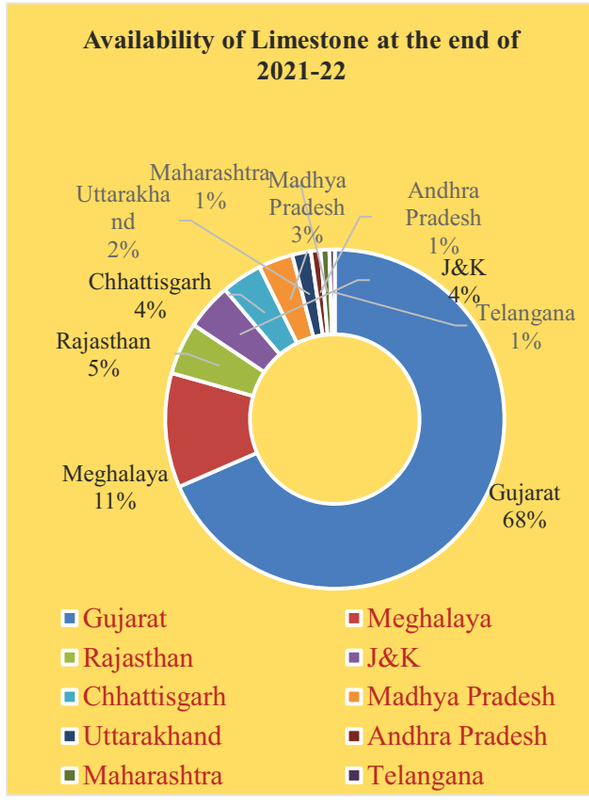
Copper (major extracting States)

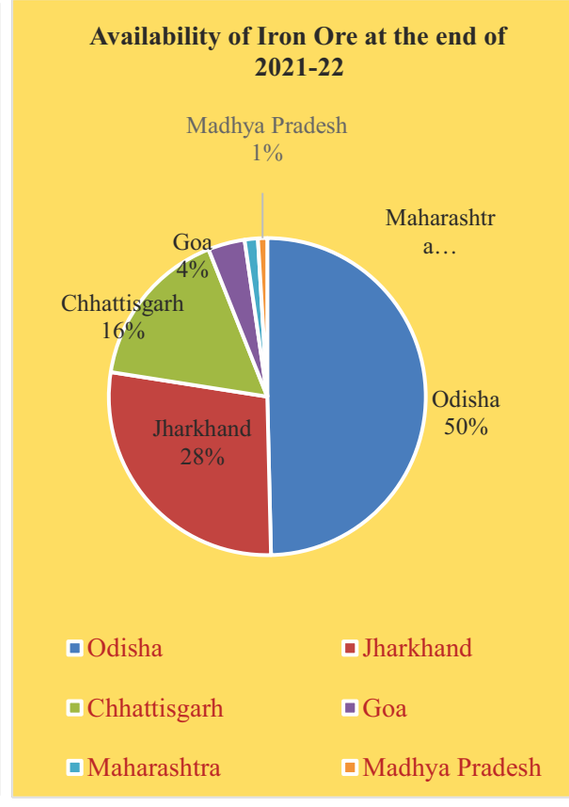


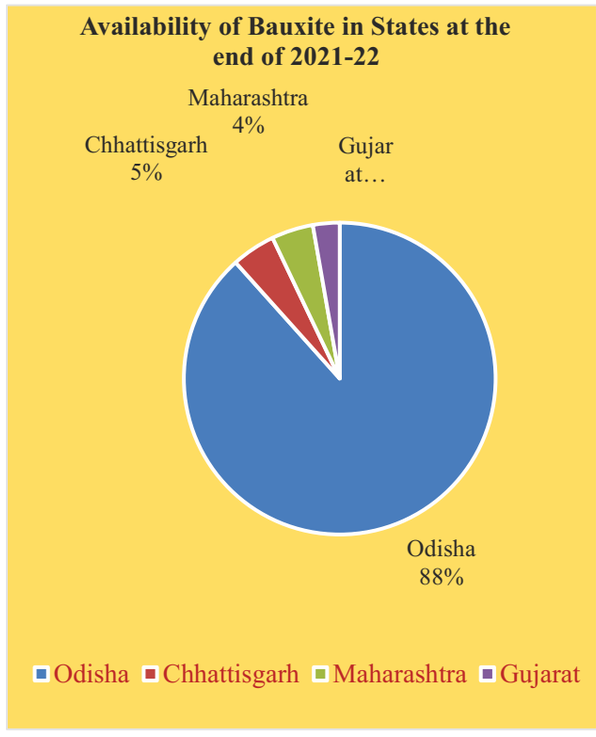
Rock Phosphate (major extracting States)

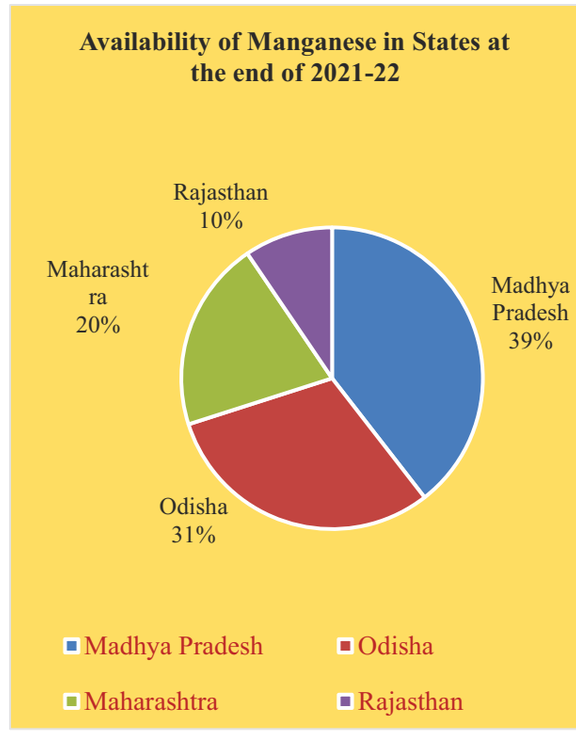
State-wise stock of resources March 2022 (State/qty.)						
Limestone	**Iron Ore**	**Bauxite**	**Manganese**	**Chromite**	**Copper ore**	**Magnesite**
						(In million tonnes)
Gujarat (59,502.08)	Odisha (3,490.11)	Odisha (904.52)	Madhya Pradesh (63.37)	Odisha (62.05)	Madhya Pradesh (105.79)	Uttarakhand (231.07)
Meghalaya (9,476.42)	Jharkhand (1,958.44)	Chhattisgarh (46.50)	Odisha (49.06)		Rajasthan (46.12)	Tamil Nadu (75.37)
Rajasthan (4,338.62)	Chhattisgarh (1159.03)	Maharashtra (44.31)	Maharashtra (32.8)			J&K (7.00)
J&K (3,848.81)	Goa (263.78)	Gujarat (28.31)	Rajasthan (15.24)			
Chhattisgarh (3,376.21)	Maharashtra (94.74)					
Madhya Pradesh (2,845.97)	Madhya Pradesh (66.58)					
Uttarakhand (1542.76)						
Andhra Pradesh (793.48)						
Maharashtra (728.41)						
Telangana (444.88)						

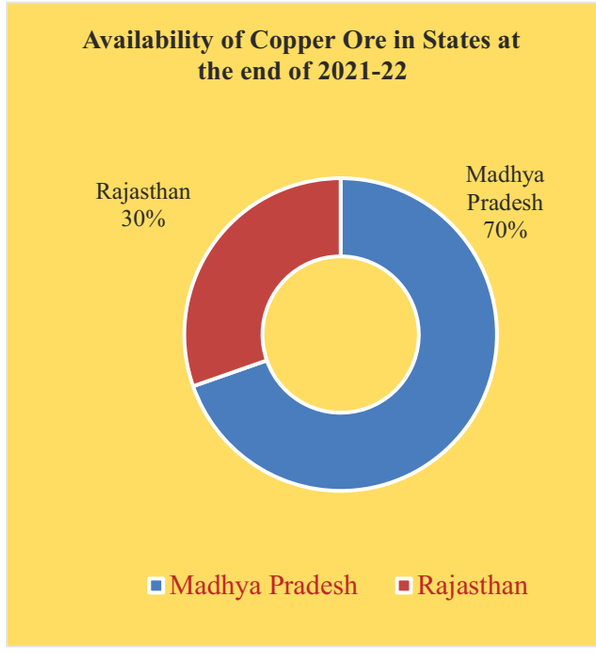
The major stock bearing States are depicted through the charts below:

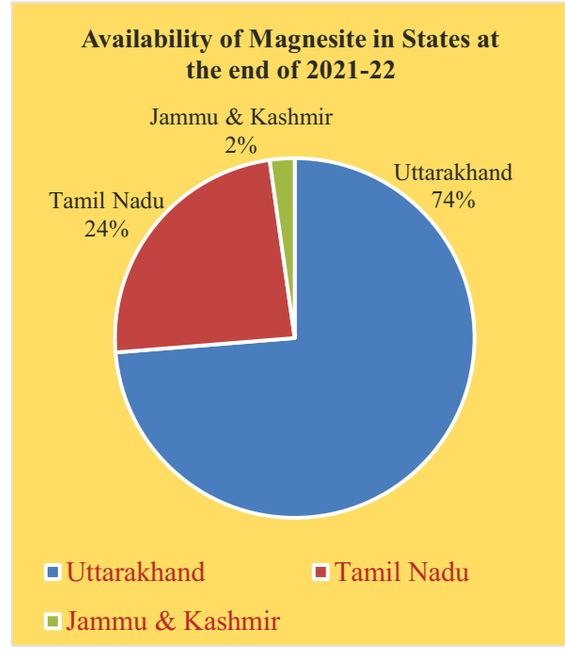












Sustainability of resources are discussed in paragraphs 4.5.1.

Notes:

- ✓ ***The Opening balances are reckoned from the last years Closing Balances. Any Prior period accounting errors coming to fore during the year 2021-22, had been adjusted as upward/downward reappraisal as envisaged in SEEA-CF framework.***
- ✓ ***Additions are those new discoveries or opening-up of new blocks as proved reserves as reported by the State Governments.***

- ✓ *Extractions have been further divided into extraction for/by Government sector, Private sector and others which includes illegal mining. Figures as reported by the State Governments have been adopted.*
- ✓ *The resultant balance has been reckoned as the closing stock of resources.*

4.4 Asset Account of Minor Minerals

Minor minerals are those which are controlled and auctioned/sold otherwise, royalties levied and also collected by the State Governments. GoI has in 2015 notified 31 major minerals which accounted for more than half of total leases as in 2015 as minor minerals placing them under the purview of the State Governments. These are, agate, ball clay, barytes, calcareous sand, calcite, chalk, china clay, clay (others), corundum, diaspore, dolomite, dunite/pyroxenite, felsite, feldspar, fireclay, fuschite quartzite, gypsum, jasper, kaolin, laterite, lime kankar, mica, ochre, pyrophyllite, quartz, quartzite sand (other), shale, sandstone, silica sand, slate and steatite/talc/soapstone. Also, there are other minor minerals like granite, bentonite, marble, construction material like sand, stone, bajri, aggregates, murrum etc. which were earlier notified as minor minerals.

The Asset Accounting process in the States covered almost all of these important minor minerals. The overall State-wise position of stock and flow of significant minor minerals commencing with the opening stock, additions and extractions during the year, and closing stock at the end of the year 2021-22 are depicted through the following table. The detailed statement is at **Annexure - VII.**

Significant Minor Minerals

Sl. No	Name of mineral	No. of States involved	Opening balance	Additions	Extractions	Closing balance
						In million tonnes
1.	Marble	6	566.78	9.79	13.6	562.97
2.	Barytes	3	49.39	0.29	2.34	47.34
3.	China clay	6	435.50	8.84	9.48	434.86
4.	Dolomite	12	2,397.40	7.58	7.31	2,397.67
5.	Feldspar	5	162.77	26.86	6.67	182.96
6.	Laterite	6	27.01	1.77	6.37	22.41
7.	Silica Sand	7	1,289.24	21.86	11.76	1,299.34
8.	Quartz	8	93.10	10.35	2.04	101.41
9.	Quartzite	9	77.32	35.52	3.83	109.01

Note: The variations in stock and flow, if any, is due to variations in stock and flow of resources as reported by the States.

Other minor minerals covered are granite, pyrophylite, white clay, bajri, sandstone etc. as detailed in the **Annexure - VII.**

Thus, at the end of March 2022, the stock of significant minor minerals in the States stood at 2,397.67 million tonnes of dolomite, 1299.34 million tonnes of silica sand, 562.97 million tonnes of marble, 434.86 million tonnes of china clay, 109.01 million tonnes of quartzite, 47.34 million tonnes of barytes, 22.41 million tonnes of laterite and others.

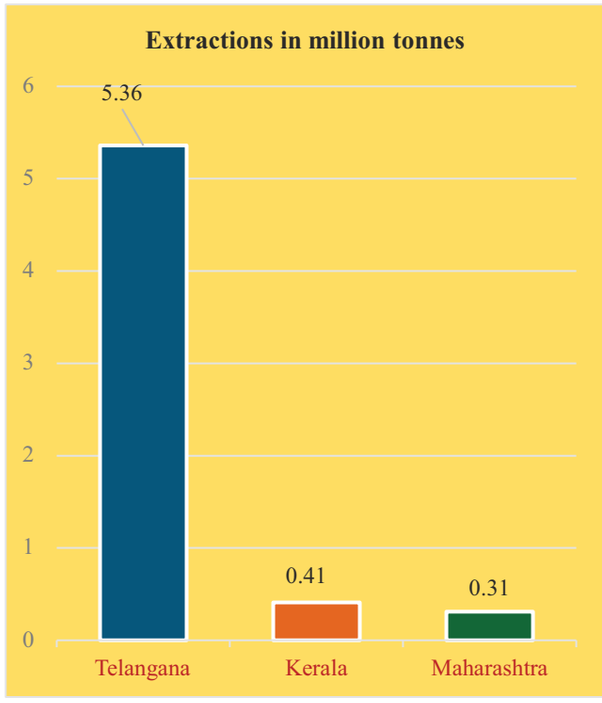
The valuation of the closing stock of these resources is possible using the average sale price of the produces for the month of March 2022 captured by the IBM/States.

Similarly, in respect of the above significant minor minerals during the year, the flow of reserves involved additions of 9.79 million tonnes of marble, 35.52 million tonnes of quartzite, 21.86 million tonnes of silica sand, 10.35 million tonnes of quartz, and 7.58 million tonnes of dolomite in the States which were new discoveries/newly declared as proved reserves; while at the same time there were extractions of 13.6 million tonnes of marble, 11.76 million tonnes of silica sand, 9.48 million tonnes of china clay, 7.31 million tonnes of dolomite, 6.37 million tonnes of laterite, 2.04 million tonnes of quartz. Other major extractions details were in **Annexure - VII.**

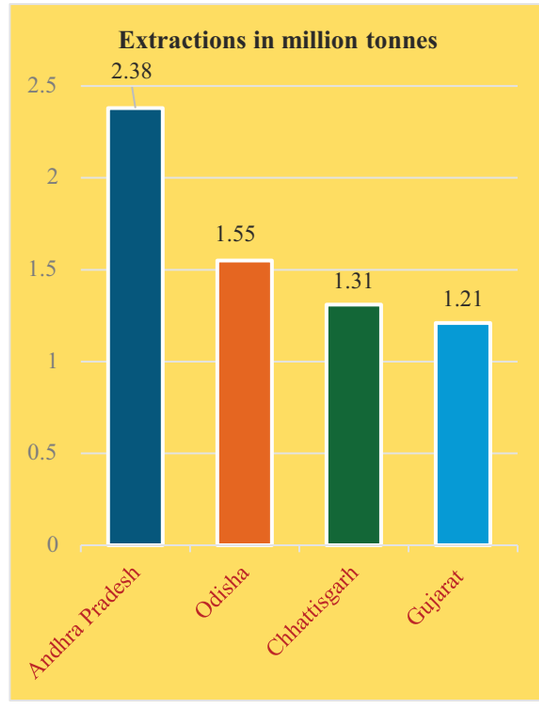
State-wise position of major-extractors and availability of resources at the end of the year in descending order are given in the following tables:

Highest extractions (State/Qty)					
Marble	**Laterite**	**China clay**	**Dolomite**	**Silica sand**	**Quartz**
				In million tonnes/In million cum (in red)	
Rajasthan (12.54)	Telangana (5.36)	Gujarat (5.09)	Andhra Pradesh (2.38)	Rajasthan (4.68)	Telangana (1.23)
Gujarat (0.72)	Kerala (0.41)	Rajasthan (3.97)	Odisha (1.55)	Maharashtra (2.66)	Gujarat (0.26)
	Maharashtra (0.31)	Kerala (0.24)	Chhattisgarh (1.31)	Gujarat (2.07)	
			Gujarat (1.21)	Uttar Pradesh (0.35)	

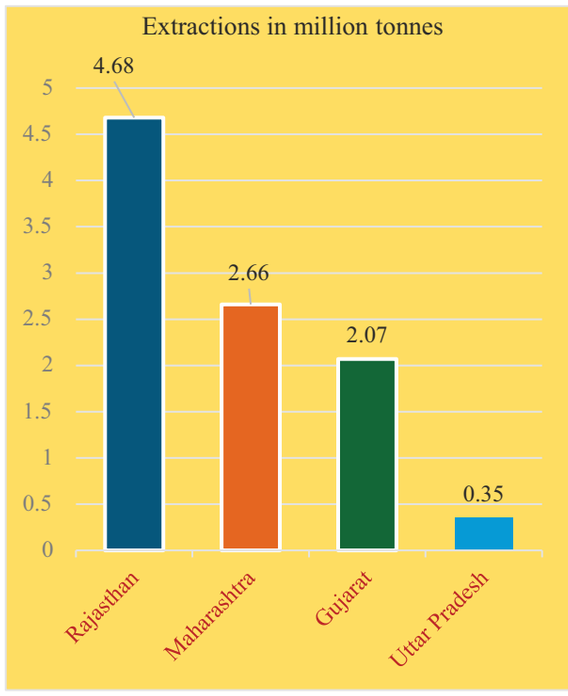
These are further depicted through the charts below.



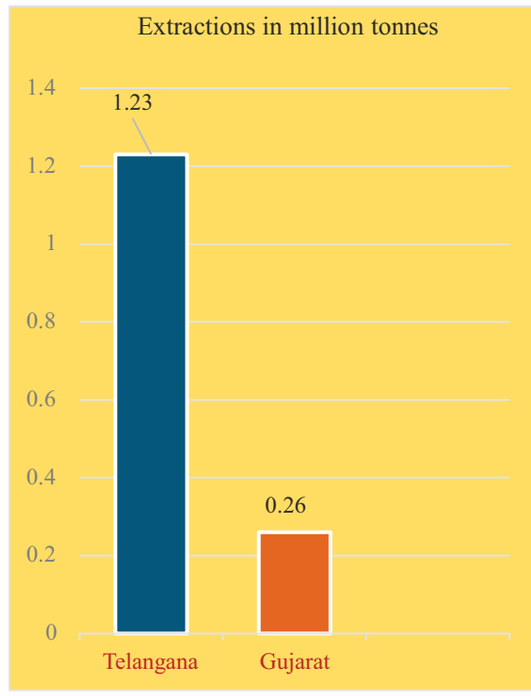
Laterite (major extracting States)



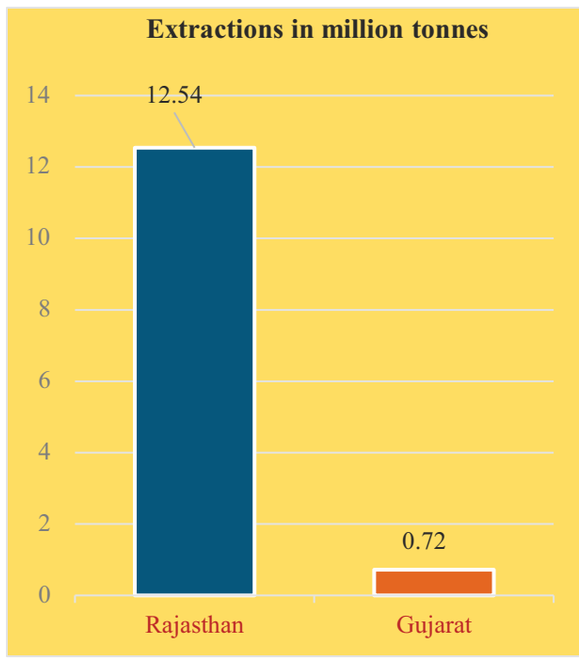
Dolomite (major extracting States)



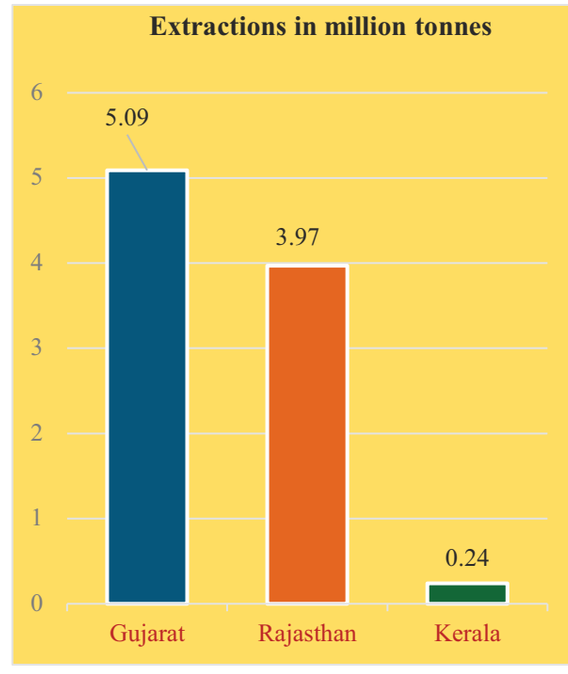
Silica Sand (major extracting States)



Quartz (major extracting States)



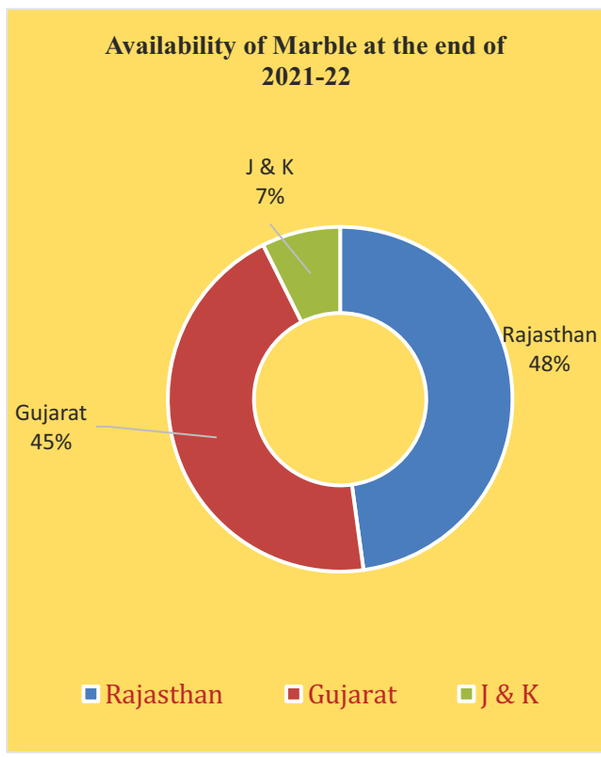
Marble (major extracting States)

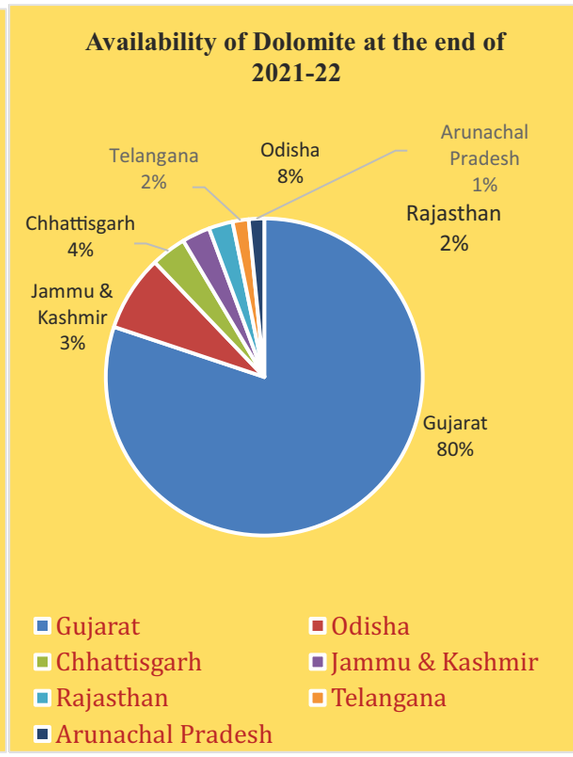


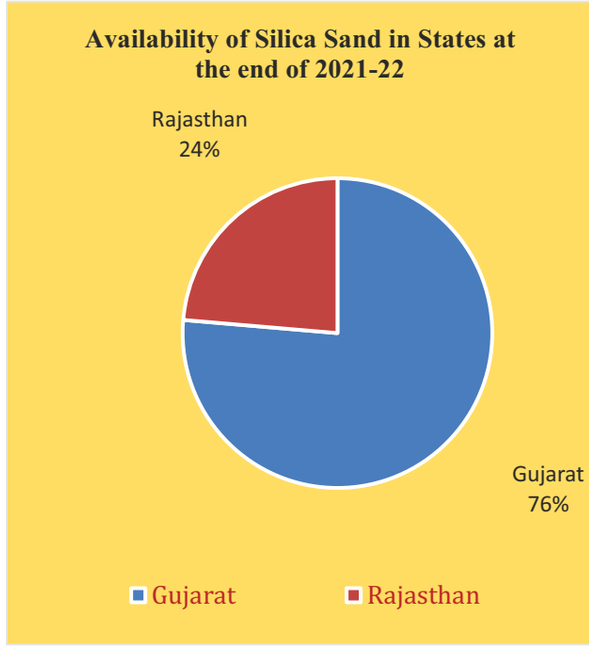
China Clay (major extracting States)

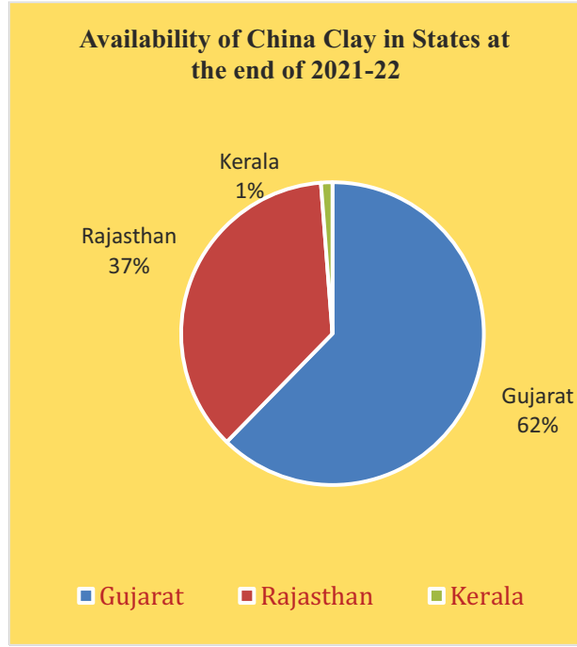
Closing stock of resources March 2022 (State/qty)					
Quartz	**Dolomite**	**Silica Sand**	**China Clay**	**Barytes**	**Marble**
					In million tonnes
Andhra Pradesh (44.93)	Gujarat (1,882.65)	Gujarat (960.69)	Gujarat (268.62)	Andhra Pradesh (40.55)	Rajasthan (264.15)
Tamil Nadu (25.01)	Odisha (181.9)	Rajasthan (297.51)	Rajasthan (157.19)	Rajasthan (5.50)	Gujarat (247.37)
Telangana (13.15)	Chhattisgarh (84.54)		Kerala (5.27)	Telangana (1.29)	Jammu and Kashmir (40.72)
Gujarat (12.93)	Jammu & Kashmir (67.37)				
West Bengal (2.22)	Rajasthan (57.67)				
	Telangana (38.46)				
	Arunachal Pradesh (37.09)				

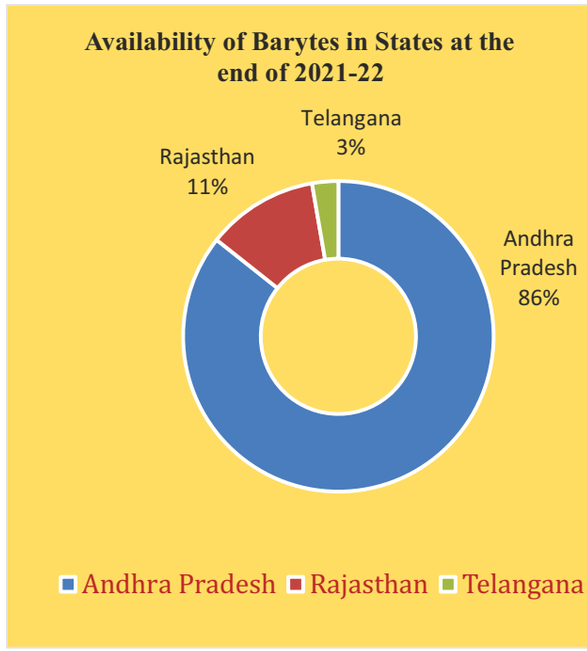
The major stock bearing States are depicted through the charts below:

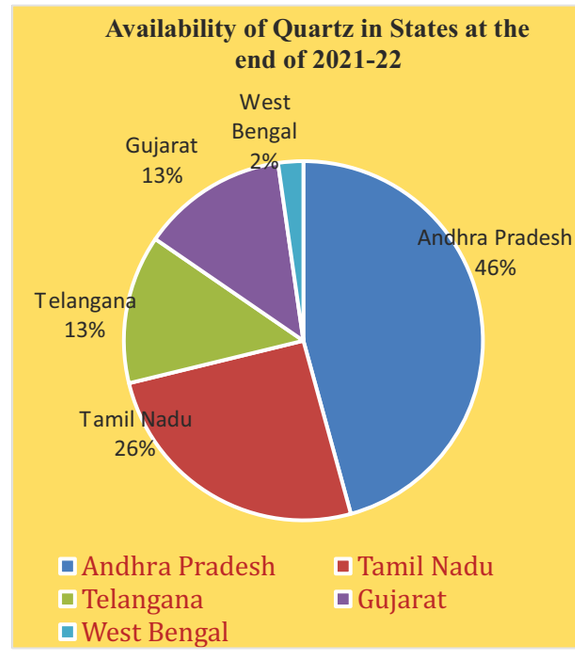












4.5 Additionalities – Country specific inputs

4.5.1 Sustainability of resources in States – vulnerable minerals

An attempt to extend the SEEA prescribed framework was to enable inputs for the policy makers for evidence based decision making to capture mineral wise sustainability so as to identify vulnerable resources. This will help ensure more focus on their sustainable use and identify alternatives for the future. The closing stock of proved reserves as on 31 March 2022 vis-à-vis stock extracted during 2021-22 has been taken into consideration for working out the sustainability of resources. The extraction could be averaged out after this system continues for couple of years thus, providing inputs on pace of extraction and rough sustainability of the resources vis-à-vis the stock.

The following table shows the minerals which will exhaust in period ranging upto 10 years, between 10 – 20 years and 20 – 30 years from now if the extractions continued at the same pace as was done during 2021-22 and there are no catastrophic or other losses of the stock as on 31 March 2022 which has been reckoned as the base. Further exploration or opening-up of new blocks, deep-seated deposits would change the sustainability.

State	Mineral	< 10 years	>10 years < 20 years	>20 years < 30 years
Andhra Pradesh	Limestone		16 years	
	Manganese ore		11 years	
	W.Shale		13 years	
	Dolomite		16 years	
	Feldspar		15 years	
	Silica Sand	8 years		

	Barytes		17 years	
Chhattisgarh	Iron ore			27.42 years
Bihar	Limestone	10 years		
Goa	Basalt		12.49 years	
	Laterite		11.15 years	
Gujarat	Bauxite			21 years
	Manganese Ore		18 years	
	Bentonite			21 years
	Crude Oil			24 years
J&K	RBM			28 years
Jharkhand	Stone			25.9 years
	Quartzite		15.9 years	
	Bauxite		14.6 years	
Kerala	Monazite		20 years	
	Limestone			22 years
	Granite		15 years	
	Laterite	1 year		
	Laterite (Cement)	4 years		
	China clay			22 years
	Silica sand		11 years	
Madhya Pradesh	Iron ore	9.48 years		
	Coal		13.92 years	
Maharashtra	Sand Stowing	6.66 years		
	Quartz & Silica Sand	2.86 years		
	Pyrophyllite	6.38 years		
Manipur	Limestone			26 years
	Chromite	10 years		
Meghalaya	Limestone		20 years	
	Boulder Stone	8 years		
Odisha	Chromite		16 years	
	Graphite		20 years	
	Iron ore			24 years
Rajasthan	Natural Gas	4.66 years		
	Petroleum/Crude Oil	4.33 years		
	Lead Zinc ore	8.22 years		
	Copper Ore		15.96 years	
	Wollastonite		11.83 years	
	Bentonite		12.02 years	
	Garnet	1.53 years		

	Ochre		14.55 years	
	Ball clay	4.90 years		
	Gypsum	0.68 year		
	Mica		15.89 years	
	Sand Stone	0.91 year		
	Serpentine	1.28 years		
	Marble			21.05 years
	Pyrophylite	9.87 years		
Tamil Nadu	Limestone	9 years		
	Roughstone		15 years	
	Gravel	4 years		
	Feldspar	3 years		
	Fire Clay	9 years		
	Lime & Kankar	9 years		
	Earth	1 year		
Telangana	Limestone		16 years	
	Manganese Ore	8 years		
	Feldspar	4 years		
	Laterite	2 years		
	Quartz		11 years	
	White clay	7 years		
Tripura	Natural gas		20 years	
	Sand	5 years		
Uttar Pradesh	Limestone		12 years	
	Coal	5 years		
West Bengal	Silica sand	8 years		

Note: Limestone in two states, Iron ore in two states, Laterite in three states, Silica Sand in four states, China Clay in one state, Sand stowing in one state, Pyrophyllite in two states, Boulder Stone in one state, Feldspar in two states, Natural Gas, Crude oil and Coal in one state and other thirteen minerals in one state will be exhausted in 10 years.

4.5.2 Collection of District Mineral Foundation and National Mineral Exploration Trust

In order to fund the welfare measures towards the people living in mining and nearby areas affected by mining activities, the GoI had enacted District Mineral Foundation in January 2015 at 10 per cent and 30 per cent of royalties to be paid by the lessees in cases of leases granted after and before 2018 respectively. Similarly, the GoI also enacted National Mineral Exploration Trust at 2 per cent of the royalty amount for boosting the exploration activities. The funds are to be kept separate and spent as per the guidance of the GoI.

The formats of Asset Accounts require collection of information on DMF and NMET realisable and those realised. This will provide specific information to the State Governments on amounts realisable, amounts realised and amounts remaining to be collected. All information were not readily

available with the States. Information provided by the State Governments on DMF/NMET collectible and collected during 2021-22 are shown in the following table:

Sl. No.	State	Total DMF/ NMET realisable (₹ in Crore)	Total DMF/ NMET realised (₹ in Crore)	Variations (-) Surplus (DMF/NMET)	
				₹ in Crore	Percentage
1.	Andhra Pradesh	264.59/8.26	264.59/8.26	Nil	Nil
2.	Arunachal Pradesh	3.19/ Nil	2.00/ Nil	1.19/ Nil	37.30/ Nil
3.	Assam	5.19/ 0.35	5.19/ 0.35	--	--
4.	Bihar	17.51/ 0.16	16.45/ 0.16	1.06/ Nil	6.05/ Nil
5.	Chhattisgarh	2,019.33/ 134.41	2,088.06/ 138.39	(-)68.73/ (-)3.98	(-)3.40/ (-)2.96
6.	Goa	6.21/ 0.41	6.64/ 0.44	(-) 0.43/ (-)0.029	(-) 6.92/ (-)7.07
7.	Gujarat	149.57/ 9.23	126.77/ 7.90	22.80/ 1.33	15.24/ 14.41
8.	Haryana	NA	89.41/ Nil	NA	NA
9.	Himachal Pradesh	49.03/ NA	34.33/ 2.33	14.70/ NA	29.99/ -
10.	J&K	5.66/ 0.22	6.94/ 0.3	(-)1.28/ (-)0.08	(-)22.61/ (-)36.36
11.	Ladakh	0.8053/ NA	0.8085/ NA	(-)0.0032/ NA	(-)0.40/ NA
12.	Jharkhand	1,809.91/ 103.76	1,780.44/ 107.84	29.47/ (-)4.08	1.63/ (-)3.93
13.	Karnataka	853.64/ NA	853.64/ 52.55		
14.	Kerala		10.19/ 0.21		
15.	Madhya Pradesh	NA	964.62/ 60.72		
16.	Maharashtra		707.68/ 35.49		

17.	Meghalaya		20.09/ 1.13		
18.	Odisha	--	4,738.33/ 376.35		
19.	Punjab	52.22	33.09	19.13	36.6
20.	Rajasthan	1,634.28/ 75.33	1,592.86/ 75.33	41.42/ 0	2.53/ 0
21.	Tamil Nadu	30.81/ 9.26	31.25/ 9.26	(-) 0.44/ 0	(-) 14.28/ 0
22.	Telangana	284.9/ 0	284.9/ 4.50	0	0
23.	Uttar Pradesh	0/ 9.94	231.38/ 10.27	0/ (-) 0.33	0/ (-) 3.35
24.	Uttarakhand	42.39/ NA	54.43/ NA	(-) 12.04/ NA	(-)28.40/ NA
25.	West Bengal	0.34/ 0.34	0.34/ 0.34		

The reasons for over payment is attributable to lumpsum payments made by the lessees against which the payables are adjusted from time to time. Information from remaining States were awaited.

4.5.3 Generation of power from non-renewable and renewable energy resources

The national declaration on *panchamrit* set a target of taking the non-fossil energy capacity to 500 GW and generating 50 per cent energy needs to be sourced from renewable energy sources by 2030.

Input tables were designed and included for collection of information by State Governments on sector-wise requirement of power in the State vis-à-vis production from renewable and non-renewable sources and the percentage of generation of power vis-à-vis the total requirement. It also required to capture information on power procured from out of the State by the energy deficit States. These inputs will enable States and the Union Government to monitor achievement of the national target of 50 per cent power generation from renewable energy resources by 2030. Information provided by the States for the year 2021-22 indicated the following:

State	Total energy required	Non-renewable energy generated within the state	Renewable energy generated within the State	Percentage of renewable energy generation vis-à-vis total energy required
Andhra Pradesh (MU)	69,154.69	49,479.35	19,493.24	28.19
Arunachal Pradesh (MWH)	1001712.24	Nil	65174.4	6.51
Assam (MWH)	84,94,500	19,71,540	1,16,915	1.38
Bihar (GWH)	29,107	40,557.77	337.5	1.16
Chhattisgarh (MWH)	3,56,78,688.48	7,42,41,370	24,17,540	6.78

Delhi (MW)	3,151	530.16	58.7	1.86
Goa (MU)	4,391.02	180.37	17.77	0.40
Gujarat (MWH)	12,93,17,126.3	11,05,33,959	1,87,83,168	14.52
Haryana (MU)	568556.6	463709.37	104847.2	18.44
Himachal Pradesh (MU)	10,201.08	Nil	9,411.56	92.26
J&K (MWH)	1,80,25,771.72	Nil	1,74,82,921.91	96.99
Ladakh (MWH)	2,50,060	50,060	2,00,000	79.98
Jharkhand (MWH)	1,38,15,255	37,85,643	1,01,496	0.73
Karnataka (MU)	-	13317.57	27083.54	-
Kerala (MU)	26,703.19	Nil	10,977.31	13.44
Madhya Pradesh (MWH/GWH)	86,730	72,239	13,401	15.45
Maharashtra (MU)	1,21,978.85	1,27,289	16,994.60	13.93
Manipur (MWH)	7,78,260	Nil	6137	0.79
Meghalaya (GWH)	1,549.65	Nil	884.97	57.11
Mizoram (MU)	658.06	Nil	28.28	4.30
Nagaland (MWH)	98.95	91.43	7.52	7.60
Odisha (MW)	27,122	18,291.18	8,830.82	32.56
Punjab (MU)	53166	45892	16261.95	30.59
Rajasthan (MU)	90,810	69,092	18,649	20.54
Sikkim (MU)	495.20	Nil	1,428.43	288.46
Tamil Nadu (MW)	117561	16,652.20	17225.11	17.73
Telangana (MU)	68,184.54	61,331.83	12,089.43	17.73
Tripura (MW)	1,553.81	563.64	15.19	0.98
Uttar Pradesh (GWH)	90356.89	101719.69	21687.19	24
Uttarakhand (MU)	14,581.68	Nil	509	3.49
West Bengal (MU)	33,231.99	32,680.91	1,846.54	5.56

MW – Mega Watt. MU – million units of energy. 500 MW running for 24 hours gives 12 MUs of energy. Captive consumption has been consolidated and detailed break-up is available in State-wise reports.

CHAPTER

V

GOOD PRACTICES AND INNOVATIONS OF MINERAL RESOURCES IN STATES

GOOD PRACTICES AND INNOVATIONS OF MINERAL RESOURCES IN STATES

5.1 Introduction

This chapter explores the "Good Practices and Innovations" within the management of mineral and energy resources. It aims to spotlight effective strategies and pioneering approaches that have emerged across various states, showcasing how they have contributed to the sustainable and efficient utilization of these critical resources. By highlighting technological advancements, and policy innovations, this section provides a comprehensive overview of best practices that not only enhance resource management but also set a benchmark for future developments in the sector. Through a detailed examination of these practices, the chapter underscores the importance of adaptive strategies and forward-thinking solutions in addressing the challenges associated with mineral and energy resource management.

5.2 Techniques and Tools for better management of mining activities

5.2.1 Importance of Geo-tagging and Geo-fencing

Geo-tagging of mineral bearing areas refers to attaching of geographic coordinate information recorded by GPS enabled electronic devices. Geo-tagged mineral bearing areas would, thus, contain the coordinates of the entire mine area with geospatial metadata such as latitude and longitude coordinates, altitude bearing and more. In google maps and similar GPS services, geo-tagging may also be referred to as dropping a pin. Pins can be tagged with contextual information to share information about the specific physical location.

Geo-tagged mine area

Some of the benefits of Geo-tagging are:

Accurate Resource Mapping: Geo-tagging allows for the precise mapping of mineral deposits, providing detailed and accurate location data. This helps in creating comprehensive geological maps, which are crucial for exploration and resource management.

- *Efficient Exploration*: Exploration companies can use geo-tagged data to identify and prioritize mineral-rich areas, reducing the time and cost associated with exploration activities.
- *Optimized Extraction*: By knowing the exact locations and extents of mineral deposits, mining operations can be planned more efficiently, minimizing waste and optimizing resource extraction.
- *Strategic Planning*: Geo-tagged data aids in long-term resource planning and management, allowing authorities and companies to make informed decisions about resource allocation and development.
- *Monitoring and Enforcement*: Accurate geo-tagging supports compliance with mining regulations by providing a clear record of mineral locations, helping to ensure that operations are conducted within legal boundaries.
- *Environmental Impact Assessments*: Geo-tagging is essential for conducting environmental impact assessments, as it allows for the identification of potentially affected areas and the planning of mitigation measures.

Similar to geo-tagging of the mines area, geotag pins are generated around the mineral bearing areas which are then connected to each other to create geo- fencing of the mine area. The benefits of Geo-fencing are:

- *Increased Accuracy*: Geo-fencing provides precise location tracking and boundary definition, improving the effectiveness of various applications.
- *Improved Security*: Enhances security by monitoring and managing access to sensitive or restricted areas. Mining activities carried out outside the geo-tagged area could be picked up by satellite interventions and reported.

5.2.2 Initiatives of Ministry of Mines, Government of India to geo-fence the mine areas

Ministry of Mines & Indian Bureau of Mines (IBM) have developed the Mining Surveillance System (MSS), with assistance from Bhaskaracharya Institute for Space Applications and Geo-informatics (BISAG), Gandhinagar and Ministry of Electronics and Information Technology (MeitY).

Mining Surveillance System (MSS) is a satellite-based monitoring system which aims to establish a regime of responsive mineral administration by curbing instances of illegal mining activity through automatic remote sensing detection technology.

The system works on the basic premise that most minerals occur in the continuity and their occurrence is not limited to the lease area but is likely to extend in the vicinity. The MSS checks a region of 500 meters around the existing mining lease boundary to search for any unusual activity which is likely to be illegal mining. Any discrepancy found is flagged-off as a trigger.

State Governments can access the application with the user id and password provided to them for the purpose of verification, validation. A user-friendly mobile app for MSS has also been developed. Training for adoption of MSS for minor minerals was also given to various mineral rich States. A total of 179 Officers from States have participated in the training.

The main advantages of MSS are as under -

Transparency: Public is also provided access to the system

Participatory: The citizens by using the mobile app can also report unusual mining activity.

Bias-free: The system has no human interference.

Deterrence Effect: 'yes watching from the sky'

Quicker Response and Action: The mining areas will be monitored regularly. Sensitive areas will be monitored more frequently.

Effective Follow-up: The action taken on triggers will be followed-up at various levels like Department of Mines and Geology (DMG), State Mining Secretary, State Office and Headquarters Office of IBM and Ministry of Mines, Government of India.

Summary of Phase wise triggers generated

	Generated	Verified	Unauthorized Mining
Phase-I (Major) (2016-17)	296	287	47
Phase-II (Major) (2018-19)	52	45	5
Phase-II (Minor) (2018-19)	130	104	9
Phase-III (Major) (2021-22)	177	97	12
Phase-IV (Major) (2022-23)	61	24	7
Phase-IV (Major) (2023-24) #	157	0	0

#Recent Triggers, have been recently communicated to State Government for verification.

While Government of India uses the above MSS for identifying illegal mining of major minerals, they have advised the States to introduce MSS for monitoring the minor minerals also.

However, no verifiable progress had been made in most of the States on developing MSS to curb illegal mining of minor minerals. States neither have a robust system of mapping the supply and use of resources to detect illegal extraction and supply of resources by unscrupulous miners/entities. Moreover, the system of detection and imposition of penal measures is also deficient in States as evident from the fact of instances of non-recording of name and volume of minerals detected, royalty amounts involved, etc. were not found recorded in most of the States.

During the course of the study, a number of good practices and innovations have been observed in States, which are discussed in the following paragraphs.

5.3 Good practices and innovations observed in States

5.3.1 Andhra Pradesh

The following good practices have been adopted by State Government of Andhra Pradesh:

1. Online Mineral E-permit System (OMEPS)

Online Mineral E-permit System (OMEPS)

The Department of Mines & Geology of Andhra Pradesh has significantly advanced its mineral administration processes through the implementation of Automated Mineral Administration System - **Online Mineral E-permit System (OMEPS)**. Launched on 29-09-2014, in Visakhapatnam, this system was expanded statewide from December 2014 to cover both major and minor minerals. Its key features include:

Comprehensive Data Capture: At the instance of the Accountant General, a new screen was integrated into the system to capture additional relevant data. This enhancement allows for more detailed monitoring and reporting.

Field Office Integration: All district field offices were mandated to upload data into OMEPS starting 07-12-2020. This ensures uniform data entry & accessibility across State.

2. Andhra Pradesh Mineral Vehicle Tracking System (APMVTS)

In collaboration with the Andhra Pradesh Space Application Center (APSAC), the DMG developed the Andhra Pradesh Mineral Vehicle Tracking System (APMVTS). This system provides an online platform for the real-time surveillance of mineral-carrying vehicles. Its key features include:

Real-Time Surveillance: APMVTS employs cutting-edge technology to monitor mineral transportation and prevent illegal mining activities.

Enhanced Monitoring: The platform integrates GPS tracking and other technological tools to ensure compliance with regulations and track mineral movements effectively.

3. Online System for Regulation of Buying, Storing, & Transportation of Minerals

To further streamline mineral management, the DMG has developed an online system for regulating the buying, storing, and transportation of minerals. This system is designed to facilitate seamless transactions and monitoring. Its key features include:

Online Applications and Transit Passes: Dealers can file applications and generate transit passes online, which simplifies the regulatory process and reduces paperwork. **Real-Time Monitoring**: The system enables real-time tracking of stock movements and transportation, enhancing vigilance and regulatory oversight.

The DMG, Government of Andhra Pradesh, has been recognized for its innovative approaches and effective implementation of digital solutions in mineral administration and was conferred with following prestigious awards:

- SKOCH SILVER AWARD (2021): Awarded under the Digital India & e-Governance category for outstanding achievement in digital governance.
- SKOCH Order of Merit (2021): Received for the Online System for Mineral Audit.

5.3.2 Bihar

The Department of Mines & Geology introduced Vehicle Tracking Devices (VTD) based vehicle tracking system in 25/10/2023 for mineral transporting vehicles operating in the State of Bihar. As a part of this, installation of VTD in vehicles registered with the Department for transportation of minerals in the state has been mandatory. The fitment of VTD on mineral transporting vehicles shall enable on-line, real-time monitoring of their movement and effecting enforcement through a web-based Vehicle Tracking Application.

5.3.3 Goa

The Directorate of Mines and Geology (DMG) has implemented a robust software named as "Bhumija"in November, 2021 to bring IT intervention to track the ore extraction and its transportation in the State. The system tracks production of mineral ore at the mining leases and provides for online payment of Royalty, DMF, GIOPF, NMET contributions. The system also enables proper stock management by the lessees, traders/organizations.

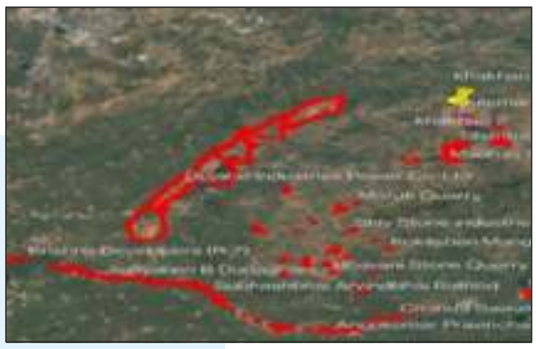
The vehicle tracking system facilitates efficient planning and tracking of ore carrying vehicles/barges. All mineral carrying vehicles/barges are fitted with GPS and are subject to live tracking. The system captures over speeding vehicles and provides for punitive actions on detection of such cases.

5.3.4 Gujarat

Integrated Lease Management System (ILMS) developed by the O/o Commissioner of Geology and Mining (CGM), Gandhinagar has introduced a feature which automatically locks the account of the lease holder if the monthly returns are not filed by 10th day of succeeding month. This has resulted in better data capturing as well as compliance of various rules by leaseholders.

The Commissionerate of Geology and Mining, Gujarat has introduced 'Drone Project (Trinetra)'which is first of its kind used for surveillance of Mining areas in India. The Drone can record video in Full High Definition and can be controlled from a distance 4–5 kilometre (at a radius of 2 to 2.5 km) and covers approximately 10 kms. Further, the Drone can capture the mining activities and vehicle number from height of 30 to 35 meters during daytime and can record mining activities from the height of 70 to 75 meters with night vision facility.

The State Government has also implemented GPS based vehicle tracking monitoring system to curb royalty theft and illegal transportation of minerals. The system tracks navigation route of vehicles transporting minerals using GPS technology and alerts deviations in the pre-determined routes. It also assists the mining officers to monitor driving patterns to prevent loss of minerals due to rash/negligent driving.



Digital picturisation of Trinetra project

All mines in Gujarat are geo-tagged with the help of BISAG with information such as name of leaseholder, mine area, environmental clearance status along with geographical boundary of mine etc. (picture of screen alongside).

5.3.5 Jammu & Kashmir

The Geology and Mining Department, J&K has launched e-Services web portal (i.e. https://www.geologyminingjk.com) for facilitating the applicants for grant of following services:-

- Grant and renewal of Mineral Dealer License (MD1).
- Grant/renewal of Quarry license for Private land (QL1).
- Grant of Mining Lease for Private Land i.e. in case the minerals are not deposited in State land (ML1).
- Short-Term Permit / Disposal Permit (STP1).
- Model Form for Monthly Return (ML8).
- Annual Return to be furnished by the Mining Lessee.
- Monthly Return to be submitted by Mineral Dealer Licensee.

In order to provide key construction material to various Developmental Projects, the Department has granted 171 Mining Leases of River Bed Material (RBM) in the UT of J&K. Besides, more than 600 Short Term and Disposal Permits have also been granted by this Department to the Principal Executing Agencies of National Highway Authority of India, Airports Authority of India (AAI), IRCON, KRCL, NHIDCL, etc.

The Department has granted Eighty (80) Mineral Dealer Licenses to various entrepreneurs/ individuals in the UT of J&K for stocking and trading of the Minor Minerals viz., RBM, Bajri, Boulders, Aggregates, Ordinary Earth, Crusher Dust/ Bajri, Nallah Muck, etc. for providing/availability of the construction material to general masses.

5.3.6 Jharkhand

The State Government of Jharkhand is presently engaged in the development and implementation of a GPS-based Vehicle Monitoring & Tracking System to enhance the efficiency and transparency of mineral transportation. This system is designed to achieve several key objectives that address the critical needs of the mining industry and its logistics activities. The system is presently at an advanced stage of implementation and on a test run. The key objectives in this regard are as follows:

Key Objectives

- *Real-Time Tracking*: One of the primary goals of the system is to facilitate real-time tracking and navigation of mineral transporting vehicles. Using GPS technology, vehicles would be monitored from the point of origin to their destination as specified in the issued challan. This ensures that all movements are accounted for and any deviations can be immediately detected and addressed.
- *Ensuring Proper Delivery*: The system is designed to ensure that minerals are offloaded or delivered at the designated purchaser' location. The delivery should match the details and

timeline provided in the challan, ensuring that the minerals reach their intended destination without unauthorized diversions.

- *Route and Quantity Verification*: During the transit of minerals, the system checks for any variations in the route taken by the vehicle and the quantity of minerals being transported. This helps in identifying any discrepancies or potential theft, thereby safeguarding the integrity of the mineral transport process.
- *Increased Transparency*: By implementing this tracking system, the transparency of mining and logistics activities is significantly increased. Stakeholders can monitor the movement of minerals, ensuring compliance with regulations and reducing the potential for illegal activities.

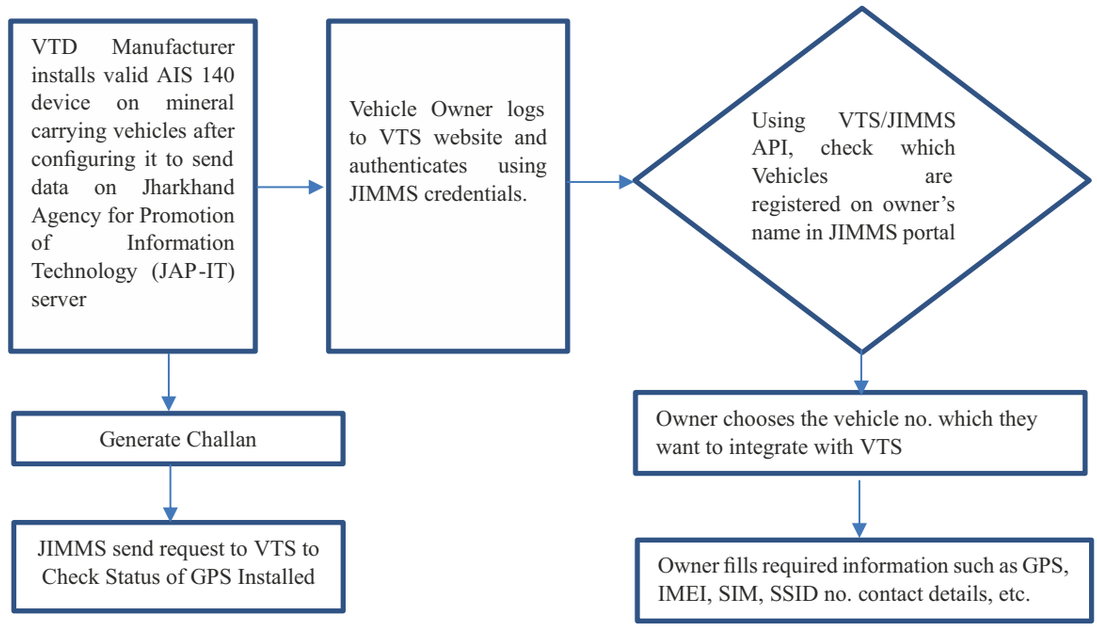
Progress Report: Achievements to Date

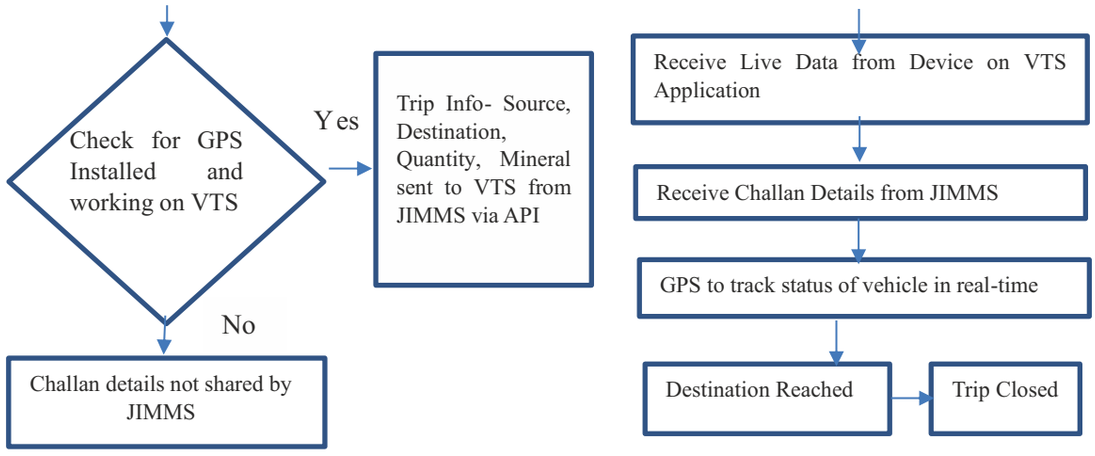
- *Geo-Fencing*: The geo-fencing functionality has been successfully implemented in 22 districts, covering a total of 802 lessees. This enables precise monitoring of vehicle movements within designated geographical boundaries, ensuring compliance with prescribed routes.
- *Interfaces for Vehicle Tracking System (VTS) Modifications*: The system has been modified to be open for any Automotive Industry Standard 140 (AIS140) compliant Vehicle Tracking Device (VTD). This flexibility ensures that a wide range of devices can be integrated into the system, enhancing its applicability and ease of use.
- *Application Programming Interface (API) Integration*: An API has been developed and completed to integrate the Vehicle Tracking System (VTS) with the JIMMS (Jharkhand Integrated Mines and Minerals System) application. This integration allows for seamless data exchange between the systems, improving overall functionality and user experience.

Ongoing Efforts

Deployment on Jharkhand State Data Centre (JHSDC) Server: The deployment of the system on the JHSDC server is currently in progress.

Process Flow Diagram





5.3.7 Karnataka

A comprehensive web-based application called Integrated Lease Management System (ILMS) was implemented on April 1, 2011 which provides real time services to the lease holders and other stakeholders. It contains information related to the Lease holder, payments, transaction, updated mineral rates, issuance of e-permits, etc. This system provides seamless services by capturing data related to the production of individual mines and auction parameters (Major Minerals). Development of ILMS 2.0 is under progress.

A vehicle tracking system has been developed and deployed for tracking of all minerals carrying vehicles. So far, 52,000, mineral carrying vehicles have been registered in the Department under One State One GPS (OSOG) platform.

The Drone Survey of the quarry leases in respect of building stone has been initiated with the assistance of the Karnataka State Remote Sensing Application Centre for assessing the total pit volume of all the building stone leases to plug the loss of revenue to the State. Accordingly, Drone survey work has been completed in respect of 10 districts. The work is in progress in respect of 15 districts.

3D Drone Survey to combat illegal mining

The Integrated Lease Management System has been integrated with the Karnataka Forest Department Application (Forest Produce Track System) to provide single platform for generation of Mineral Dispatch Permits which is running successfully from 01.04.2019.

5.3.8 Kerala

Automation Initiative:

Kerala Online Mining Permit Awarding Services (KOMPAS) is the e-Governance initiative of the Department of Mining and Geology for bringing efficiency and transparency to mineral administration in the State. KOMPAS ensures citizen centric, cost effective and quality electronic service delivery pertaining to mines and minerals in the State. The stakeholders can avail following services:

Kerala Online Mining Permit Awarding Services (KOMPAS)

- Submission of online application for mineral movement permits.
- e-payment of application fee, royalty and other payments.
- Online tracking of status of processing of applications.
- Online generation of e-Pass.
- Online filing of returns.
- Dashboard for stakeholders including Lease / Permit holders.

The KOMPAS ensures transparency by providing statistics of mineral concessions in the State, particulars of mineral concessions and documents submitted for availing concessions, locations of working mines, quarries, crushers and dealers, information on mineral availability to public. KOMPAS also provides information pertaining to genuineness of e-Pass, permits/licenses to other regulatory agencies like Police, Land Revenue authorities of the State. A Google map-based service provides location-specific information about the mining entities, quarries and related information to public and other stakeholders.

The lessees in the State are filing monthly return in Form'F' through KOMPAS portal since 2018. Currently KOMPAS is being revamped to KOMPAS 2.0 and is under development.

5.3.9 Ladakh

For the first time, more Minor Mineral Blocks have been prepared for granting of Mining leases. This move has generated substantial direct and indirect employment besides ensuring mining on scientific lines.

UT Ladakh Administration has taken initiative on automation of mining related activities through a centralized management and monitoring system. A web portal regarding e-Auctioning of Minor Mineral Blocks has been appointed as e-Auctioneer which is being created and designed by MSTC Limited, a Central Miniratna PSU under Administrative Control of Ministry of Steel, Govt. of India. MSTC appointed as e-Auctioneer of Minor Mineral Blocks on nomination basis in various States such as Uttar Pradesh, Rajasthan, Assam, Madhya Pradesh, Kerala, Chhattisgarh, Odisha, Andhra Pradesh, Jharkhand, etc. who have successfully conducted e-Auctions process for grant of lease of Minor Mineral Blocks in these states and intend to provide similar services to DGM UT Ladakh as well.

5.3.10 Meghalaya

The Mining & Geology Department, Government of Meghalaya, has issued a Revised Standard Operating Procedure for checking illegal mining and illegal transporting of coal in the State, in which the State Government has also set up a Drone Control Rooms funded through the Meghalaya Environmental and Protection Restoration Fund (MEPRF) to be used by the Police Department in various coal bearing Districts to prevent/monitor illegal mining and transportation activities through technology.

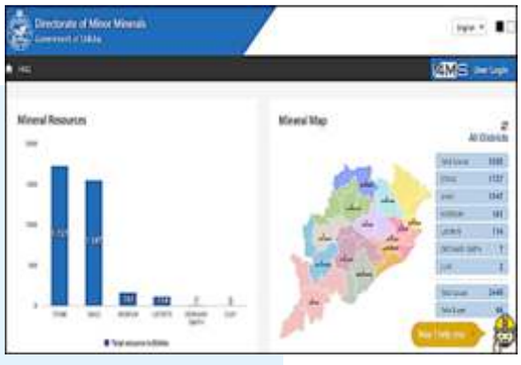
5.3.11 Punjab

The Punjab Government has taken initiatives on automation of mining related activities through a centralized unit. The Centralized Management and Monitoring System has been developed by the

Department of Water Resources, Mining and Geology. A web portal (www.minesandgeology.punjab.gov.in) has been put in place with the following features:

- *Centralized common platform to monitor each aspect of mining.*
- *Periodical reports of extracted and available quantity of each mine.*
- *In case of any violation, the generation of weighment slips can be stopped.*
- *To monitor the movement of vehicles so as to keep tab on illegal transportation of minerals.*
- *To provide the service offered by the Department in online mode.*
- *To provide easy and affordable access to Sand/Gravel to consumers/trade.*

5.3.12 Odisha



The Directorate of Minor Minerals, Odisha functioning under the administrative control of Steel & Mines Department has implemented schemes like "revention of theft of Minor Minerals and eviction activities"and i4MS (Integrated Minor Mineral Mining Management System).

i4MS enables System Administrator, Department Users, Directorate Users, District Users, Lessee or Buyers, and Vehicle Owners to do all the mining related activities in one window. User can access modules and sub-modules, register new data and can take action against the same. The i4ms application allows the authorized user to administer and regulate the minor mineral such as Calcium, Sand, Clay, Laterite, Stone, Chips etc., reserves in the various District and Tahsil under State of Odisha. A list of modules and sub-modules are present to administer the Source Identification, Source Profiling, Royalty & Mineral Mapping, auction of mining lease, grant of quarry lease, cancellation of quarry lease, surrender of quarry lease, transfer of quarry lease, grant of brick kiln license, crusher license, quarry permit, surrender quarry permit, support request management, vehicle seizure and compounding, material seizure and compounding, issuance of e-Transit Pass, appeal, demand assessment, and reports & returns.

5.3.13 Rajasthan

The following good practices and initiatives have been adopted by the State Government of Rajasthan:

- *As per Department of Mines & Geology, all the mines are geo-tagged and geo-fencing will be completed within six months.*
- *Department of Mines and Geology (DMG) has a "Geophysical Section" which carries out geophysical surveys for departmental projects as well as for private entrepreneurs to identify the sub surface location of the ore body and its extension through Resistivity, SP, IP, Seismic and Gravity survey.*
- *Remote Sensing Cell is also working in DMG which carries out the satellite data interpretation for preparation of geological and structural map including lineament for in house projects and use GIS based applications for mineral exploration. The cell is well equipped with Image Processing Systems like ERDAS 9.2, ENVI, ARC GIS, OASIS MONTAZ, SURFER, etc. with skilled manpower.*

- *Regional office of IBM, Ajmer had extended login facility to the State Government for accessing returns of major mineral lessees provided to the IBM.*

Besides, above mentioned good practices, the department has a comprehensive website to control and monitor mining activities in the State, which also facilitates issuance of transit pass for minerals on online system namely "e-Rawanna"with mobile application.

5.3.14 Telangana

Telangana Government has implemented information technology in regulation of mineral activity in the State. Department of Mines and Geology, Telangana has developed an online module facilitating lease holders in the state and totally circumventing manual intervention.

For this, the State Government has implemented a user-friendly online process namely "*Online Mineral e-Payments and e-Permit System (OMEPPS)*"to monitor and regulate mining activities.

NIC is entrusted with up-gradation of the existing OMEPPS to facilitate collection and compilation of data from district level offices which is in the development stage.

OMEPPS facilitates:

- *Lease holders to make online payment of statutory amounts.*
- *Filing, Processing and Issue of Dispatch permits and generation of Transit Forms (Waybills) by lease holders.*
- *Online Receipt, Processing and Disposal of Mineral Concession Applications for Minor Minerals through Department's web portal.*
- *Online monitoring of Mineral Dealer's Transit Passes, filing of applications, Processing and Approval of Transit passes for transportation of processed/finished mineral.*
- *'Online Temporary Permits Monitoring System' for minor minerals.*
- *'E-office' in the Directorate for processing and disposal of files.*

To implement Mining Surveillance Systems (MSS) in respect of minor mineral leases, Department empaneled 8 agencies for DGPS/ETS Survey for geo-fencing of the leases by recording geo-coordinate of the quarry and preparation of geo-referenced cadastral maps.

After completion, the geo-referenced maps will be used to identify the unauthorized quarrying/mining. The survey work is in progress currently.

5.3.15 Uttarakhand

The following good practices and initiatives have been adopted by the State Government of Uttarakhand:

- An online e-Challan system has been put in place that will minimise the possibility of duplicacy of challans, which is highly possible in physical challan system, thus minimizing illicit mining.
- A departmental 'e-Ravanna' portal has been set up, and all vehicles utilized for the transportation of minerals within the State are registered there. Only registered vehicles will receive e-Ravanna forms.
- In the State, plans are underway to distribute electronic versions of the e-Ravanna forms. In this way, e-Ravanna forms will not be misused.

- The e-Ravanna site has been enhanced by setting up mineral wise retail store across the State.
- The State has forbidden the retail buying and selling of minerals/sub-minerals from one store to another store.

5.3.16 Uttar Pradesh

All mining services has been made online to bring in transparency, simplify the process & provide ease of doing business in the state of Uttar Pradesh. It scrutinizes online, all the applications related to license, permit & lease namely krishi bhumi, niji bhumi, stock license, mineral retailer registration, building/development project, mining plan, vehicle registration & deed execution and thereafter accepts, rejects, or marks them to the respective authority.

The State Government has developed an end-to-end solution for mineral management called 'Mine Mitra' an innovative and ambitious initiative of the Directorate of Geology and Mining in the area of e-Governance. The system encompasses all online mining services, integrated mining surveillance system, e-Commerce platform for minerals to encourage transparent mining practices and curb illegal mining and transportation through real time data monitoring.

Enforcements for prevention of illegal mining and transportation: To prevent and control illegal mining in the State of UP, the State Government has framed Uttar Pradesh Minerals (Prevention of Illegal Mining, Transportation and Storage) Rules 2018 under section 23 C of Mines and Minerals (Development and Regulation) Act 1957 which has been implemented from 20th December 2018. As per the Rules, if anyone is found to have contravened above Rule, then the District Officer will recover penalty up to ₹5,00,000 (five lakh) and the price of such mineral including royalty. On failure to deposit the said amount of penalty, the same shall be deducted by the District Officer from the security money deposited against the concern stock license and also approved a high- tech plan, which would include installation of CCTVs at barriers, to check illegal mining in the state. Mining Department had approved the proposal to install CCTVs at barriers in districts, give android phone to the officers, software for tracking vehicles.

5.3.17 West Bengal

Mining Surveillance

a) Monitoring Transportation of Sand through GPS monitoring

The District Level Sand Committee under intimation to West Bengal Mineral Development Trading Corporation Limited (WBMDTCL) is empowered to take steps for tracking carriers through colour coding of vehicles, patrolling, establishing check points & barriers, Radio Frequency Identification (RFID) tags and Global Positioning System (GPS) tracking devices in vehicles. It is ensured that the required information is uploaded on the centralized portal for regulating the sand mining operations by West Bengal Mineral Development Trading Corporation Limited. (WBMDTCL).

b) Monitoring the Availability of Sand & Establishing Storage Points/Depots

The West Bengal Mineral Development Trading Corporation Limited (WBMDTCL) maintains and operates a centralized portal for monitoring sand mining operations, check illegal sand mining, transportation of storage and sale of sand to ensure that stock yard/depots have stock of sand for meeting demand of sand for a period of not more than 3 months at any given point of time. WBMDTCL ensures that no sand mining shall be carried out within 200 meters, upstream and downstream, measure from the centerline of any bridge, regulator and similar hydraulic structure and from hundred meters from the endpoint of bank protection works.

c) Monitoring Sale of Sand

The West Bengal Mineral Development Trading Corporation Limited (WBMDTCL) has developed a centralized online portal to give consumers the facility of viewing available stocks in different reports and purchase sand online.

Geo-Tagging and Geo-fencing the Mining areas

The Mining Department of the State of West Bengal has Geo-tagged and Geo-fenced all Mines relating to Major Minerals e.g. Coal and other Minor Minerals. Thus, by attaching of geographic coordinate information recorded by GPS enabled electronic devices, the State Mining Department is having coordinates of the entire mine area with geospatial metadata i.e., latitude and longitude coordinates, altitude, etc. Geo-tag pins generated around the mineral bearing areas which are then connected to each other to create geo-fencing of the mine area and therefore mining activities carried out outside the geo-tagged area could be picked up by satellite interventions and report generated to State Mining Department.

Use of Drones in detection of illegal mining

Drone mining surveys has been done by Mining Department of Government of West Bengal in the District of Bankura and Purulia. The survey produces highly accurate measurements using photogrammetric cameras and software which is highly useful in mining stockpile management, usually a daily problem for Mine Managers.

When the Department combines these data points using software, one can identify all the surface unevenness and undulation to prevent any safety issues with stockpile subsidence. These surveys are therefore essential to minimize errors in stockpile volume calculations and the data obtained by drones can even contribute to accurate production calculations.

The Mining Department is trying to have a Real-time, moment-to-moment progress monitoring with mining drones. It is possible to work remotely and obtain real-time images from the site and track the progress of a construction design, or a mine's production without leaving the site. Capturing regular images every day can also paint a picture of progress over time and can be used to communicate to remote offices or Mine stakeholders that aren't on the site every day.

5.4 Summary

Considering the Good Practices and Innovations of various States, it is evident that the landscape of resource management is being increasingly shaped by a commitment to innovation and excellence. This chapter has illustrated how states are effectively implementing best practices and pioneering new approaches that foster sustainability, enhance efficiency and drive economic growth. The diverse examples provided underscore the critical role of adaptive strategies in overcoming resource management challenges and highlight the positive impact of technological advancements and policy reforms. By embracing these forward-thinking practices, states not only optimize the value derived from their mineral and energy assets but also set a precedent for others to follow. The lessons and insights from these innovations will be crucial in guiding future efforts and ensuring the responsible stewardship of our vital natural resources.

CHAPTER

VI

WAY FORWARD –
TO BETTER MANAGEMENT OF RESOURCES

WAY FORWARD – TO BETTER MANAGEMENT OF RESOURCES

6.1 The Compendium – A recap

The Compendium, besides providing an outline of stock & flow of mineral and energy resources for 2021-22, has also brought out a number of initiatives of Government of India and State Governments/UT authorities. Besides the above, GASAB's endeavour in working with the Central and State Governments/UT authorities with guidelines/suggestions for further streamlining the systems/processes in managing the resources better and optimizing revenues therefrom are also highlighted in Chapter II.

Despite SEEA –CF being a complex framework based on which a number of input tables had been designed by GASAB, the State Government/UT authorities were very forthcoming about the project and worked in tandem with the Accountants General in States/UTs to provide all possible support/information/data to fill these tables. The active participation of the States/UTs is highly appreciated without which preparation of Asset Accounts and their compilation would not have been possible. However, there remain some issues in measurement of stock as evidenced by variations reported in opening stock vis-à-vis last year's closing stock in a few cases in States/UTs. The SEEA framework had foreseen this issues and acknowledged that during the initial years some mismatches are bound to occur and has provided for adjustments like upward and downward reappraisals to adjust prior period errors. These options have been used in such cases in the compilations.

6.2 The Way Forward

While the compilation of Asset Accounts would be a continuing process, based on the efforts of the Central and State Governments/UT authorities, emerging challenges, good practices, the following are some of the areas/issues of importance needing attention in the near and long term.

- ***Implementation of Government of India' initiatives on –***

  - curbing illegal mining

  - checks on classification of grades at mine-head

- ***Streamlining and firming up the quarterly reporting framework designed by GASAB for generation of data and compilations of Asset Accounts***
- ***Proper Assessment of royalties based on grade-wise mineral reporting in States/UTs to prevent short collection of revenues***
- ***Expanding the control & monitoring on grade-wise reporting for major minerals for minor minerals as well for better control and monitoring of these resources***
- ***Variations in average sale prices –need for structured mechanism to prevent loss of revenue***
- ***Preparation of statement of receipts and expenditure on management of resources and mitigation of environmental degradations from Asset Account year 2022-23***
- ***Implementing the 360 degrees mapping of minerals as envisaged in Rule 45 of MCDR***
- ***Mapping of datasets of GST and Mining Departments***
- ***Development of a Pan-India application for capturing real time information on stock and flow of resources at the mine-head***

These are elaborated in the following paragraphs:

6.2.1 Implementation of Government of India's initiatives

Ministry of Mines, Government of India has taken a number of initiatives to deal with curbing illegal mining through implementation of MSS, system of red flags and enabling provisions for States/UTs to set up special Courts/task forces, streamlining the system of reporting grades of minerals some of which are discussed in Chapter III.

Suggested way forward: *These good initiatives need to be followed up with an outcome oriented system to ensure that the desired benefits of the programmes are accrued for closer monitoring on mineral extractions, productions, dispatches on correct measurement of grades, volume, sale prices and royalties till they are finally consumed or exported out of the territories.*

6.2.2 Firming up the quarterly reporting system

For correct measurement and reporting of the mineral extraction, production etc. at the mine-head, there is a need for a structured data capture and reporting mechanism with necessary controls and certifications. GASAB had designed a reporting mechanism aimed at capturing the data the mine-level with departmental certifications to ensure credibility and system of compilations at the Directorate level before transmitting the data to the Accountants General Offices for final consolidation. These are discussed in Chapter II.

During the preparation of Asset Accounts 2021-22, some delays were observed in various States with respect to timely furnishing of verified data.

Suggested way forward: *States with Electronic Data Processing Systems may modify the e-Permit system to incorporate the aforementioned procedures. Whereas, States with Manual Data Processing Systems may add appropriate manual reports or returns to integrate with the aforementioned data flow.*

6.2.3 Proper assessment of royalties based on grade wise mineral productions and correct disclosure of average sale prices

For proper assessment of royalties, it is imperative that there is a fool proof system of reporting correct grades of mineral produced and dispatched along with their values. Because royalties are paid ad-valorem on the value of different grade-wise minerals dispatched from the mine head.

A study conducted by GASAB to match the grade-wise productions reported by the lessees to the IBM with mine-wise productions and royalty payments reported by the lessees to the State Governments indicated wide variations. Also, analysis of average sale prices disclosed for similar grades of minerals in different States showed considerable variations. These are discussed in Chapter II.

The MoM, GoI had also issued specific guidelines to the States in October 2023 on prevention of mis-classification of grades of minerals.

Though there is a streamlined system of reporting of grade-wise productions with average sale prices for major minerals, the same was found to be largely absent for minor minerals as these are under the jurisdiction of State Governments/UT authorities. GASAB has been advocating the need for similar reporting mechanisms for control and monitoring of minor minerals as well. Also, there are instances of some States introducing fixed royalty mechanisms for a number of minor minerals while the same minerals are charged at ad-valorem system in other States leading to varied methodology being adopted across States. This also needs attention of the policy makers in larger interest of mineral management and their pricing as these are vital inputs for the economy of the country.

Suggested way forward: *There is a need for a more robust system of cross linking of datasets of IBM and the State Governments for major minerals in the interest of Government revenues.*

Also, the guidelines of MoM, GoI of October 2023 need to be implemented by the States/UT and closely monitored by the MoM, GoI.

Though under the purview of State Governments/UT authorities, there is a need for over-arching control of MoM, GoI on correct reporting of grade-wise productions/dispatches, mechanisms adopted for fixation of royalties for proper management of minor minerals in the country.

6.2.4 Preparation of Statement of receipts and expenditure on management of resources and mitigation of environmental degradation

As mentioned in Chapter I, the SEEA –CF has suggested four stages for implementation of NRA in the countries. Of these, while the accounting of stock and flow of assets are at stage I, the next stage is accounting for the expenditure incurred on management of environmental assets and also those incurred for the mitigation of environmental degradation caused due to their exploitation and usage.

GASAB had designed, tested and finally rolled out an input table for implementation from Asset Accounting year 2022-23. This needs to be properly disseminated among the concerned State Government departments/UT authorities for their understanding, data gathering and compilations.

Suggested way forward: *The statement on receipts from exploitation of resources and expenditure on management of resources and mitigation of environmental degradation needs to be prepared from next Asset Accounting year, i.e. 2022-23 by the State Governments/UT authorities.*

6.2.5 Implementation of 360 degrees mapping of minerals

The amended provisions of Rule 45 of MCDR 2011 provides a novel opportunity for complete

mapping of minerals from the stage of extractions, productions, dispatches, transportation, storage, end-use/exports by the miners, stockists, transporters, industries/user agencies and exporters. More so because the reporting requirements mandate reporting all outward and inward supplies/carriage/use with specific reference to the licensees. These are discussed in greater details in Chapter II.

It would be evident from the reporting methodologies envisaged in Rule 45 of MCDR that only by instituting a program to analyse and map the licensee-wise reporting of mineral extraction, production, dispatch, transportation, stocking till their end-use/export has the potential of diminishing the scope for illegal mining to large extent if not fully.

Suggested way forward: *In order to harness the benefits of reporting requirements of Rule 45 of MCDR, MoM, GoI may institute a program for mapping the movement of all major minerals –licensee wise from mine-head till these are consumed/exported out of the territories to detect any variations/mis-reporting in the interest of improved management of resources and optimisation of revenues.*

Further, similar system of centralised reporting mechanism with scope for end to end mapping need to be instituted for minor minerals as well for their greater control, monitoring and policy decisions.

Ministry of Coal may also consider amending their reporting requirements in the lines of MCDR for preventing pilferage, if any, in greater interest of mineral management of the country.

6.2.6 Mapping the GST and Mining datasets

The scope and advantages of mapping the datasets of mining and GST departments are highlighted in Chapter II. GASAB has endeavoured to impress upon the mining and GST departmental authorities in States through the Accountants General to attempt mapping both the datasets –electronically or manually in their mutual interest.

Suggested way forward: *The departments of mining and GST, both at the State/UT level and at the Centre needs to coordinate and consider how the e-way bill and mineral movement challan modules could be mapped for harnessing the benefits of electronic reporting systems implemented by both the departments in mutual interest.*

This is another way forward for preventing pilferage of minerals, erroneous reporting on grades of minerals produced or their average sale values which would help assess the correct royalties as well as GST payable on minerals.

Annexure - I
Sustainable Development Goals and associated targets
(Reference: Para 1.3)

Goals	About the Goals	Associated targets
GOAL - 1 No Poverty	End poverty in all its forms everywhere	7
GOAL - 2 Zero Hunger	End hunger, achieve food security and improved nutrition and promote sustainable agriculture	8
GOAL - 3 Good health and well being	Ensure healthy lives and promote wellbeing for all at all ages	13
GOAL - 4 Quality education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	10
GOAL - 5 Gender equality	Achieve gender equality and empower all women and girls	9
GOAL - 6 Clean water and sanitation	Ensure availability and sustainable management of water and sanitation for all	8
GOAL - 7 Affordable and clean energy	Ensure access to affordable, reliable sustainable and modern energy for all	5
GOAL - 8 Decent work and economic growth	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	12
GOAL - 9 Industry, innovation and infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation	8
GOAL - 10 Reduced inequality	Reduce inequality within and among countries	10
GOAL - 11 Sustainable cities and communities	Make cities and human settlements inclusive, safe, resilient and sustainable	10
GOAL - 12	Ensure sustainable consumption and production patterns	11

Goals	About the Goals	Associated targets
Responsible consumption and production		
GOAL - 13 Climate action	Take urgent action to combat climate change and its impacts	5
GOAL - 14 Life below water	Conserve and sustainably use the oceans, seas and marine resources for sustainable development	10
GOAL - 15 Life on land	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt biodiversity loss	12
GOAL - 16 Peace and justice strong institution	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	12
GOAL - 17 Partnership to achieve goal	Strengthen the means of implementation and revitalise the global partnership for sustainable development	19

Annexure - II
Tentative input tables for data collection of Asset Accounts
(Reference: Para 2.5)

Table 1 (Mother Table as prescribed by SEEA)

Particulars	Names of resource(s)
Opening stock of environmental asset	
Growth in stock	
Discoveries of new stock	
Upward reappraisals	
Reclassifications	
Total addition of stock	
Reduction of stock	
Extractions	
Normal loss of stock	
Catastrophic losses	
Downward reappraisals	
Reclassification	
Total reduction in stock	
Valuation/Revaluation of the stock* (revenue receivable/actual market price) – as in table 3	
Closing stock of environmental assets	

Table 2 (Physical stock and flow, sustainability)

Classification	Grade-wise sub-classification (may vary from State to State)	Opening stock of proved reserves	Addition to stock	Reduction in stock			Closing stock of proved reserves	Sustainability of resources in years
				Extracted by/for		Other extractions /exports	Total extraction	
				Govt. Sector	Private Sector			
		(in tonnes/cum - as the case may be)						
Major, minor and fossil fuels								

Table 2A
(Format for Riverine resources –Physical)

Classification (may vary from State to State)	Name of Resources (illustrative only) with grades (wherever applicable)	Available reserves at the beginning of the year	Accumulation during the year	Reduction in stock			Extractions planned in mining plans during the year (if available)	Remaining reserves at the end of the year
				Extracted by/for		Other extractions including exports	Total extraction	
				Govt. Sector	Private Sector			
		(in cum)						
Sand Stone RBM								

Table 2B
(Format for Riverine resources–Valuations)

Classification (may vary from State to State)	Name of resources (illustrative only) with grades (wherever available)	Physical extracted showing Govt., Private and other sector as in table 2A (Govt.)	Valuation of resources		
			Revenue receivable Govt. Sector	Total revenue receivable	Average Market value
			(' in crore)		
Sand Stone RBM					

Table 3 (Valuation of resources)

Particulars	Grade- wise sub-classification (may vary from State to State)	Physical unit (in tonnes/ cum) extracted showing Govt., Private and other sector	Valuation of resources		
			Revenue receivable showing Govt., Private and other sector	Total revenue receivable	Average Market value (as ascertained from the IBM/ State Statistical Department)
			(₹ in crore)		

Table 3A (Data on illegal mining detected by Department)

Name of the District	Authority who detected the illegal Quarrying (Police/Revenue/Mines)			Detection of illegal mining by the department authorities on which challan issued and offence report registered				
				Name of the Minerals with Grades (if available)	Physical Quantity (in cbm/MT)	Revenue involved (in Rs)	Amount recovered (in Rs)	Provisions under which compounding done
	Mines	Revenue	Police					

Table 4 (Capturing entire cycle from extraction, production and dispatch)

Name of resource (s) with detailed grades	Opening stock at the beginning of the year		Extraction during the year	Production during the year	Production loss/variations between extraction and production		Dispatch during the year	Closing stock at the end of the year	
	Run of Mines	Processed ores			In volume	In *per cent*		Run of Mines	Processed ores
	Physical Units							Physical Units	

Table 5A/5B (Capturing DMF/NMET etc.)

Name of Mine/Mineral/ District	Volume of minerals on which DMF/NMET was realisable	Rate at which DMF/NMET realisable	Total DMF/NMET realisable	Total DMF/NMET realised	Variations, if any	
					In ₹	Percentage

Table 6 (Generation of renewable energy resources)

Sector	Energy requirement by sector during the year (in MWH/ GWH)	Total energy requirement in the State (in MWH/ GWH)	Generation/additional generation of energy during the year (in MWH/GWH)		Percentage share of non-renewable and renewable energy resources vis-à-vis total requirement
			Non-renewable (N/R) energy/Fossil fuel sources (MWH/ GWH)	Renewable energy	
				Solar/Wind/Hydel/Others incl Bio Mass, Waste to energy, Geothermal etc.	N/R vis-à-vis Renewable energy
Industries					
Domestic					
Agriculture					
Commercial					
Traction and Railways					
Others					

Annexure - III
Statement showing royalty, fees etc. of States during 2021-22
(Reference: Para 3.7)

Sl. No.	Name of the State	Major Head	2020-21 Amount (₹ in lakh)	2021-22 Amount (₹ in lakh)
1.	Andhra Pradesh	0853 Non-ferrous Mining & Metallurgical Industries	22,54,92.34	29,73,89.81
2.	Arunachal Pradesh	0853 Non-ferrous Mining and Metallurgical Industries	NA	86,55.52
3.	Assam	0802 Petroleum	14,67,44.13	25,02,42.06
		0803-Coal and Lignite	16,03.82	4,58.21
		0853-Non-ferrous Mining and Metallurgical industries	5,44.14	6,62.97
4.	Bihar	0853-Non-ferrous Mining and Metallurgical industries	1,70,911.55	20,17,91.97
5.	Chhattisgarh	0853-Non-ferrous Mining and Metallurgical industries	49,76,35.58	73,80,94.92
6.	Goa	0853 - Non-ferrous Mining and Metallurgical industries	1,68,10.00	1,29,20.21
7.	Gujarat	0853- Non-ferrous Mining and Metallurgical Industries	28,96,72.48	43,06,50.51
8.	Haryana	0853 Non-Ferrous Mining and Metallurgical Industries	10,00,41.01	8,25,25.23
9.	Himachal Pradesh	0853 Non-ferrous Mining and Metallurgical Industries	2,01,14.03	1,99,81.76
10.	Jammu & Kashmir	0853- Non-Ferrous Mining and Metallurgical Industries	68,92.48	47,01.07
11.	Jharkhand	0853- Non-ferrous Mining and Metallurgical Industries	48,96,16.74	74,63,43.20

Sl. No.	Name of the State	Major Head	2020-21 Amount (₹ in lakh)	2021-22 Amount (₹ in lakh)
12.	Karnataka	0853 Non -ferrous Mining and Metallurgical Industries	38,80,82.04	63,04,12.23
13.	Kerala	0853-Non-ferrous Mining and Metallurgical Industries	2,01,90.26	2,20,90.41
14.	Madhya Pradesh	0853 - Non-Ferrous Mining and Metallurgical Industries	28,34,70.41	37,59,87.29
15.	Maharashtra	0853 - Non-Ferrous Mining and Metallurgical Industries	39,49,90.24	49,07,30.99
16.	Manipur	0853 Non-ferrous Mining and Metallurgical industries	0.43	0.67
17.	Meghalaya	0853 Non-ferrous Mining and Metallurgical Industries	2,46,43.58	2,39,78.39
18.	Mizoram	0853 Non-ferrous Mining and Metallurgical Industries	5,02.84	6,51.07
19.	Nagaland	0853- Non-ferrous Mining and Metallurgical Industries	49.14	1,93.73
20.	Odisha	0803- Coal and Lignite	1,26,87.79	1,21,711.02
		0853- Non-ferrous Mining and Metallurgical Industries	1,37,91,72.09	4,86,42,01.70
21.	Punjab	0853 Non - Ferrous Mining and Metallurgical Industries	1,20,01.33	1,24,74.39
22.	Rajasthan	0802. Petroleum	19,04,80.82	39,95,39.90
		0853. Non-ferrous Mining and Metallurgical Industries	48,59,36.60	62,68,24.96
23.	Sikkim	0853- Non-ferrous Mining and Metallurgical Industries	15.98	25.43
24.	Tamil Nadu	0853. Non-ferrous Mining and Metallurgical Industries	8,64,06.75	11,04,06.26
25.	Telangana	0853-Non-ferrous Mining and Metallurgical Industries	34,57,49.04	22,96,35.55
26.	Tripura	Receipts from natural gas and sand	91,39.00	
27.	Uttar Pradesh	0853-Non-Ferrous Mining and Metallurgical Industries-	2,70,165.87	2,32,934.66

Sl. No.	Name of the State	Major Head	2020-21 Amount (₹ in lakh)	2021-22 Amount (₹ in lakh)
28.	Uttarakhand	0853-Non-Ferrous Mining and Metallurgical Industries	4,98,05.81	5,61,31.31
29.	West Bengal	0853-Non-ferrous Mining and Metallurgical Industries	1,65,69.17	

Note: Finance Accounts of Tripura and West Bengal for 2021-22 is not yet public

Annexure - IV
Statement showing basis of stock* and flow of resources in different States
(Reference: Para 4.1)

Sl. No.	State	Reserves based on	Reduction based on
1.	Andhra Pradesh	Proved reserves	Extraction
2.	Arunachal Pradesh	Proved reserves	Extraction
3.	Assam	Proved reserves	Extraction
4.	Bihar	Proved reserves	Extraction
5.	Chhattisgarh	Proved and probable reserves	Extraction
6.	Goa	Proved reserves	Extraction
7.	Gujarat	Proved and probable reserves	Production
8.	Haryana	Proved reserves	Extraction
9.	Himachal Pradesh	Proved reserves	Extraction
10.	Jammu & Kashmir	Proved and probable reserves	Dispatch
11.	Ladakh	Proved and probable reserves	Extraction
12.	Jharkhand	Proved reserves	Extraction
13.	Karnataka	Proved reserves	Extraction
14.	Kerala	Proved reserves	Production
15.	Madhya Pradesh	Total reserves	Production
16.	Maharashtra	Proved reserves	Extraction
17.	Manipur	Proved reserves	--
18.	Meghalaya	Proved reserves	Production
19.	Mizoram	--	Extraction
20.	Nagaland	Proved, indicated, inferred & Reconnaissance	Extraction
21.	Odisha	Proved reserves	Extraction
22.	Punjab	Proved and probable reserves	Extraction
23.	Rajasthan	Proved reserves	Extraction
24.	Sikkim	Probable reserves	--
25.	Tamil Nadu	Proved reserves	Production
26.	Telangana	Proved reserves	Extraction
27.	Tripura	Proved and probable reserves	Extraction
28.	Uttar Pradesh	Proved and Mineable reserves	Production/Dispatch
29.	Uttarakhand	Proved and Mineable reserves	Production/Dispatch
30.	West Bengal	Proved reserves	Production

* Except sand stowing, some of the minor minerals and other riverine resources.

No extraction of minerals reported in Manipur during 2021-22.

In Uttar Pradesh, Production figure are taken for Coal & Limestone and Dispatch figure for other Minerals.

In Uttarakhand, Production figure are taken for Magnesite & Soapstone and Dispatch figure for other Minerals.

Annexure – V

Position of stock and flow of Fossil fuels in States during 2021-22

			In Million Tonnes													In Million Cubic Meter				
Sl. No.	State		Coal					Petroleum/Crude Oil					Lignite				Natural Gas				
			O.S	Add	Up Reap	Red	C.S	O.S	Add	Red	Down Reap	C.S	O.S	Add	Red	C.S	O.S	Add	Red	Down Reap	C.S
1	Andhra Pradesh	2021-2022						0.01	0.16	0.16		0.01					72.95	793.52	793.52		72.95
2	Arunachal Pradesh	2021-2022	31.23	0.00		0.00	31.23	1.45	0.00	0.04		1.41					2.87	0.00	0.06		2.81
3	Assam	2021-2022	460.21	0.00	2.63	0.03	462.81	151.62	0.00	3.91	0.03	147.71					164270.00	0.00	3371.00	665.00	160234.00
4	Bihar	2021-2022																			
5	Chhattisgarh	2021-2022	17364.75	0.00		146.44	17218.31														
6	Goa	2021-2022																			
7	Gujarat	2021-2022						114.13	1.26	4.55		110.84	3484.18	0.00	13.39	3470.78	56444.53	755.47	682.20		56517.80
8	Haryana	2021-2022																			
9	Himachal Pradesh	2021-2022																			
10	Jharkhand	2021-2022	10336.77	0.00	1432.16	128.08	11640.85														
11	Karnataka	2021-2022																			
12	Kerala	2021-2022																			
13	Madhya Pradesh	2021-2022	634.20	7.63	1448.06	140.10	1949.79														
14	Maharashtra	2021-2022	5658.30	0.00		55.96	5602.34														
15	Manipur	2021-2022																			
16	Meghalaya	2021-2022	132.74	0.00	0.04	0.35	132.43														
17	Mizoram	2021-2022																			
18	Nagaland	2021-2022	492.68	135.81		0.43	628.06	598.98	0.00	0.00		598.98									
19	Odisha	2021-2022	43326.00	325.41		185.85	43465.56														

20	Punjab	2021-2022																		
21	Rajasthan	2021-2022						28.70	2.56	5.87		25.39	1118.28	7.03	10.25	1115.07	12327.84	2509.68	2622.67		12214.85
22	Sikkim	2021-2022	0.72	0.00		0.00	0.72														
23	Tamil Nadu	2021-2022						9.08	0.00	0.04		9.04	3295.22	0.00	23.62	3271.60	37890.00	0.00	1008		36882
24	Telangana	2021-2022	9444.24	0		65.37	9378.87														
25	Tripura	2021-2022															30567.00	1196.00	1530		30233
26	Uttar Pradesh	2021-2022	108.94	0.00		18.07	90.87														
27	Uttarakhand	2021-2022																			
28	West Bengal	2021-2022	17045.13	0.00		29.07	17016.06														
29	Jammu and Kashmir	2021-2022	0	0.01		0.01	0						5	0	0	5					
30	Ladakh	2021-2022																			
	Total		105035.91	468.86	2882.89	769.76	107617.90	903.97	3.98	14.57	0.03	893.38	7902.68	7.03	47.26	7862.45	301575.19	5254.67	10007.45	665.00	296157.41

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.
The variations, if any, in closing stock is due to rounding off of fractions into million tons.
In case of Nagaland, the figure of petroleum includes natural gas. This has been referred back to the State Government for bifurcation of figures.
Replies awaited.

Annexure - VI
Position of stock and flow of Major Minerals in States during 2021-22

In Million Tonnes

		Andhra Pradesh						Arunachal Pradesh						Assam						Bihar					
Sl. No.	State	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S
1	Limestone	831.23	12.8	50.54			793.48	67.89	0		0		67.89	169.5	0		1.8		167.69	10.8	0	0.98		9.82	
2	Magnesite																								
3	Bauxite																								
4	Chromite																								
5	Copper Ore																								
6	Iron Ore	22.11	0		0.34	21.78								18.29	0		0	18.29							
7	Manganese	2.41	0		0.2		2.21																		
8	Gold																								
9	Silver																								
10	Lead-Zinc Ore																								
11	Garnet																								
12	Marl																								
13	Vermiculite	0.0008	0	0.003			0.0002																		
14	Graphite																								
15	Beach Sand Minerals																								
16	Base Metals																								
17	Talc																								
18	Rock Phosphate																								
19	Wollastonite																								
20	Selenite																								
21	Siliceous earth																								
22	Aluminous Laterite																								
23	Kyanite																								

24	Lime shell																							
25	Martilised Magnetitic Iron Ore																							
26	Titaniferrous Magnetite																							
27	Tin Ore																							
28	Tin Metal																							
29	Auriferous Quartz																							
30	W. Shale	1.05	0		0.07		0.98																	
31	Diamond (Carat)																							
32	Fluorite																							
33	Sand Stowing																							
34	Sillimanite													13.6	0		0		13.6					
35	Illemenite																							
36	Leucoxene																							
37	Rutile																							
38	Zircon																							
39	Monazite																							
40	Ni-Co-Cr bearing Magnetite																							
41	W. Clay	0	0.18		0.18		0																	
42	Siderite																							
43	Salt																							

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.
The variations, if any, in closing stock is due to rounding off of fractions into million tons.
Kg in Blue Colour.
Carat in Green Colour.

Annexure - VI
Position of stock and flow of Major Minerals in States during 2021-22

In Million Tonnes

		Chhattisgarh						Goa						Gujarat						Haryana					
Sl. No.	State	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S
1	Limestone	2622.11	790.4		36.3		3376.21							59506.47	14.84		19.22		59502.08						
2	Magnesite																								
3	Bauxite	38.79	8.64		0.93		46.5	11.76	0		0		11.76	28.78	0.88		1.35		28.29						
4	Chromite																								
5	Copper Ore																								
6	Iron Ore	1201.294	0		42.26		1159.03	263.78	0		0		263.78												
7	Manganese							1.19	0		0		1.19	1.36	0		0.07		1.28						
8	Gold																								
9	Silver																								
10	Lead-Zinc Ore																								
11	Garnet																								
12	Marl																								
13	Vermiculite													0.001	0		0		0.001						
14	Graphite	0.006	0		0		0.006							2.13	0		0		2.13						
15	Beach Sand Minerals																								
16	Base Metals																								
17	Talc																								
18	Rock Phosphate																								
19	Wollastonite													3.04	0		0		3.04						
20	Selenite																								
21	Siliceous earth																								
22	Aluminous Laterite																								

23	Kyanite																								
24	Lime shell																								
25	Martilised Magnetitic Iron Ore																								
26	Titaniferrous Magnetite																								
27	Tin Ore	0.004	0		0.00002		0.004																		
28	Tin Metal	0.0001	0		0		0.0001																		
29	Auriferous Quartz																								
30	W. Shale																								
31	Diamond (Carat)																								
32	Fluorite													11.61	0		0		11.61						
33	Sand Stowing																								
34	Sillimanite																								
35	Illemenite																								
36	Leucoxene																								
37	Rutile																								
38	Zircon																								
39	Monazite																								
40	Ni-Co-Cr bearing Magnetite																								
41	W. Clay																								
42	Siderite													4.65	0		0		4.65						
43	Salt																								

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.

The variations, if any, in closing stock is due to rounding off of fractions into million tons.

Kgrat Blue Colour.

Annexure - VI
Position of stock and flow of Major Minerals in States during 2021-22

In Million Tonnes

		Himachal Pradesh						Jharkhand						Karnataka						Kerala					
Sl. No.	State	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S
1	Limestone	188.44	0		13.4		175.03	2.3	3.37		0.07		5.6							8.57	0		0.37		8.20
2	Magnesite																								
3	Bauxite							26.77	0	1.3	1.8		26.27												
4	Chromite																								
5	Copper Ore																								
6	Iron Ore							1610		374.5	25.66		1958.44												
7	Manganese																								
8	Gold																								
9	Silver																								
10	Lead-Zinc Ore																								
11	Garnet																								
12	Marl																								
13	Vermiculite																								
14	Graphite																								
15	Beach Sand Minerals																								
16	Base Metals																								
17	Talc																								
18	Rock Phosphate																								
19	Wollastonite																								
20	Selenite																								
21	Siliceous earth																								

22	Aluminous Laterite																							
23	Kyanite																							
24	Lime shell																		0	0		0		0
25	Martilised Magnetitic Iron Ore																							
26	Titaniferrous Magnetite																							
27	Tin Ore																							
28	Tin Metal																							
29	Auriferous Quartz																							
30	W. Shale																							
31	Diamond (Carat)																							
32	Fluorite																							
33	Sand Stowing																							
34	Sillimanite																		0.69	0		0.01		0.68
35	Illemenite																		3.72	0		0.11		3.61
36	Leucoxene																		0.01	0		0		0.01
37	Rutile																		0.2	0		0.002		0.2
38	Zircon																		0.48	0		0.005		0.48
39	Monazite																		0.01	0		0		0.01
40	Ni-Co-Cr bearing Magnetite																							
41	W. Clay																							
42	Siderite																							
43	Salt	0.03	0		0.0002		0.03																	

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.
The variations, if any, in closing stock is due to rounding off of fractions into million tons. Kg in Blue Colour. Carat in Green Colour.
Note: In view of data gaps, the data of Mineral Resources for the year 2021-22 for Karnataka is excluded from Compendium of Asset Accounts on Mineral and Energy Resources for the year 2021-22.

Annexure - VI
Position of stock and flow of Major Minerals in States during 2021-22

In Million Tonnes

		Madhya Pradesh						Maharashtra						Manipur						Meghalaya					
Sl. No.	State	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S
1	Limestone	2699.06	150.71	46.3	50.1		2845.97	341.51	400.45		13.55		728.41	0.627	0		0		0.627	9488.85	0		9.8	2.63	9476.42
2	Magnesite																								
3	Bauxite	24.17	0.04		0.73		23.48	2.92	42.03		0.64		44.31												
4	Chromite													0.005	0		0		0.005						
5	Copper Ore	106.44	1.79		2.44		105.78	0	0.93		0		0.93												
6	Iron Ore	53.83	10.8	8.97	7.02		66.58	3.78	92.94		1.98		94.74							3.6	0		0		3.6
7	Manganese	60.27	2.11	1.84	0.85		63.37	6.55	26.98		0.73		32.8												
8	Gold																								
9	Silver																								
10	Lead-Zinc Ore																								
11	Garnet																								
12	Marl																								
13	Vermiculite																								
14	Graphite																								
15	Beach Sand Minerals																								
16	Base Metals																								
17	Talc																								
18	Rock Phosphate	13.94	0		0.11		13.83																		
19	Wollastonite																								
20	Selenite																								
21	Siliceous earth																								

22	Aluminous Laterite																								
23	Kyanite							0.19	5.45		0.001		5.64												
24	Lime shell																								
25	Martilised Magnetitic Iron Ore																								
26	Titaniferrous Magnetite																								
27	Tin Ore																								
28	Tin Metal																								
29	Auriferous Quartz																								
30	W. Shale																								
31	Diamond (Carat)	768622.46	0		0		768622.46																		
32	Fluorite							0.21	0.004		0.001		0.22												
33	Sand Stowing							0	0.93		0.12		0.8												
34	Sillimanite							0.13	0.39		0.01		0.51												
35	Illemenite																								
36	Leucoxene																								
37	Rutile																								
38	Zircon																								
39	Monazite																								
40	Ni-Co-Cr bearing Magnetite																								
41	W. Clay																								
42	Siderite																								
43	Salt																								

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.
The variations, if any, in closing stock is due to rounding off of fractions into million tons. Kg in Blue Colour. Carat in Green Colour.

Annexure - VI
Position of stock and flow of Major Minerals in States during 2021-22

In Million Tonnes

		Mizoram						Nagaland						Odisha						Punjab					
Sl. No.	State	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S
1	Limestone							431.4	0		0		431.4	331.5	1.42		7.06		325.87						
2	Magnesite																								
3	Bauxite													293.25	627.71		16.45		904.52						
4	Chromite													65.82	0		3.77		62.05						
5	Copper Ore																								
6	Iron Ore													3439.91	196.03		145.823		3490.11						
7	Manganese													32.16	17.41		0.514		49.06						
8	Gold																								
9	Silver																								
10	Lead-Zinc Ore																								
11	Garnet																								
12	Marl																								
13	Vermiculite																								
14	Graphite													2.764	0.49		0.153		3.1						
15	Beach Sand Minerals																								
16	Base Metals																								
17	Talc																								
18	Rock Phosphate																								
19	Wollastonite																								
20	Selenite																								
21	Siliceous earth																								
22	Aluminous Laterite																								

23	Kyanite																								
24	Lime shell																								
25	Martilised Magnetitic Iron Ore																								
26	Titaniferrous Magnetite																								
27	Tin Ore																								
28	Tin Metal																								
29	Auriferous Quartz																								
30	W. Shale																								
31	Diamond (Carat)																								
32	Fluorite																								
33	Sand Stowing																								
34	Sillimanite																								
35	Illemenite																								
36	Leucoxene																								
37	Rutile																								
38	Zircon																								
39	Monazite																								
40	Ni-Co-Cr bearing Magnetite							18.69	0		0		18.69												
41	W. Clay																								
42	Siderite																								
43	Salt																								

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.

The variations, if any, in closing stock is due to rounding off of fractions into million tons.

Kg in Blue Colour.

Carat in Green Colour.

Annexure - VI
Position of stock and flow of Major Minerals in States during 2021-22

In Million Tonnes

		Rajasthan						Sikkim						Tamil Nadu						Telangana					
Sl. No.	State	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S
1	Limestone	4295.288	130.33		86.99		4338.62	1.073	0		0		1.073	215.76	181.24		14.94		382.06	473.28	0		28.4		444.88
2	Magnesite	0	0		0		0							75.45	0		0.08		75.37						
3	Bauxite																								
4	Chromite																								
5	Copper Ore	46.51	2.49		2.88		46.11																		
6	Iron Ore	-1.41	0.39		4.76		-5.79													0.49	0		0		0.49
7	Manganese	1.011	14.24		0.013		15.23													0.1	0		0.01		0.09
8	Gold																								
9	Silver	74.67	0		0.00004		74.67																		
10	Lead-Zinc Ore	28.73	0		3.11		25.62																		
11	Garnet	0.02	0		0.008		0.012							0.18	0		0.004		0.17	0.01	0		0		0.01
12	Marl													1.17	0		0.68		0.49						
13	Vermiculite	0.04	0		0		0.04							1.52	0		0.0006		1.51						
14	Graphite							0.0006	0		0		0.0006	2.38	0		0.05		2.33						
15	Beach Sand Minerals																								
16	Base Metals							1.9	0		0		1.9												
17	Talc							0.15	0		0		0.15												
18	Rock Phosphate	65.53	0		0.91		64.62																		
19	Wollastonite	1.14	0		0.089		1.06																		
20	Selenite	0.91	0		0.001		0.91																		

21	Siliceous earth	4.21	0		0.034		4.17																		
22	Aluminous Laterite																								
23	Kyanite																								
24	Lime shell																								
25	Martilised Magnetitic Iron Ore																								
26	Titaniferrous Magnetite																								
27	Tin Ore																								
28	Tin Metal																								
29	Auriferous Quartz																								
30	W. Shale																								
31	Diamond (Carat)																								
32	Fluorite																								
33	Sand Stowing																		0	0		0.55		-0.55	
34	Sillimanite																								
35	Illemenite													167.54	0		0.06		167.48						
36	Leucoxene																								
37	Rutile													7.84	0		0.001		7.84						
38	Zircon													10.19	0		0.004		10.18						
39	Monazite													2.46	0		0.002		2.45						
40	Ni-Co-Cr bearing Magnetite																								
41	W. Clay																								
42	Siderite																								
43	Salt																								

Note: Government/Private bifurcation wherever not available had been listed under Private extraction. Kg in Blue Colour. Carat in Green Colour

The variations, if any, in closing stock is due to rounding off of fractions into million tons.

Annexure - VI
Position of stock and flow of Major Minerals in States during 2021-22

In Million Tonnes

		Tripura						Uttar Pradesh						Uttarakhand						West Bengal					
Sl. No.	State	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S
1	Limestone							35.24	0		2.81		32.43	1542.76	0		0		1542.76						
2	Magnesite													231.09	0		0.02		231.06						
3	Bauxite																								
4	Chromite																								
5	Copper Ore																								
6	Iron Ore																								
7	Manganese																								
8	Gold																								
9	Silver																								
10	Lead-Zinc Ore																								
11	Garnet																								
12	Marl																								
13	Vermiculite																								
14	Graphite																								
15	Beach Sand Minerals																								
16	Base Metals																								
17	Talc																								
18	Rock Phosphate																								
19	Wollastonite																								
20	Selenite																								
21	Siliceous earth																								
22	Aluminous Laterite																								

23	Kyanite																								
24	Lime shell																								
25	Martilised Magnetitic Iron Ore																								
26	Titaniferrous Magnetite																								
27	Tin Ore																								
28	Tin Metal																								
29	Auriferous Quartz																								
30	W. Shale																								
31	Diamond (Carat)																								
32	Fluorite																								
33	Sand Stowing																			0	0		2.29		-2.29
34	Sillimanite																								
35	Illemenite																								
36	Leucoxene																								
37	Rutile																								
38	Zircon																								
39	Monazite																								
40	Ni-Co-Cr bearing Magnetite																								
41	W. Clay																								
42	Siderite																								
43	Salt																								

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.
The variations, if any, in closing stock is due to rounding off of fractions into million tons.
Kg in Blue Colour.
Carat in Green Colour.

Annexure - VI
Position of stock and flow of Major Minerals in States during 2021-22

In Million Tonnes

		Jammu and Kashmir						Ladakh					
Sl. No.	State	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S
1	Limestone	3855.89	0		1.39	5.69	3848.81	37.67	0		0		37.67
2	Magnesite	7	0		0		7						
3	Bauxite	13.74	0		0		13.74						
4	Chromite												
5	Copper Ore												
6	Iron Ore												
7	Manganese												
8	Gold												
9	Silver												
10	Lead-Zinc Ore												
11	Garnet												
12	Marl												
13	Vermiculite												
14	Graphite												
15	Beach Sand Minerals												
16	Base Metals												
17	Talc												
18	Rock Phosphate												
19	Wollastonite												
20	Selenite												
21	Siliceous earth												
22	Aluminous Laterite												
23	Kyanite												

24	Lime shell												
25	Martilised Magnetitic Iron Ore												
26	Titaniferrous Magnetite												
27	Tin Ore												
28	Tin Metal												
29	Auriferous Quartz												
30	W. Shale												
31	Diamond (Carat)												
32	Fluorite												
33	Sand Stowing												
34	Sillimanite												
35	Illemenite												
36	Leucoxene												
37	Rutile												
38	Zircon												
39	Monazite												
40	Ni-Co-Cr bearing Magnetite												
41	W. Clay												
42	Siderite												
43	Salt												

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.
The variations, if any, in closing stock is due to rounding off of fractions into million tons.
Kg in Blue Colour.
Carat in Green Colour.

Consolidated position of stock and flow of Major Minerals in States during 2021-22

In Million Tonnes

Sl. No.	State	O.S	Add	Upward Reapp.	Red	Down Reapp	C.S
1	Limestone	87157.218	1685.56	46.3	337.72	8.32	88543
2	Magnesite	313.54	0	0	0.11	0	313.43
3	Bauxite	440.18	679.3	1.3	21.9	0	1098.87
4	Chromite	65.825	0	0	3.77	0	62.055
5	Copper Ore	152.95	5.21	0	5.32	0	152.82
6	Iron Ore	6615.274	300.16	383.47	227.843	0	7071.05
7	Manganese	105.051	60.74	1.93	2.387	0	165.23
8	Gold	0	0	0	0	0	0
9	Silver	74.67	0	0	0.0004	0	74.67
10	Lead-Zinc Ore	28.73	0	0	3.11	0	25.62
11	Garnet	0.21	0	0	0.012	0	0.192
12	Marl	1.17	0	0	0.68	0	0.49
13	Vermiculite	1.5618	0.002	0	0.0032	0	1.55123
14	Graphite	7.2806	0.49	0	0.203	0	7.5666
15	Beach Sand Minerals	0	0	0	0	0	0
16	Base Metals	1.9	0	0	0	0	1.9
17	Talc	0.15	0	0	0	0	0.15
18	Rock Phosphate	79.47	0	0	1.02	0	78.45
19	Wollastonite	4.18	0	0	0.089	0	4.1
20	Selenite	0.91	0	0	0.001	0	0.91
21	Siliceous earth	4.21	0	0	0.034	0	4.17
22	Aluminous Laterite	0	0	0	0	0	0
23	Kyanite	0.19	5.45	0	0.001	0	5.64
24	Lime shell	0	0	0	0	0	0
25	Martilised Magnetitic Iron Ore	0	0	0	0.128	0	-0.128

26	Titaniferrous Magnetite	0	0	0	0	0	0
27	Tin Ore	0.004	0	0	0.00002	0	0.004
28	Tin Metal	0.0001	0	0	0	0	0.0001
29	Auriferous Quartz	0	0	0	0	0	0
30	W. Shale	1.05	0	0	0.07	0	0.98
31	Diamond (Carat)	768622.46	0	0	0	0	768622.46
32	Fluorite	11.82	0.004	0	0.001	0	11.83
33	Sand Stowing	0	0.93	0	2.96	0	-2.04
34	Sillimanite	14.42	0.39	0	0.02	0	14.79
35	Illemenite	171.26	0	0	0.17	0	171.09
36	Leucoxene	0.01	0	0	0	0	0.01
37	Rutile	8.04	0	0	0.003	0	8.04
38	Zircon	10.68	0	0	0.01	0	10.66
39	Monazite	2.47	0	0	0.002	0	2.46
40	Ni-Co-Cr bearing Magnetite	18.69	0	0	0	0	18.69
41	W. Clay	0	0.18	0	0.18	0	0
42	Siderite	4.65	0	0	0	0	4.65
43	Salt	0.03	0	0	0.0002	0	0.03

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.
The variations, if any, in closing stock is due to rounding off of fractions into million tons.

Annexure - VII
Position of stock and flow of Minor Minerals in States during 2021-22

In Million Tonnes

		Andhra Pradesh				Arunachal Pradesh				Assam				Bihar			
Sl. No.	State	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1	Gypsum																
2	Dolomite	38.96	0.4	2.38	36.98	37.1	0	0	37.1								
3	Quartzite	31.97	0.18	0.93	31.22					0.47	0	0	0.47				
4	Marble	3.59	0	0	3.59												
5	Barytes	42.6	0.29	2.34	40.55												
6	China Clay	3.12	0	0.11	3.01												
7	Decorative Building Stone																
8	Mineral Sand																
9	Pyrophylite	0.2	0	0	0.2												
10	RBM (Boulder, Stone Chips, Kankar, Pebbles)																
11	Aluminous Clay																
12	Kaolinc include ball clay/white clay																
13	Clay	0.64	0	0.09	0.55												
14	Corundum																
15	Dunite																
16	Felspar	2.48	2.21	0.29	4.4												
17	Fire clay	0.05	0	0.05	0												
18	Import Sand																
19	Fuller's Earth																
20	Sand stone																
21	Lime shell																
22	Bentonite																
23	Calcite	0.15	0	0	0.15												
24	Mica	0.5	0.17	0.02	0.65												

25	Ochre	6.5	0	0.08	6.42												
26	Quartz	35.12	10.28	0.48	44.92												
27	Silica Sand	16.93	1.08	1.92	16.09												
28	Talc-Steatite-Soapstone	4.66	0	0.11	4.55												
29	Ball Clay	19.4	0	0.219	19.18												
30	Phyllite																
31	Laterite	5.43	1.01	0.21	6.23												
32	Lime kankar	0.01	0.49	0.47	0.03												
33	Chalk																
34	Cubes & Kerbs	4.38	0.033	0.18	4.23												
35	Mosaic Chips	1.98	0.04	0.03	1.99												
36	Slate	0.229	0	0.004	0.2253												
37	Moulding Sand	0	0	0	0												
38	Black Stone																
39	Jambha Chira																
40	Gravel	4.65	4.46	6.9	2.21												
41	River Sand																
42	Clay Major																
43	Shale																
44	Diaspore																
45	Jalwa Quartz													2.89	0	0	2.89
46	Limestone	77.51	0.62	0.43	77.7												
47	Granite									331.5	0	0	331.5				
48	Granite (in MMT)																
49	Brick Earth																
50	Road Metal	181.45	50.64	8.4	223.69												
51	Black Granite	45.77	3.04	0.8	48.01												
52	Sand													203.1	0	32	171.1
53	Stone													181.5	0	10.6	171

54	C. Granite	212.8	16.5	0.722	228.58												
55	L. Stone Slabs	71.54	14.41	20.68	65.27												
56	Roughstone																
57	Murum/Bajri																
58	Building Stone																
59	Ordinary Earth																
60	Green Granite																
61	Grey Granite																
62	Multi-Colour Granite																
63	Basalt (MT conversion)																
64	Sapphire																
65	Pink Granite																
66	Pink Porphry																
67	Shahabad Stone																
68	Tiger black																
69	Waste rocks generated in ornamental																
70	Waste rocks																
71	White Quartz																
72	Ordinary Building Stone by Works Dett.																
73	Brick Clay																
74	Ordinary Sand (Category-I)																
75	Ordinary Sand (Category-II)																
76	Red Morrum																
77	Sized dimentional Stone																
78	Stone Dust																
79	Dolostone																
80	Dolostone (Ballast) (Gitti)																
81	Diatomaceous Earth																

82	Nepheline Syenite																
83	Steatite																
84	Serpentine																
85	Masonary Stone																
86	Pulverized Sand																
87	Aggregate																

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.
The variations, if any, in closing stock is due to rounding off of fractions into million tons.
Cubic Meter in Red Colour.
Kg in Blue Colour.

Annexure - VII
Position of stock and flow of Minor Minerals in States during 2021-22

In Million Tonnes

		Chhattisgarh				Goa				Gujarat				Haryana			
Sl. No.	State	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1	Gypsum									3.33	0	0	3.33				
2	Dolomite	85.85	0	1.31	84.54	1.19	0	0	1.19	1883.9	0	1.21	1882.6	3.06	0	0.0008	3.06
3	Quartzite	3.69	0	0.01	3.69												
4	Marble									248.09	0	0.72	247.37	4.78	0	0.34	4.44
5	Barytes																
6	China Clay	0.13	0	0	0.13					265.15	8.56	5.09	268.62				
7	Decorative Building Stone																
8	Mineral Sand																
9	Pyrophylite																
10	RBM (Boulder, Stone Chips, Kankar, Pebbles)																
11	Aluminous Clay																
12	Kaolinc include ball clay/white clay																
13	Clay																
14	Corundum																
15	Dunite																
16	Felspar																
17	Fire clay	0.36	0	0	0.36					147.84	0	0.66	147.17				
18	Import Sand																
19	Fuller's Earth																
20	Sand stone									1358.3	0	1.48	1356.8				
21	Lime shell																
22	Bentonite									73.03	0	3.32	69.7				
23	Calcite									0.05	0	0	0.05				

24	Mica																
25	Ochre																
26	Quartz	1.78	0	0.01	1.77					13.19	0	0.26	12.93				
27	Silica Sand									962.76	0	2.07	960.69				
28	Talc-Steatite-Soapstone	0.03	0	0	0.03												
29	Ball Clay																
30	Phyllite																
31	Laterite					0.56	0.45	0.083	0.98								
32	Lime kankar																
33	Chalk									152.68	0	0.16	152.52				
34	Cubes & Kerbs																
35	Mosaic Chips																
36	Slate													8.28	0	0.011	8.27
37	Moulding Sand	0	0	0	0												
38	Black Stone																
39	Jambha Chira																
40	Gravel													117.51	0	20.94	96.56
41	River Sand																
42	Clay Major																
43	Shale																
44	Diaspore																
45	Jalwa Quartz																
46	Limestone																
47	Granite									18967	0	0.47	18966				
48	Granite (in MMT)																
49	Brick Earth																
50	Road Metal													799.67	0	69.22	730.45
51	Black Granite																
52	Sand													544.77	0	16.28	528.49

53	Stone																
54	C. Granite																
55	L. Stone Slabs																
56	Roughstone																
57	Murum/Bajri																
58	Building Stone																
59	Ordinary Earth																
60	Green Granite																
61	Grey Granite																
62	Multi-Colour Granite																
63	Basalt (MT conversion)					12.2	2.25	1.07	13.42								
64	Sapphire																
65	Pink Granite																
66	Pink Porphry																
67	Shahabad Stone																
68	Tiger black																
69	Waste rocks generated in ornamental																
70	Waste rocks																
71	White Quartz																
72	Ordinary Building Stone by Works Dett.																
73	Brick Clay																
74	Ordinary Sand (Category-I)																
75	Ordinary Sand (Category-II)																
76	Red Morrum																
77	Sized dimentional Stone																
78	Stone Dust																
79	Dolostone																
80	Dolostone (Ballast) (Gitti)																

81	Diatomaceous Earth									0.48	0	0	0.48				
82	Nepheline Syenite									19.03	0	0	19.03				
83	Steatite									0.007	0	0	0.007				
84	Serpentine																
85	Masonary Stone																
86	Pulverized Sand																
87	Aggregate																

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.

The variations, if any, in closing stock is due to rounding off of fractions into million tons.

Cubic Meter in Red Colour.

Kg in Blue Colour.

Annexure - VII
Position of stock and flow of Minor Minerals in States during 2021-22

In Million Tonnes

		Himachal Pradesh				Jharkhand				Karnataka				Kerala			
Sl. No.	State	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1	Gypsum																
2	Dolomite																
3	Quartzite					3.21	6.29	0.56	8.94								
4	Marble																
5	Barytes																
6	China Clay													5.51	0	0.24	5.27
7	Decorative Building Stone																
8	Mineral Sand																
9	Pyrophylite																
10	RBM (Boulder, Stone Chips, Kankar, Pebbles)	45.86	1.08	2.61	44.33												
11	Aluminous Clay																
12	Kaolinc include ball clay/white clay																
13	Clay																
14	Corundum																
15	Dunite																
16	Felspar																
17	Fire clay																
18	Import Sand																
19	Fuller's Earth																
20	Sand stone																
21	Lime shell													0	0	0	0
22	Bentonite																
23	Calcite																
24	Mica																

25	Ochre																
26	Quartz																
27	Silica Sand													0.34	0	0.03	0.31
28	Talc-Steatite-Soapstone																
29	Ball Clay																
30	Phyllite																
31	Laterite													0.78	0.31	0.41	0.67
32	Lime kankar																
33	Chalk																
34	Cubes & Kerbs																
35	Mosaic Chips																
36	Slate																
37	Moulding Sand	0.061	0	0.0033	0.057												
38	Black Stone																
39	Jambha Chira																
40	Gravel																
41	River Sand																
42	Clay Major													0	0	0	0
43	Shale																
44	Diaspore	3.11	0	0.98	2.13												
45	Jalwa Quartz																
46	Limestone																
47	Granite													111038	0	531	110507
48	Granite (in MMT)													519.68	0	32.85	486.83
49	Brick Earth					0.27	0	0.0009	0.26								
50	Road Metal																
51	Black Granite																
52	Sand													0	0	0.28	-0.28
53	Stone	22.06	0.07	1.97	20.16												

54	C. Granite					846.3	192.9	38.62	1000.55								
55	L. Stone Slabs																
56	Roughstone																
57	Murum/Bajri	7.17	0	0.1	7.06												
58	Building Stone	28.33	2.15	2.79	27.69	15654.91	0	0	15654.91								
59	Ordinary Earth	0.5	0.1	0.02	0.6									0	0	10.7	-10.7
60	Green Granite																
61	Grey Granite																
62	Multi-Colour Granite																
63	Basalt (MT conversion)																
64	Sapphire																
65	Pink Granite																
66	Pink Porphry																
67	Shahabad Stone																
68	Tiger black																
69	Waste rocks generated in ornamental																
70	Waste rocks																
71	White Quartz																
72	Ordinary Building Stone by Works Dett.																
73	Brick Clay													0	0	0.005	-0.005
74	Ordinary Sand (Category-I)																
75	Ordinary Sand (Category-II)																
76	Red Morrum																
77	Sized dimentional Stone																
78	Stone Dust																
79	Dolostone																
80	Dolostone (Ballast) (Gitti)																
81	Diatomaceous Earth																

82	Nepheline Syenite																
83	Steatite																
84	Serpentine																
85	Masonary Stone																
86	Pulverized Sand	0.48	0.3	0.03	0.75												
87	Aggregate	0.05	0	0.05	0												

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.
The variations, if any, in closing stock is due to rounding off of fractions into million tons.
Cubic Meter in Red Colour. Kg in Blue Colour.
Note: In view of data gaps, the data of Mineral Resources for the year 2021-22 for Karnataka is excluded from Compendium of Asset Accounts on Mineral and Energy Resources for the year 2021-22.

Annexure - VII
Position of stock and flow of Minor Minerals in States during 2021-22

In Million Tonnes

		Madhya Pradesh				Maharashtra				Manipur				Meghalaya			
Sl. No.	State	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1	Gypsum																
2	Dolomite					5.77	0	0.01	5.76								
3	Quartzite																
4	Marble																
5	Barytes																
6	China Clay																
7	Decorative Building Stone																
8	Mineral Sand																
9	Pyrophylite					0	0.02	0.002	0.01								
10	RBM (Boulder, Stone Chips, Kankar, Pebbles)					0	0	77.4	-77.4					10.39	9.62	2.17	17.84
11	Aluminous Clay																
12	Kaolinc include ball clay/white clay																
13	Clay					0	0	7.46	-7.46	0.08	0	0	0.08	97	0	0.32	96.68
14	Corundum																
15	Dunite																
16	Felspar																
17	Fire clay																
18	Import Sand																
19	Fuller's Earth																
20	Sand stone																
21	Lime shell																
22	Bentonite																
23	Calcite																
24	Mica																

25	Ochre																
26	Quartz																
27	Silica Sand					10.29	0	2.66	7.63								
28	Talc-Steatite-Soapstone																
29	Ball Clay																
30	Phyllite																
31	Laterite					0	0	0.31	-0.31								
32	Lime kankar																
33	Chalk																
34	Cubes & Kerbs																
35	Mosaic Chips																
36	Slate																
37	Moulding Sand																
38	Black Stone																
39	Jambha Chira					0	0	3.93	-3.93								
40	Gravel																
41	River Sand													6.07	5.34	0.22	11.19
42	Clay Major																
43	Shale																
44	Diaspore																
45	Jalwa Quartz																
46	Limestone													42.01	44.14	4.2	81.95
47	Granite																
48	Granite (in MMT)													24	0	0	24
49	Brick Earth													1.84	0	0.00004	1.84
50	Road Metal																
51	Black Granite																
52	Sand					0	0	10.9	-10.9	2.77	0	0	2.77				
53	Stone					0	0	6.25	-6.25	17.45	0	0	17.45				

54	C. Granite																
55	L. Stone Slabs																
56	Roughstone																
57	Murum/Bajri					0	0	47.57	-47.57								
58	Building Stone																
59	Ordinary Earth									11.61	0	0	11.61				
60	Green Granite																
61	Grey Granite																
62	Multi-Colour Granite																
63	Basalt (MT conversion)																
64	Sapphire																
65	Pink Granite																
66	Pink Porphry																
67	Shahabad Stone																
68	Tiger black																
69	Waste rocks generated in ornamental																
70	Waste rocks																
71	White Quartz																
72	Ordinary Building Stone by Works Dett.																
73	Brick Clay																
74	Ordinary Sand (Category-I)																
75	Ordinary Sand (Category-II)																
76	Red Morrum																
77	Sized dimentional Stone																
78	Stone Dust																
79	Dolostone																
80	Dolostone (Ballast) (Gitti)																
81	Diatomaceous Earth																

82	Nepheline Syenite																
83	Steatite																
84	Serpentine																
85	Masonary Stone																
86	Pulverized Sand																
87	Aggregate																

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.

The variations, if any, in closing stock is due to rounding off of fractions into million tons.

Cubic Meter in Red Colour.

Kg in Blue Colour.

Annexure - VII
Position of stock and flow of Minor Minerals in States during 2021-22

In Million Tonnes

		Mizoram				Nagaland				Odisha				Punjab			
Sl. No.	State	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1	Gypsum																
2	Dolomite									176.27	7.18	1.554	181.9				
3	Quartzite									21.06	1.29	0.17	22.18				
4	Marble																
5	Barytes																
6	China Clay																
7	Decorative Building Stone					317	0	0	317								
8	Mineral Sand									163.3	0	0.341	162.97				
9	Pyrophylite									2.76	0	0.006	2.76				
10	RBM (Boulder, Stone Chips, Kankar, Pebbles)																
11	Aluminous Clay																
12	Kaolinc include ball clay/white clay																
13	Clay					20	0	0	20								
14	Corundum																
15	Dunite																
16	Felspar																
17	Fire clay																
18	Import Sand																
19	Fuller's Earth																
20	Sand stone																
21	Lime shell																
22	Bentonite																
23	Calcite																
24	Mica																

25	Ochre																
26	Quartz									1.34	0.075	0.001	1.41				
27	Silica Sand																
28	Talc-Steatite-Soapstone																
29	Ball Clay																
30	Phyllite																
31	Laterite																
32	Lime kankar																
33	Chalk																
34	Cubes & Kerbs																
35	Mosaic Chips																
36	Slate																
37	Moulding Sand																
38	Black Stone																
39	Jambha Chira																
40	Gravel																
41	River Sand																
42	Clay Major																
43	Shale																
44	Diaspore																
45	Jalwa Quartz																
46	Limestone																
47	Granite																
48	Granite (in MMT)																
49	Brick Earth																
50	Road Metal																
51	Black Granite																
52	Sand	0	33389.4	33389.4	0	0	0.83	0.83	0					639.65	0	13.48	626.17
53	Stone	0	789475	789475	0												

54	C. Granite																
55	L. Stone Slabs																
56	Roughstone																
57	Murum/Bajri																
58	Building Stone																
59	Ordinary Earth																
60	Green Granite																
61	Grey Granite																
62	Multi-Colour Granite																
63	Basalt (MT conversion)																
64	Sapphire																
65	Pink Granite																
66	Pink Porphry																
67	Shahabad Stone																
68	Tiger black																
69	Waste rocks generated in ornamental																
70	Waste rocks																
71	White Quartz																
72	Ordinary Building Stone by Works Dett.																
73	Brick Clay																
74	Ordinary Sand (Category-I)																
75	Ordinary Sand (Category-II)																
76	Red Morrum																
77	Sized dimentional Stone																
78	Stone Dust																
79	Dolostone																
80	Dolostone (Ballast) (Gitti)																
81	Diatomaceous Earth																

82	**Nepheline Syenite**																
83	**Steatite**																
84	**Serpentine**																
85	**Masonary Stone**																
86	**Pulverized Sand**																
87	**Aggregate**																

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.

The variations, if any, in closing stock is due to rounding off of fractions into million tons.

Cubic Meter in Red Colour.

Kg in Blue Colour.

Annexure - VII
Position of stock and flow of Minor Minerals in States during 2021-22

In Million Tonnes

		Rajasthan				Sikkim				Tamil Nadu				Telangana			
Sl. No.	State	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1	Gypsum	5.24	0.53	3.44	2.33												
2	Dolomite	57.91	0	0.24	57.67	1	0	0	1					39.07	0	0.61	38.46
3	Quartzite	10.66	27.76	0.55	37.87					0.48	0	0.0002	0.48				
4	Marble	266.9	9.79	12.54	264.15												
5	Barytes	5.5	0	0.006	5.5									1.29	0	0	1.29
6	China Clay	160.88	0.28	3.97	157.19												
7	Decorative Building Stone																
8	Mineral Sand																
9	Pyrophylite	0.62	0.22	0.07	0.77												
10	RBM (Boulder, Stone Chips, Kankar, Pebbles)					0	0	0.32	-0.32								
11	Aluminous Clay																
12	Kaolinc include ball clay/white clay													0.27	0	0.03	0.24
13	Clay																
14	Corundum																
15	Dunite									2.25	0	0.04	2.2				
16	Felspar	155.3	24.65	5.58	174.38					1.12	0	0.07	1.05	3.72	0	0.73	3
17	Fire clay	6.56	0	0.001	6.55					1.57	0	0.18	1.39				
18	Import Sand																
19	Fuller's Earth	3.88	0.016	0.22	3.68									0	0	0.34	-0.34
20	Sand stone	-22.42	46.25	12.47	11.36												
21	Lime shell																
22	Bentonite	3.45	0.27	0.28	3.44												
23	Calcite	0.59	0	0.02	0.56					0.05	0	0.001	0.04				
24	Mica	-0.04	0.76	0.04	0.67												

25	Ochre	37.84	11.75	3.19	46.41												
26	Quartz									25.02	0	0.01	25.01	14.38	0	1.23	13.15
27	Silica Sand	281.41	20.78	4.68	297.51												
28	Talc-Steatite-Soapstone	44.94	19.65	1.6	62.99												
29	Ball Clay	30.93	0	5.23	25.69												
30	Phyllite	8.69	0	9.03	-0.33												
31	Laterite	4.3	0	0	4.3									15.94	0	5.36	10.58
32	Lime kankar									2.59	0	0.29	2.3				
33	Chalk																
34	Cubes & Kerbs																
35	Mosaic Chips													0	0	0.2	-0.2
36	Slate																
37	Moulding Sand																
38	Black Stone																
39	Jambha Chira																
40	Gravel									26.04	0	4.94	21.1	0	0	100.27	-100.27
41	River Sand																
42	Clay Major																
43	Shale													13.6	0	0.03	13.57
44	Diaspore																
45	Jalwa Quartz																
46	Limestone																
47	Granite	211275.30	285957	3261.06	493971.23					558045417	0	124681	557920736				
48	Granite (in MMT)									0.41	0	0.01	0.39				
49	Brick Earth																
50	Road Metal													0	0	145.51	-145.51
51	Black Granite													0	0	0.95	-0.95
52	Sand					0	0	0.283	-0.283					0	0	18.59	-18.59

53	Stone					0	0	0.361	-0.361								
54	C. Granite													0	0	2.07	-2.07
55	L. Stone Slabs													0	0	0.015	-0.015
56	Roughstone									651691015	0	4.00E+07	611559127				
57	Murum/Bajri																
58	Building Stone																
59	Ordinary Earth																
60	Green Granite																
61	Grey Granite																
62	Multi-Colour Granite																
63	Basalt (MT conversion)																
64	Sapphire																
65	Pink Granite																
66	Pink Porphry																
67	Shahabad Stone																
68	Tiger black																
69	Waste rocks generated in ornamental																
70	Waste rocks																
71	White Quartz																
72	Ordinary Building Stone by Works Dett.																
73	Brick Clay																
74	Ordinary Sand (Category-I)																
75	Ordinary Sand (Category-II)																
76	Red Morrum																
77	Sized dimentional Stone																
78	Stone Dust																
79	Dolostone																
80	Dolostone (Ballast) (Gitti)																

81	Diatomaceous Earth																
82	Nepheline Syenite																
83	Steatite																
84	Serpentine	-0.71	1.76	0.46	0.59												
85	Masonary Stone	-102.04	25.28	117.73	-194.49												
86	Pulverized Sand																
87	Aggregate																

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.

The variations, if any, in closing stock is due to rounding off of fractions into million tons.

Cubic Meter in Red Colour.

Kg in Blue Colour.

Annexure - VII
Position of stock and flow of Minor Minerals in States during 2021-22

In Million Tonnes

		Tripura				Uttar Pradesh				Uttarakhand				West Bengal			
Sl. No.	State	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1	Gypsum																
2	Dolomite																
3	Quartzite					0	0	1.61	-1.61								
4	Marble																
5	Barytes																
6	China Clay													0.71	0	0.07	0.63
7	Decorative Building Stone																
8	Mineral Sand																
9	Pyrophylite					0.41	0	0.004	0.41								
10	RBM (Boulder, Stone Chips, Kankar, Pebbles)					0	0	1.54	-1.54	63.94	0	25.87	38.07				
11	Aluminous Clay																
12	Kaolinc include ball clay/white clay																
13	Clay																
14	Corundum																
15	Dunite																
16	Felspar													0.15	0	0.005	0.14
17	Fire clay													2.8	0	0.06	2.73
18	Import Sand																
19	Fuller's Earth																
20	Sand stone					0	0	14.92	-14.92					85	0	52.18	85
21	Lime shell																
22	Bentonite																
23	Calcite																
24	Mica																

25	Ochre																
26	Quartz					0	0	0	0					2.27	0	0.05	2.22
27	Silica Sand					17.04	0	0.35	16.69					0.47	0	0.05	0.41
28	Talc-Steatite-Soapstone									76.05	0	0.37	75.67				
29	Ball Clay																
30	Phyllite																
31	Laterite																
32	Lime kankar																
33	Chalk																
34	Cubes & Kerbs																
35	Mosaic Chips																
36	Slate																
37	Moulding Sand																
38	Black Stone													19034644.51	0	160972.55	18873671.96
39	Jambha Chira																
40	Gravel																
41	River Sand																
42	Clay Major																
43	Shale																
44	Diaspore					0.464	0	0.004	0.459								
45	Jalwa Quartz																
46	Limestone																
47	Granite					2.13	0	0.018	2.11					18745172	0	3248.57	18741923.43
48	Granite (in MMT)																
49	Brick Earth																
50	Road Metal																
51	Black Granite																
52	Sand	0.97	0.48	1.01	0.44												
53	Stone																

54	C. Granite																
55	L. Stone Slabs																
56	Roughstone																
57	Murum/Bajri					0	0	20.07	-20.07								
58	Building Stone																
59	Ordinary Earth																
60	Green Granite																
61	Grey Granite																
62	Multi-Colour Granite																
63	Basalt (MT conversion)																
64	Sapphire																
65	Pink Granite																
66	Pink Porphry																
67	Shahabad Stone																
68	Tiger black																
69	Waste rocks generated in ornamental																
70	Waste rocks																
71	White Quartz																
72	Ordinary Building Stone by Works Dett.																
73	Brick Clay																
74	Ordinary Sand (Category-I)					0	0	7.19	-7.19								
75	Ordinary Sand (Category-II)					0	0	1.46	-1.46								
76	Red Morrum					0	0	0.0008	-0.0008								
77	Sized dimentional Stone					0	0	0.11	-0.11								
78	Stone Dust					0	0	0.21	-0.21								
79	Dolostone					0	0	0.053	-0.053								
80	Dolostone (Ballast) (Gitti)					0	0	9.74	-9.74								
81	Diatomaceous Earth																

82	Nepheline Syenite																
83	Steatite																
84	Serpentine																
85	Masonary Stone																
86	Pulverized Sand																
87	Aggregate																

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.

The variations, if any, in closing stock is due to rounding off of fractions into million tons.

Cubic Meter in Red Colour.

Kg in Blue Colour.

Annexure - VII
Position of stock and flow of Minor Minerals in States during 2021-22

In Million Tonnes

		Jammu and Kashmir				Ladakh			
Sl. No.	State	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1	Gypsum	42.87	0	0.93	41.94				
2	Dolomite	67.37	0	0	67.37				
3	Quartzite	5.78	0	0	5.78				
4	Marble	40.72	0	0	40.72	2.7	0	0	2.7
5	Barytes								
6	China Clay								
7	Decorative Building Stone								
8	Mineral Sand								
9	Pyrophylite								
10	RBM (Boulder, Stone Chips, Kankar, Pebbles)	170.42	0	5.96	164.46	0	2.91	2.91	0
11	Aluminous Clay								
12	Kaolinc include ball clay/white clay								
13	Clay								
14	Corundum								
15	Dunite								
16	Felspar								
17	Fire clay								
18	Import Sand								
19	Fuller's Earth								
20	Sand stone								
21	Lime shell								
22	Bentonite								
23	Calcite								
24	Mica								

25	Ochre								
26	Quartz								
27	Silica Sand								
28	Talc-Steatite-Soapstone								
29	Ball Clay								
30	Phyllite								
31	Laterite								
32	Lime kankar								
33	Chalk								
34	Cubes & Kerbs								
35	Mosaic Chips								
36	Slate								
37	Moulding Sand								
38	Black Stone								
39	Jambha Chira								
40	Gravel								
41	River Sand								
42	Clay Major								
43	Shale								
44	Diaspore								
45	Jalwa Quartz								
46	Limestone								
47	Granite	0.002	0	0	0.002				
48	Granite (in MMT)					111.5	0	0	111.5
49	Brick Earth								
50	Road Metal								
51	Black Granite								
52	Sand								
53	Stone								

54	C. Granite								
55	L. Stone Slabs								
56	Roughstone								
57	Murum/Bajri								
58	Building Stone								
59	Ordinary Earth								
60	Green Granite								
61	Grey Granite								
62	Multi-Colour Granite								
63	Basalt (MT conversion)								
64	Sapphire	0	3.13 kg	3.13 kg	0				
65	Pink Granite								
66	Pink Porphry								
67	Shahabad Stone								
68	Tiger black								
69	Waste rocks generated in ornamental								
70	Waste rocks								
71	White Quartz								
72	Ordinary Building Stone by Works Dett.								
73	Brick Clay								
74	Ordinary Sand (Category-I)								
75	Ordinary Sand (Category-II)								
76	Red Morrum								
77	Sized dimentional Stone								
78	Stone Dust								
79	Dolostone								
80	Dolostone (Ballast) (Gitti)								
81	Diatomaceous Earth								

82	Nepheline Syenite								
83	Steatite								
84	Serpentine								
85	Masonary Stone								
86	Pulverized Sand								
87	Aggregate								

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.

The variations, if any, in closing stock is due to rounding off of fractions into million tons.

Cubic Meter in Red Colour.

Kg in Blue Colour.

Consolidated position of stock and flow of Minor Minerals in States during 2021-22

In Million Tonnes

Sl. No.	State	O.S	Add	Red	C.S
1	Gypsum	51.44	0.53	4.37	47.6
2	Dolomite	2397.4	7.58	7.3148	2397.66
3	Quartzite	77.32	35.52	3.8302	109.02
4	Marble	566.78	9.79	13.6	562.97
5	Barytes	49.39	0.29	2.346	47.34
6	China Clay	435.5	8.84	9.48	434.95
7	Decorative Building Stone	317	0	0	317
8	Mineral Sand	163.3	0	0.341	162.97
9	Pyrophylite	3.99	0.24	0.082	4.15
10	RBM (Boulder, Stone Chips, Kankar, Pebbles)	244.75	12.53	116.17	141.112
11	Aluminous Clay	0	0	0	0
12	Kaolinc include ball clay/white clay	0.27	0	0.03	0.24
13	Clay	117.72	0	7.87	109.85
14	Corundum	0	0	0	0
15	Dunite	2.25	0	0.04	2.2
16	Felspar	162.77	26.86	6.675	182.97
17	Fire clay	159.18	0	0.951	158.2
18	Import Sand	0	0	0	0
19	Fuller's Earth	3.88	0.016	0.56	3.34
20	Sand stone	1420.87	46.25	81.05	1438.25
21	Lime shell	0	0	0	0
22	Bentonite	76.48	0.27	3.6	73.14
23	Calcite	0.84	0	0.0212	0.8
24	Mica	0.46	0.93	0.06	1.32
25	Ochre	44.34	11.75	3.27	52.83
26	Quartz	93.1	10.355	2.041	101.41

27	Silica Sand	1289.24	21.86	11.76	1299.33
28	Talc-Steatite-Soapstone	125.68	19.65	2.08	143.24
29	Ball Clay	50.33	0	5.449	44.87
30	Phyllite	8.69	0	9.03	-0.33
31	Laterite	27.01	1.77	6.373	22.45
32	Lime kankar	2.6	0.49	0.76	2.33
33	Chalk	152.68	0	0.16	152.52
34	Cubes & Kerbs	4.38	0.033	0.18	4.23
35	Mosaic Chips	1.98	0.04	0.23	1.79
36	Slate	8.509	0	0.0147	8.4953
37	Moulding Sand	0.06104	0	0.0033	0.05704
38	Black Stone	19034645	0	160972.55	18873671.96
39	Jambha Chira	0	0	3.93	-3.93
40	Gravel	148.2	4.46	133.05	19.6
41	River Sand	6.07	5.34	0.22	11.19
42	Clay Major	0	0	0	0
43	Shale	13.6	0	0.03	13.57
44	Diaspore	3.574	0	0.984	2.589
45	Jalwa Quartz	2.89	0	0	2.89
46	Limestone	119.52	44.76	4.63	159.65
47	Granite	577132203	285957	131722.118	577286437.7
48	Granite (in MMT)	655.59	0	32.86	622.72
49	Brick Earth	2.11	0	0.00094	2.1
50	Road Metal	981.12	50.64	223.13	808.63
51	Black Granite	45.77	3.04	1.75	47.06
52	Sand	1391.28	33390.71	33483.033	1298.957
53	Stone	221.03	789475.1	789494.131	201.969
54	C. Granite	1059.1	209.37	41.412	1227.06
55	L. Stone Slabs	71.54	14.41	20.695	65.255

56	Roughstone	651691015	0	40131889	611559127
57	Murum/Bajri	7.17	0	67.74	-60.58
58	Building Stone	15683.24	2.15	2.79	15682.6
59	Ordinary Earth	12.11	0.1	10.72	1.51
60	Green Granite	0	0	0	0
61	Grey Granite	0	0	0	0
62	Multi-Colour Granite	0	0	0	0
63	Basalt (MT conversion)	12.24	2.25	1.07	13.42
64	Sapphire	0	0	0	0
65	Pink Granite	0	0	0	0
66	Pink Porphry	0	0	0	0
67	Shahabad Stone	0	0	0	0
68	Tiger black	0	0	0	0
69	Waste rocks generated in ornamental	0	0	0	0
70	Waste rocks	0	0	0	0
71	White Quartz	0	0	0	0
72	Ordinary Building Stone by Works Dett.	0	0	0	0
73	Brick Clay	0	0	0.005	-0.005
74	Ordinary Sand (Category-I)	0	0	7.19	-7.19
75	Ordinary Sand (Category-II)	0	0	1.46	-1.46
76	Red Morrum	0	0	0.0008	-0.0008
77	Sized dimentional Stone	0	0	0.11	-0.11
78	Stone Dust	0	0	0.21	-0.21
79	Dolostone	0	0	0.053	-0.053
80	Dolostone (Ballast) (Gitti)	0	0	9.74	-9.74
81	Diatomaceous Earth	0.48	0	0	0.48
82	Nepheline Syenite	19.03	0	0	19.03
83	Steatite	0.007	0	0	0.007
84	Serpentine	-0.71	1.76	0.46	0.59

85	Masonary Stone	-102.04	25.28	117.73	-194.49
86	Pulverized Sand	0.48	0.3	0.03	0.75
87	Aggregate	0.05	0	0.05	0

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.

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SUPREME AUDIT INSTITUTION OF INDIA

लोकहितार्थ सत्यनिष्ठा

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