



NATURAL RESOURCE ACCOUNT OF KERALA FOR THE YEAR 2020-21 MINERAL & ENERGY RESOURCES



An initiative of Government Accounting Standards Advisory Board
under the aegis of CAG of India

June 2023

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MESSAGE OF STATE GOVERNMENT

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MESSAGE

The initiative of the Government Accounting Standards Advisory Board, constituted by the Comptroller and Auditor General of India, to release a concept paper on Natural Resource Accounting in India and develop a framework for Natural Resource Accounting are commendable. The framework provides a structure for the mapping of natural resources, identifying sustainable utilisation and evaluating challenges, particularly in preventing exploitation.

I am happy to note that the Assets Accounts on mineral and non-renewable energy resources in Kerala are being prepared jointly by the Principal Accountant General's office and the Government of Kerala. I appreciate the efforts of the Principal Accountant General and Secretaries to Government of Kerala and all officers involved in this process.

The Government of Kerala welcomes this key initiative which will aid in improving accountability for sustainable development, in line with the United Nations' System of Economic and Environmental Accounting and Sustainable Development Goals.

The 'Natural Resource Account of Kerala for the year 2020-21', focusing on mineral and energy resources, will be a valuable reference for formulating Government policy and devising the best strategies for optimal use of our natural resources.

12th July 2022


Dr. V P Joy

MESSAGE FROM THE ACCOUNTANT GENERAL

Our department is committed to implement the Concept on Natural Resource Accounting (NRA) in India and the preparation of Asset Accounts, bringing the Government as well as the private sector under the ambit of NRA, mapping the issues and challenges, floating the awareness of a disclosure statement on receipts and expenditure related to exploitation of natural resources. Government Accounting Standards Advisory Board (GASAB) does this under the aegis of Comptroller and Auditor General of India, which through a three-pronged action plan is doing the same. The primary goal of the short-term plan envisioned preparation of the Asset account on Mineral and Non-Renewable Energy Resources in the states. We thank the Government of Kerala who stood by this concept and for their support to the Comptroller and Auditor General of India in the preparation of the same. Environmental accounting is an integral component in enabling India meet its international obligations as signatory to the UN sponsored declaration on "blueprint to achieve a better and more sustainable future for all (SDGs). Gearing up for the same from Kerala state which continuously stands in the primary ranking in the implementation of SDGs in the country is a welcome endeavour. We take this opportunity to appreciate all in the state Government as well as the AGs office in the efforts taken to compile and present the information in this report.


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Prl. Accountant General(Au-I)


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Executive Summary

The GASAB Secretariat in CAG's Office has 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 System of Economic and Environmental Accounting – Central Framework of the UN.

Besides the plans, the Concept Paper also suggested the templates for preparation of Asset Accounts on Mineral & Energy Resources. Simultaneous to the release of the Concept Paper, pilot studies were initiated (August 2020) in five States, of which, three States namely Goa, Meghalaya and Rajasthan have successfully completed the studies, preparing the model Asset Account on Mineral and Non-renewable Energy Resources in the States.

The final formats of Asset Accounts on Mineral & Energy Resources were released in the shape of a book in October 2021 for implementation in the States. First draft Asset Accounts was targeted for the year 2020-21 to be completed by March 2022.

Subsequently, in view of the national declaration at the Conference of the Parties (CoP) 26, efforts were made by GASAB to incorporate templates for collating information on progress in generation of renewable energy in States. This was 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.

The work on preparation of the Asset Accounts in the State of Kerala commenced with joint efforts of the Accountants General Offices and the State Government. This Report presents the first draft of the Asset Accounts on Mineral and Energy Resources in the State of Kerala.

Effective implementation of a system of generating Asset Accounts on Mineral and Energy Resources in the States would aid in evidence-based good governance and have the following specific advantages.

- ***Preparation of NRA and meet the commitment made to meeting SDGs and SEEA framework.***
- ***Resources at a glance - a one pager document on State-wise major and minor minerals.***
- ***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.***
- ***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).***

- *Close monitoring on illegal mining, and*
- *Progress on commitment made at COP 26*

NRA cell in the State has been formed with joint representations from Audit, A&E Offices and technical resource persons from the concerned State Government Departments like Finance, Survey and Land records, Mines and Geology Directorate, Water Resources Department, Forest Department, Environment & Climate Change Directorate and Economic & Statistics Directorate to steer the implementation process associated with the project.

On preparation of the Asset Accounts, dual stage validation and limited verification, first by the State Government and thereafter by the Audit Office has been followed to validate the Asset Accounts on Mineral and Energy Resources in the State.

The major findings and recommendations are brought out below:

Findings

- Geo tagging of mines in KOMPAS portal were seen erroneous. Some geo coordinates were seen plotted in Arabian Sea.
- e-office not implemented and KOMPAS portal not fully implemented.
- Geo-tagged mineral map of the state is not maintained in the Department.
- Periodical review and fixation of rates/royalties' vis-a vis the market rates were not seen done by the Department.
- Compilation of data/ information regarding the resources in the State was not seen maintained in an organised/ proper form in the Department.
- State's generation of renewable energy resources vis-à-vis total requirement during the year was 34.82 *per cent*.
- State Government provided all inputs on opening balance, extraction, royalties and average market prices which aided in the preparation of the accounts. However, the State Government did not readily have the opening balances of Lime Shell, Ordinary Sand, Ordinary Earth and Brick Clay.
- The Sustainability of resources ranged between 1 year to 327 years.
- Variation between the royalties and market prices ranging between 300 4900 *per cent*

Recommendations

- Proper Geo tagging of mines in KOMPAS portal.
- Implementation of e-office and KOMPAS portal in squad offices.
- Modification of KOMPAS portal for generation of reports on requirements in auto mode.
- Preparation of Mineral Map of State with GPS co-ordinates.
- Periodical review of the fixation of rates by State Government is needed to fill the gap between the royalties levied and the market rates of the minerals extracted.
- Management information system may be implemented to make available ready information/ data on mineral resources/ exploitation/use/transport.

- Variations between the figures of State Government Departments and those maintained by the IBM needs reconciliation.
- To provide opening balance of Lime Shell, Ordinary Sand, Ordinary Earth and Brick Clay.

DISCLAIMER STATEMENT

Preparation of Asset Accounts is part of four-stage implementation strategy coined by the System of Economic and Environmental 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 endeavour of Government Accounting Standards Advisory Board under the aegis of institution of Comptroller and Auditor General of India 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 first draft of Asset Accounts on Mineral and Energy Resources in a uniform and robust manner. Once the comprehensiveness and reliability of Asset Accounts prepared by the State Government stabilizes, State Government will produce this on regular basis.

The Asset Accounts have been prepared solely based on information/data provided by the concerned departments of the State Government and GASAB/CAG of India disclaims any responsibility for their correctness/inclusivity.

The verification by Audit Office is a test check that the data/information are supported by primary documents maintained in the offices of the concerned departments and is not an audit of stock of minerals and mining activities in the State.

Sustainability of resources is arrived by dividing the closing stocks of a particular year with annual reduction in that particular year. Hence the years shown in sustainability of resources may vary depending on the production/reduction of the mineral of the particular year.

CHAPTER - 1

INTRODUCTORY

1.1 Natural Resource Accounting – the Concept

Economic growth over decades has largely been an outcome of continued reliance on natural resources. Growth is clearly the major engine to create livelihood options; its reliance on increased resource use has, however, led to many negative externalities. The current paradigm of resource-led economic development sees a coupling between the availability of natural resources and economic growth.

Natural resources play a crucial role for economic development of a country and are crucial for their inbuilt value of inter-generational equity and sustenance.

Over the years, there has been increasing awareness about environmental issues across the globe and growing concern about the depletion and degradation of the natural resources. This concern gave birth to the idea of sustainable development goals which aims at ending poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. The sustainable development dialogue has brought to the fore the direct and indirect impact of human activity on the environment and there is now a consensus that continuing economic growth and human welfare are integrally dependent on the benefits obtained from the environment. The critical trade-offs between managing ecosystems and environmental resources for future sustainable economic and social development need to be understood for effective policy interventions.

Natural resources play a vital role in the sustainable economic development of any country. They need to be exploited in a sustainable manner so that the future generations can also avail of their advantages. The rampant over-exploitation of these resources in recent times has resulted in harmful impact on the environment and issues of climate change and global warming have become a matter of discussions and deliberations round the Globe.

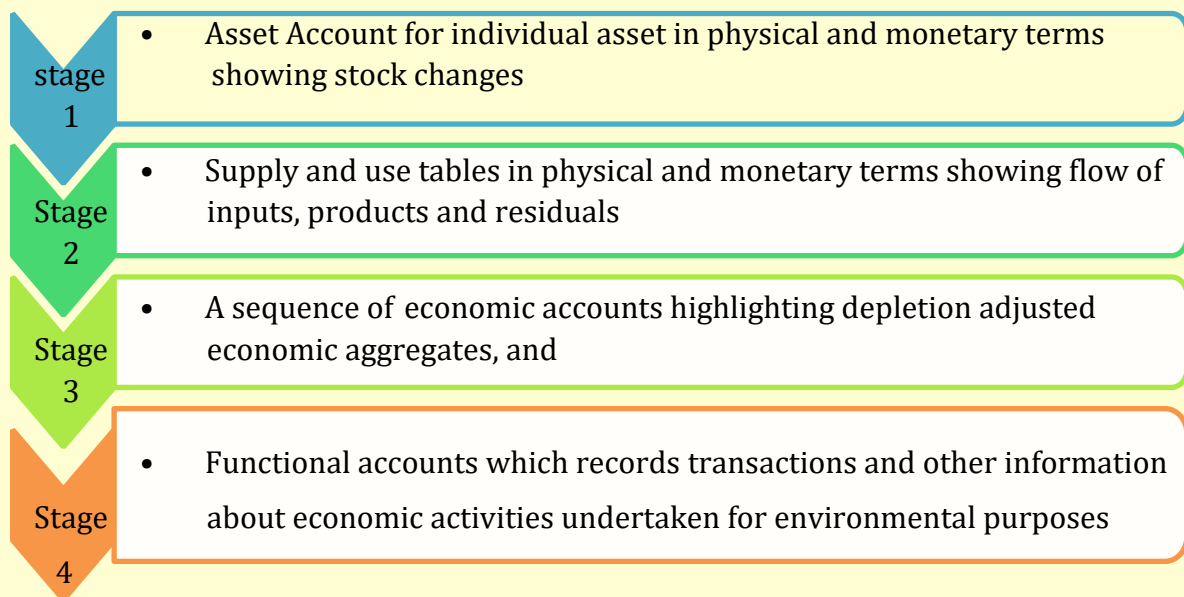


Agenda 21,
Rio +20, SDGs:
*Integrate nature into
decision making!!!*

Conventional accounting captures data of the measurable economic activity. In order 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. It is based on the concept “Measurement of a resource leads to its better Management.” The idea is to quantify the damage to the environment so that it can be reduced from GDP to arrive at Green GDP. It would assist 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.

In keeping with the developments, the United Nations has been working towards an universally acceptable framework on environmental resource accounting which culminated into release of the System of Economic and Environment Accounting - Central Framework (SEEA - CF) in 2012 which is the latest internationally accepted framework.

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 desires eventually to implement the full system, it may decide to focus its initial efforts on those accounts that are most relevant to current issues.

CHAPTER - 2

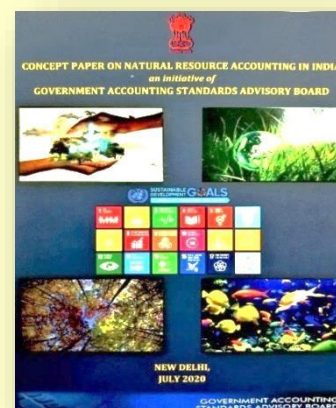
IMPLEMENTATION OF NRA IN INDIA – GASAB’S ENDEAVOUR

2.1 About Government Accounting Standards Advisory Board (GASAB)

The Government Accounting Standards Advisory Board (GASAB) was established in 2002 by the Comptroller and Auditor General of India with the assistance of Government of India to formulate Government accounting standards for improving Government accounting and financial reporting.

2.2 Concept Paper on NRA in India – released by GASAB

GASAB has taken the initiative (2019) to develop a framework for implementing NRA on priority as a nationally important project. GASAB came out with a Concept Paper on Implementation of NRA in India in July 2020. The Paper, inter alia, discussed the concept and its inter-relation with the SDGs and Climate Change, international progress on environmental accounting and merger of the concept with economic environmental accounting, progress in other countries.

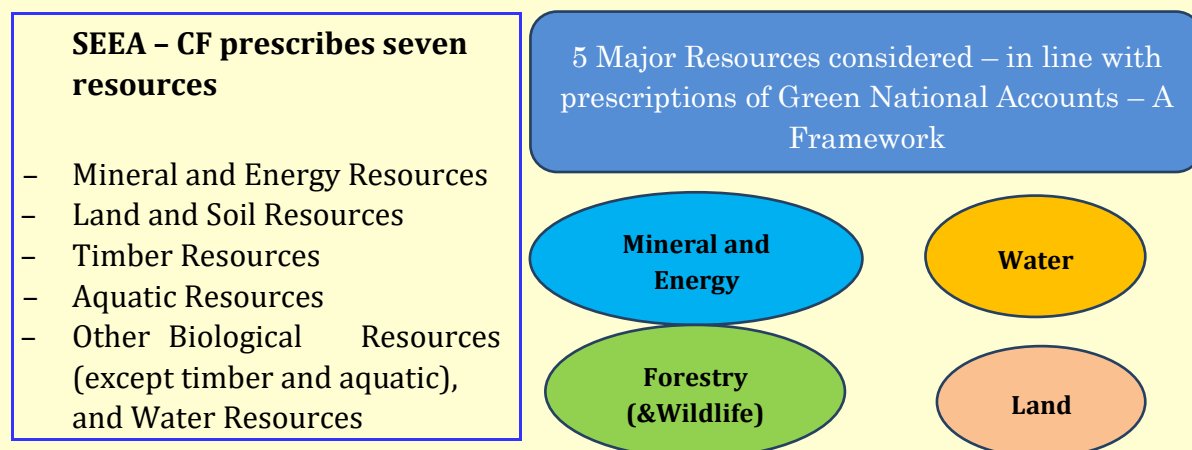


The Paper, inter alia, envisaged short, medium and long term goals in consonance with the four-stage strategy suggested by the SEEA Framework, as mentioned below:

Short term Goals	Mid term goals	Long term goals
<ol style="list-style-type: none"> 1. Preparation of Asset Accounts on Mineral and Energy Resources in States 2. Initiation and preparation of disclosure statement on revenues and expenditure related to natural resources <p>(2019-20 to 2021-22)</p>	<ol style="list-style-type: none"> 1. Preparation of National Asset Accounts on Mineral and Energy Resources 2. Preparation of Asset Accounts in respect of other four resources namely water, land and forestry & wildlife resources in the States 3. Preparation of supply and use tables in physical and monetary terms showing flow of natural resource inputs, products and residuals <p>(2022-23 to 2024-25)</p>	<ol style="list-style-type: none"> 1. Preparation of the economic accounts highlighting depletion adjusted economic aggregates; and 2. Preparation of functional accounts recording transactions and other information about economic activities undertaken for environmental purposes. <p>(2025 - 26 onwards)</p>

2.3 Goal 1 of the action plan envisaged in the Concept Paper

The initial stage of implementation strategy of NRA is preparation of the Asset Accounts on individual resources. The SEEA (CF) has listed out seven resources of which five major resources namely Mineral & Energy Resources, Water Resources, Forestry & Wildlife Resources and Land Resources have been considered for taking up initially in the Concept Paper on NRA as mentioned in the table and diagrams below:



2.4 Why - Mineral and Energy Resources

The Asset Accounts on Mineral & Energy Resources have been considered as the most important goal as it consists of non-renewable resources while other major resources fall in the other group and gets renewed naturally.

In keeping with the implementation stages as envisaged in the SEEA (CF), the flexibility embedded therein and the importance of non-renewable resources discussed above coupled with the prescription of SEEA that a country may decide to focus its initial efforts on those accounts that are most relevant to current issues, preparation of Asset Accounts on Mineral & Energy resources have been conceptualised as the need of the hour and thus planned as the short term goal No.1.

Mineral & Energy Resources being non-renewable resources have been considered as the first goal

2.5 Advantages of consolidating the Asset Accounts on Mineral & Energy Resources

A system of collation of a periodic database in the shape of an Asset Accounts on available natural resources linked with inter-related factors like revenues and costs involved in exploitation of such resources, their sustainability for the future generations would be extremely helpful in monitoring the sustainability of resources, effective decision making and ensuring evidence based good governance, adoption/adaption of SEEA besides attaining other pressing international obligations like the Sustainable Development Goals and Climate Change.

Besides the above, the Asset Accounts would aid in good governance with the following specific inputs:



Thus, the Asset Accounts, once compiled, has the potential of multi-pronged advantages for the States in particular and the country at large as summarised below:

Resources at a glance: The Asset Accounts would enable a one pager document on the resource availability of each State.

Provide invaluable information and datasets on mineral repository and potential of States – could be used to showcase for varied purposes.

Physical flows and monetary values mapped – enabler of working out the value of extracted resources and also to help in monitoring of realisation of revenues vis-à-vis extraction of resources to help in identifying cases of leakage of revenue.

Pace of exploitation: Down the years, compilation of Asset Accounts would help in drawing up the pace of exploitation of resources over the years thus bringing out vital inputs like the pattern of resource usage and sustainability of resources – in years.

Revenue vis-à-vis market value: Ascribing money value with reference to the royalties/revenues combined with the market value would aid in continuous analysis of the royalty/duty/taxes to help the public exchequer.

Sustainability of minerals in years – when analysed with revenues, has the potential to point towards revenue streams for future and will also enable States to identify alternate resources – both economic and energy resources.

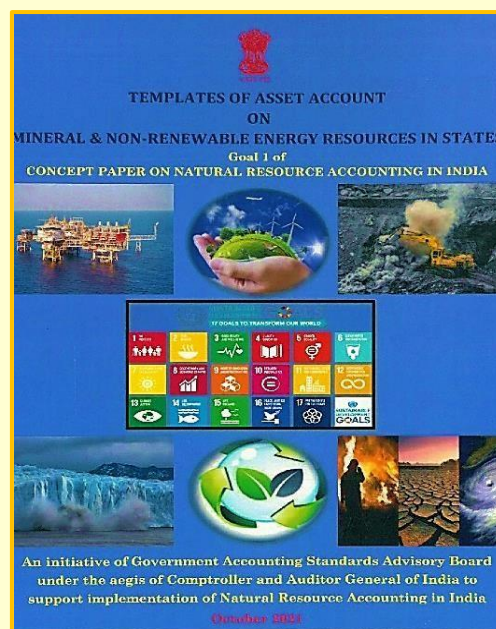
Close monitoring on illegal mining: The inter-operability of supply and use of resources and their incorporation in the system of preparation of Asset Accounts would

enable close watch on illegal mining. This will not only help in optimizing resource base but will also help in containing unscientific mining thereby aiding in conservational efforts and restricting environmental degradation due to unscientific and unsustainable mining activities.

Thus, to sum up, Asset Accounts-once compiled, would bring out State-wise mineral repository along with other inputs like actual stock of resources, usage pattern, their values - aiding in evidence-based policy framing and most importantly sustainability of resources for future generations.

2.6 Evolution of the final templates

The templates of Asset Accounts on Mineral and Energy Resources have been finalised after incorporating the comments of the Consultative Committee members and the experience gained in successful completion of pilots in three States. While the core framework as prescribed by the SEEA – CF has been retained, designs of the sub and detailed tables have been worked out based on country specific needs and other peculiarities besides constraints/data availability etc to capture data required for the core framework and also to serve as repository of an inclusive informative database for use by policy makers, stakeholders, academia and other interest groups. The templates, as they stood then, were released in the form of a book titled Templates of Asset Accounts on Mineral and Energy Resources in States in October 2021.



The formats were constantly updated with inputs and experiences gained through their implementation in the States from October 2021 through March 2022. The final formats included six tables for capturing the basic asset accounts (table 1), asset accounts on physical flows (table 2), physical flows of riverine resources (table 2A), valuation of riverine resources (table 2B), subsidiary asset accounts linking physical flows with valuation of resources (table 3), information on illegal mining (table 3A), analysis of extraction, production and dispatch of resources (table 4), collection under district mineral foundation (table 5) and the Progress in generation and use of renewable energy resources (table 6).

2.7 Additionalities – monitoring the targets committed to COP - 26

At the United Nations Climate Change Conference of 2021 or the COP 26, the Government of India committed the following:

1. India will take its non-fossil energy capacity to 500 GW by 2030.
2. India will meet 50 percent of its energy requirements from renewable energy by 2030.

3. *India will reduce the total projected carbon emissions by one billion tonnes from now till 2030.*
4. *By 2030, India will reduce the carbon intensity of its economy by more than 45 percent.*
5. *By the year 2070, India will achieve the target of Net Zero.*

In order to monitor the progresses to attain the above commitments, specific input table for collecting and collating information on progress on generation of new and renewable energy had been envisaged.

2.8 Consultative Process

To ensure wider consultation with diverse stakeholders, GASAB has constituted consultative group in GASAB headquarters consisting of ministries in Government of India, five State Governments and the Accountants General in these States, expert agencies like National Remote Sensing Centre (NRSC), The Energy and Resources Institute (TERI) etc. Idea of constituting the groups was to draw technical expertise and inputs from subject experts and academia while steering the implementation process following the action plans suggested in the Concept Paper, with special emphasis on the preparation of Asset Accounts on the Mineral and Energy Resources in the States.

2.9 Training and capacity building

As the Concept Paper envisaged commencement of the project from States, it was important that proper training and capacity building was ensured for the Officers and staff members of not only the Accountants General Offices but the State Government Departments as well. Accordingly, virtual trainings/workshops were continuously held over the time of implementation of the project.

2.10 Onboarding and handholding the States

In order to take the States on board as one of the most vital stakeholders in the implementation process, the highest echelons in the States were demi-officially informed (September 2021) by the Deputy CAG & Chairperson, GASAB about the endeavour of GASAB and vision of the project which was followed up with virtual presentations to the States. Seven virtual meetings were held in August – September 2021 covering 28 States. The views/suggestions emanating out of these meetings were taken into consideration in updating/modifying the templates.

CHAPTER - 3

INITIATIVES IN THE STATE

3.1 Formation of State NRA Cell

NRA Cell has been constituted in the State with joint representations from offices of the Principal Accountants General (Audit), (A&E) and representatives from the Department of Finance, Mining & Geology, Survey & Land Records, Forest & Wild Life, Economics & Statistics and Water Resources. Nomination from the Department of Environment & Climate Change is pending. Notification of the constitution of NRA Cell by the State Government is awaited (June 2023). List of Nodal Cell & Consultative Committee Members may be seen at **Annexure-I**.

3.2 Follow up, trainings and capacity building

3.2.1 Initiatives taken by the AsG Office.

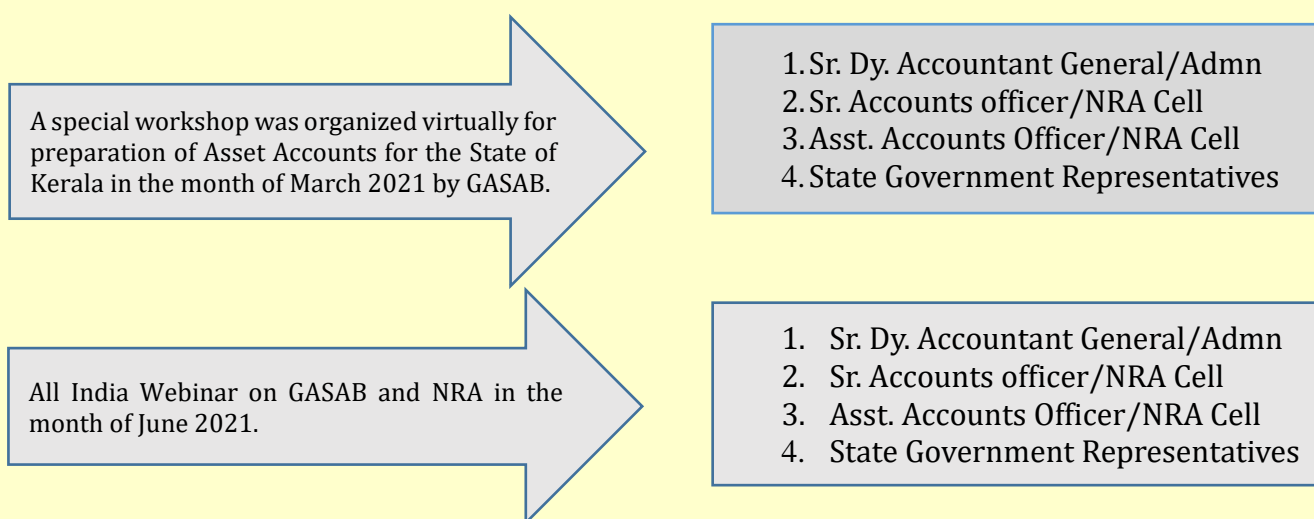
For taking NRA work forward, the teams from PAG Office visited the State Government Offices for obtaining data/information available with the concerned Departments.

1. The Directorate of Geology & Mining, Kerala has provided with the data on Opening Balance, Dispatch figure, Royalty figures, Rate of Royalty, Price per metric ton, Bifurcated data of extraction, District Mineral Foundation rates as required for preparation of Draft Asset Accounts.
2. Office of the PAG (A&E) was constantly pursuing the State Government for obtaining the information for the entire exercise from collection, compilation to validation of Asset Accounts.
3. The PAG (A&E) held meetings with the PAG (Audit) for the joint discussion on various issues related to NRA.
4. Virtual meetings chaired by the PAG (A&E) was organized with the Dy. Accountant General from Audit-II office in line of action for collection of data.
5. A virtual meeting chaired by the Sr. Dy. Accountant General/Admn was organized on 03/02/2022 with the State Government officers for regular data flow from 01/04/2022 for the Asset Account.
6. A joint meeting with the Officers/officials of State Government Department and Audit office was held on 18.05.2022 to apprise the revised guidelines for preparation of First Draft of Asset Account in the revised format, Timelines of Report, Submission of Quarterly Accounts to be implemented in the new system. Also discussed the constraints in Validating the Asset Accounts.

3.2.2 Training, Workshop & Capacity Building

Training/Workshops & Capacity Buildings for IA&AD/State Government Officials

GASAB has carried out capacity building workshops/ Webinars for IAAD and state Government officials. These workshops were very useful for field offices. Some of the Special Mentions are as follows:



3.3 Good practices

Taking forward the NRA, the Officers/Officials of NRA Cell from O/o PAG (A&E), Kerala visited State Government offices. These visits gave more clarity about the subject & benefitted State Government Offices to initiate data collection and adoption of methodology for preparation of Draft Asset Accounts. A workshop/training on data collection for preparation of Asset Accounts on Mineral and Energy Resources in States was conducted (February/ March 2022) in virtual mode.

The Senior Deputy Accountant General (Audit-II) convened (July 2022) a meeting with the Principal Secretary and the Director (Industries Department), Government of Kerala to make a permanent arrangement for the quarterly flow of data/ information for the preparation of NRA accounts. The Principal Secretary and the Director agreed to extend their co-operation for furnishing the required details. The State Government has provided the quarterly reports for the year 2022-23.

CHAPTER - 4

MINERAL PROFILE OF STATE AND SHORTLISTING OF RESOURCES

4.1 Mineral profile of Kerala

Kerala, the God's own Country, is famous for its natural scenic beauty. However, the State is relatively poor in mineral resources. Though deposits of minerals such as Heavy Mineral Sands (Ilmenite, Rutile, Zircon, Monazite, Sillimanite), Gold, Iron ore, Bauxite, Graphite, China Clay, Fire Clay, Tile and Brick Clay, Silica Sand, Lignite, Limestone, Lime shell, Dimension Stone (Granite), Gemstones, Magnesite, Steatite etc. have been identified in Kerala, Mining activities on large scale are confined mainly to a few minerals-Heavy Mineral Sands, China Clay and to a lesser extent limestone/lime shell, silica sand and granite.

4.2 Details of Mineral Resources/ Deposits in the State of Kerala and their strategic importance

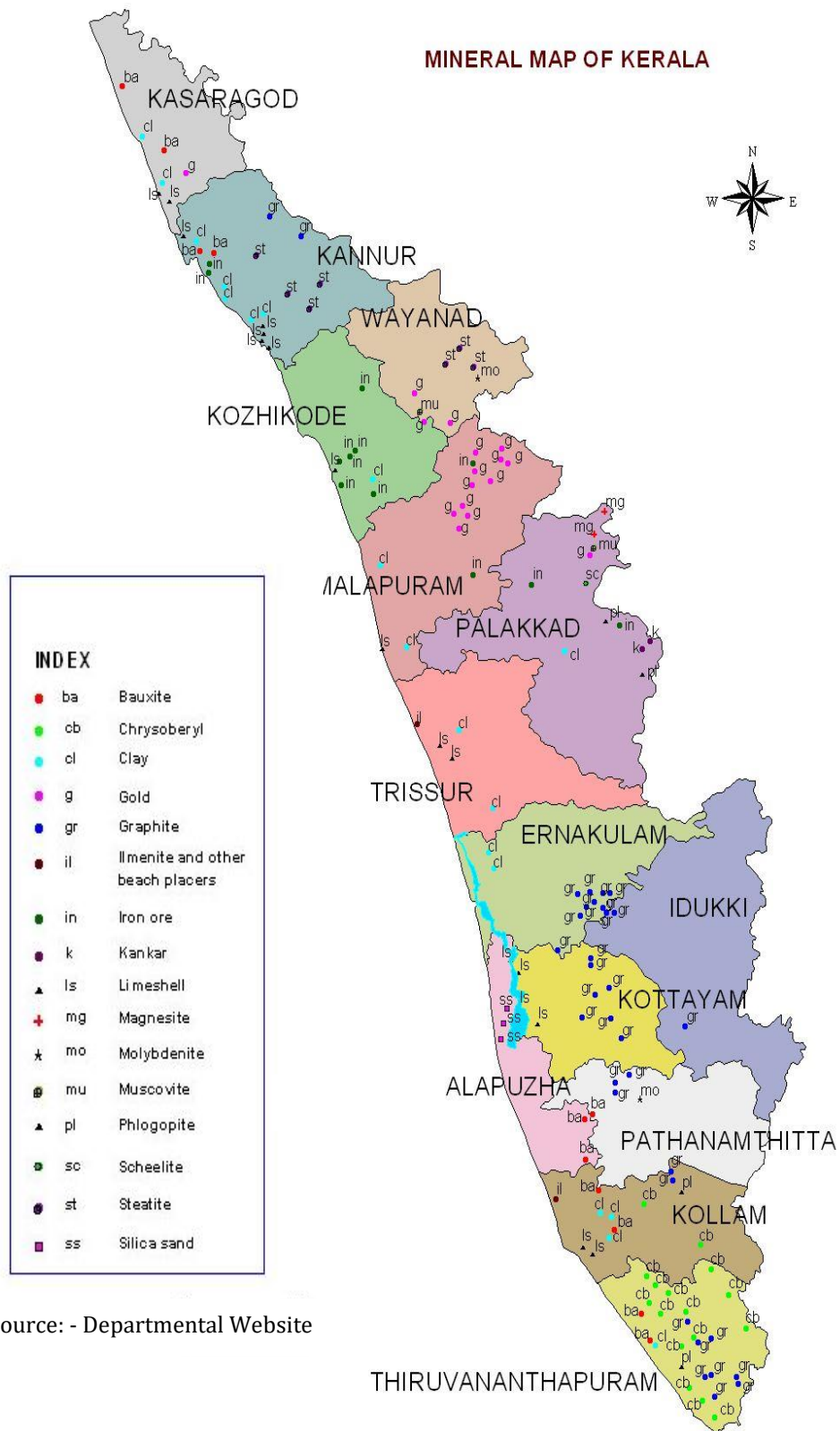
Mined Resources		
Sl. No.	Name of Mineral resource	Brief Description
1.	Mineral Sand	The Heavy Mineral Sand deposits in Kerala contain an assemblage of Ilmenite, Rutile, Leucoxene, Monazite, Zircon and Sillimanite. The State possesses one of the world class deposits of mineral sands in the coastal tracts between Neendakara and Kayamkulam.
2.	Silica Sand	The coastal tract between Alappuzha and Aroor in Alappuzha District contain extensive deposits of silica sand. The best deposits are confined to the narrow strip of land sandwiched on either side by Vembanad lake and stretching from Cherthala to Arookutti over a distance of about 35 km. Besides, there are also smaller deposits in other districts of Kerala.
3.	Graphite	Graphite occurs in nature in the form of vein, dissemination (flaky) and amorphous variety. The first two types of occurrences are found in Kerala. The vein - type graphite mined earlier around Veli, Vellanad and Changa is confined only to the Thiruvananthapuram district.
4.	China Clay	Kerala has the highest reserve of high grade china clay among all the clay producing States of India. China clay in Kerala is confined to two southern districts (Thiruvananthapuram and Kollam) and two northern districts (Kasaragod and Kannur).

5.	Lime Shell	The State is deficient in high-grade lime shell. Consequently, the requirement of lime for chemical industry is depended on the lime shell resources occurring in the backwaters/estuaries, river mouths and lagoons along the coastal tract. By far the largest reserves of lime shell are known to occur in Vembanad lake and adjoining portions comprising parts of Alappuzha, Ernakulam and Kottayam Districts.
6.	Lime stone	Lime stone can be broadly classified into Crystalline Limestone (only a few bands of crystalline limestone in Palakkad and Idukki districts have been located), Kankar Limestone (Limestone of Kankar variety has been reported from Chittoor- Kozhinjampara area in Palakkad district), Fossiliferous Limestone (Fossiliferous Limestone is known to occur in various parts of Kollam district such as Kallurkadavu, Mughathala, Kannanallur, Kottiyam, Mayyanad, and Nedumangad and Edava in Thiruvananthapuram district).
7.	Granite	Granite belt of Kerala can be classified by its geologic setting into three categories. Charnockite-Khondalite belt of Thiruvananthapuram, Kollam, Pathanamthitta and Kottayam districts (colour ranges from pale green with mottled red, bluish green with cordierite, deep dark green, greyish white). True intrusive or anatectic granites and associated migmatites of Proterozoic age from Idukki, Palakkad, Kannur, Kasargod and Wayanad districts (colour: Pink, light pink, Gray, yellowish white and bluish pink with wavy patterns). Dolerite-Gabbro dykes, Proterozoic intrusive hypabasal dyke swarms from Kottayam, Palakkad, Malappuram and Kozhikode districts (colour: dark greenish blue, black and dark gray with black spots).
8.	Tile and Brick Clay	There are about 400 tile factories and about 5,000 brick kilns spread over the entire state to manufacture tile and bricks. The vast resources of alluvial clays in the paddy land and valley fill areas are used by this industry in the State. Clays available for the manufacture of tiles are mostly found in the districts of Thrissur, Kozhikode, Ernakulam, Kollam, Thiruvananthapuram, Kannur and Palakkad Districts.

Un-Mined Resources		
Sl. No.	Name of Mineral resource	Brief Description
1.	Gold	Gold mineralization is observed in the Wayanad, Kozhikode, Malapuram and Palakkad. However, prospects for viability for exploitation and mining is yet to be explored.
2.	Iron Ore	Five iron ore deposits of banded magnetite quartzite type have been identified in Kozhikode District and one in Malappuram District. Geological Survey of India/Department of Mining and Geology, National Mineral Development Corporation (NMDC) and United Nations assisted Kerala Mineral Exploration & Development Project have explored the deposits of iron ores in these areas.
3.	Bauxite	Bauxite deposits of economic significance in south Kerala are a few and are located at Sooranad, Vadakkumuri, Chittavattom, and Adichanallur in Kollam district and Mangalapuram, Chilambil, Sasthavattom and Attipra areas of Thiruvananthapuram district.
4.	Fire Clay	The inferred reserve of fire clay stands at 11.50 million tonnes. However, this resource is waiting to be exploited.
5.	Magnesite	A total possible reserve of 0.037 million tonnes has been estimated in Mulli-Salayur areas, Attappadi in Palakkad District by the Department of Mining and Geology.
6.	Steatite/Talc	It is consumed in many manufacturing industries of paper, insecticide, textile, fertilizers, ceramics, rubber products, cement, asbestos etc. Several steatite occurrences have been identified in Thalassery Taluk of Kannur district.

Source: - Departmental Website.

Geographical distribution of Minerals in the State of Kerala



4.3 Mining process followed in the State

Mining in Kerala are confined mainly to a few Minerals-Heavy Mineral Sands, China Clay and to a lesser extent limestone/lime shell, silica sand and granite. The Department of Mining and Geology is the Statutory Body under the Industries Department of Kerala for mineral exploration, prospecting and administration. There are two divisions in the Department Namely Exploratory and Prospecting Division and Mineral Development and Mining Leases Division. The functions of the Exploratory and Prospecting Division include preliminary and detailed geological mapping, trenching, pitting, drilling, sampling and chemical analysis and mineral identification of samples. The Mineral Development and Mining Leases Division is responsible for the implementation of Mines and Minerals (Regulation and Development) Act, 1957, The Mineral Concession Rules, 1960 and the Kerala Minor Mineral Concession Rules, 1967. This function is being executed through 14 District Offices, and 3 Kerala Mineral Squads (Southern, Central and Northern Region) with their headquarters at Thiruvananthapuram, Thrissur and Kozhikode respectively.

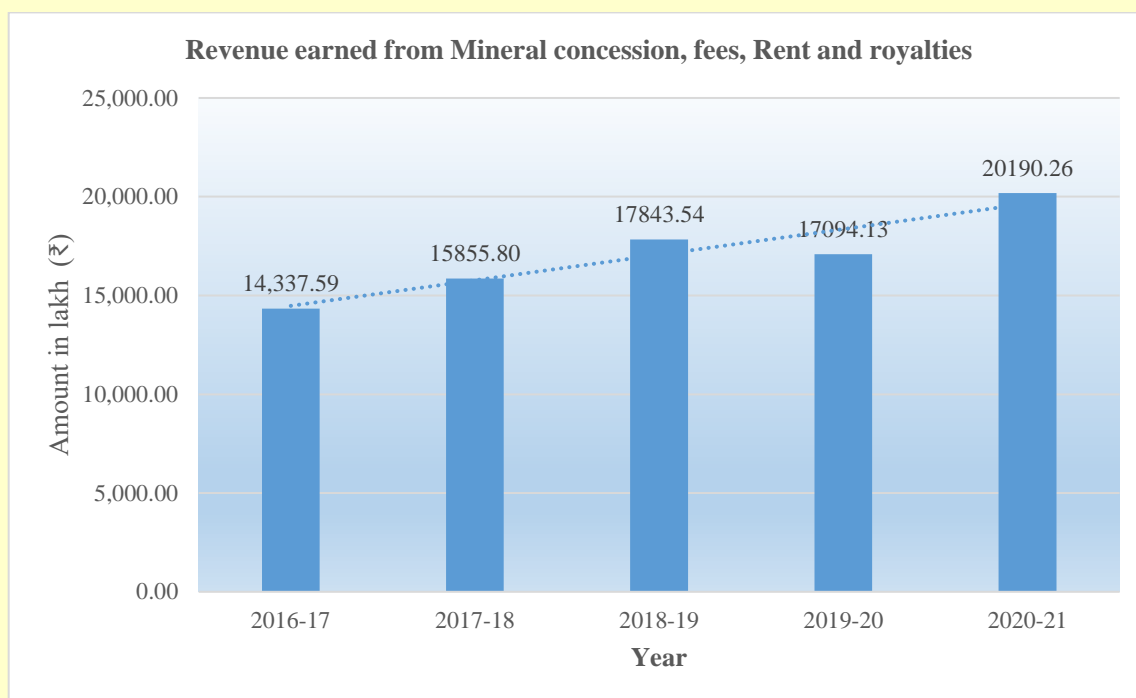
The main activities of Mineral Development and Mining Lease Division are as follows:

- 1) Recommending to State Government to grant/renewal of mining leases and prospecting licenses in respect of major minerals.
- 2) Grant/renewal of quarrying permits, quarrying leases and dealer's licenses in respect of major minerals.
- 3) Inspection of mines and quarries and enforcement of relevant rules and regulations by virtue of the powers vested with it under the Mines and Minerals (Development & Regulation) Act, 1957, the Mineral Concession Rules, 1960 and the Kerala Minor Mineral Concession Rules, 1967.
- 4) Collection of revenue on both major as well as minor minerals.
- 5) Curbing of illegal mining and clandestine movement of minerals.
- 6) Attending to court cases in connection with mining and movement of minerals.
- 7) Collection of data on production/sales/consumption of major and minor minerals and furnishing the required information to government of India and other Central/ State institutions.

4.4 Contribution of mineral resources in the revenues of the State

The growth rate of income from mining and quarrying sector in Kerala has been fluctuating over the years. The revenue from minerals is mainly by way of royalty. About 95 *per cent* of the revenue comes from minor minerals and rest from major minerals. The highest revenue received among major minerals was from Ilmenite and Zircon. Among minor minerals, granite building stone contributes the highest followed by granite dimension stone. After registering a growth of revenue for three years from 2016-17 to 2018-19, it declined by 4.19 *per cent* in 2019-20. In 2020-21, income from mining and quarrying sector grew by 18.11 *per cent* to 201.90 crore. The overall receipts of the State to total non-tax receipts was 11.01 *per cent* during the year 2020-21.

The revenue received by the Government under the head Mineral concession, fees, rents and royalties for the period 2016-17 to 2020-21 as detailed below: -



4.5 Short-listing of resources for this study

The Asset Account covered all the mined resources in the State (8 major minerals and 11 minor minerals) for the year 2020-21. The compiled data was validated by the State Government and verified by the Audit Office in a limited manner based on the records made available.

CHAPTER - 5

ASSET ACCOUNT OF MINERAL AND ENERGY RESOURCES OF KERALA

5.1.1 Scope

The present study covers the period 2020-21 and all the mined minerals in the State of Kerala both Major (8 resources) and Minor minerals (11 resources) and energy resources are selected for the study.

5.1.2 Objectives

The objectives of the study are as follows:

- To prepare the Asset Account of mineral and energy resources of the State for better monitoring of resource extractions, usage, contain illegal mining and revenue optimization in the interest of the State.
- To assist the Country/State in attaining the international commitment on becoming SEEA framework compliant and for effectively mapping the SDG indicators.
- To assist the policy makers with comprehensive data-set on availability, usage and sustainability of mineral for evidence-based decision making.
- To provide inputs for monitoring the progresses towards national commitment made at the COP 26 and increase in generation and usage of renewable energy resources.

5.1.3 Methodology of data collection and compilation of physical flows

Data is collected from the reports of Finance Accounts of A&E and directly from the Departments concerned.

The compiled data was validated by the State Government and verified by the Audit Office in a limited manner based on the records made available.

5.1.4 Methodology of monetisation of physical flows

Two-pronged valuation of physical flows, i.e., revenues and average market prices have been adopted. Importance of these two aspects to enable analysis of the royalty rates vis-à-vis the market prices to ensure there is no loss to State exchequer.

State Government Departments/Indian Bureau of Mines has provided the data and the information is collected from the websites of the Department concerned and through visit to these offices.

5.1.5 Dual stage validation and limited verification of data

Dual stage validation, first by the State Government and thereafter limited verification by the Audit Office has been followed to validate the Asset Accounts on Mineral and Energy Resources in the State.

5.1.6 Challenges and limitations

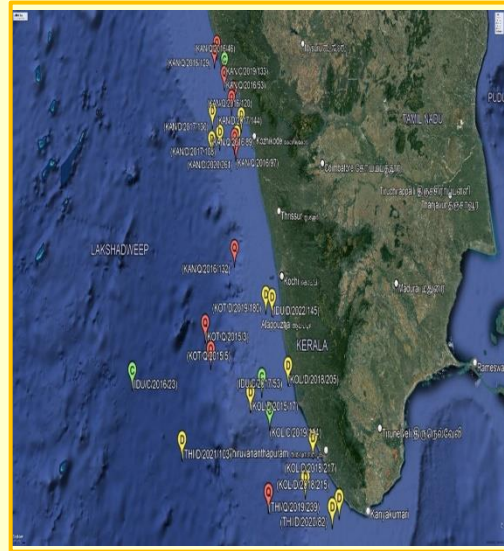
The absence of ready availability of data and the difficulties faced in the confirmation of figures from the districts were experienced during the process.

5.2 Asset Accounts on Mineral & Energy Resources

5.2.1 Highlights

The following issues were noticed in the Implementation of Kerala Online Mining Permit Awarding Services (KOMPAS).

1. Geo tagging of mines in the KOMPAS portal were seen erroneous. On a test check of geo coordinates of all the quarries, depots, crusher units etc. for the Kollam District available in KOMPAS portal, it was seen that one concession and four depots in Kollam District are plotted in the Arabian Sea. Further, two quarries and a depot in Kollam District are seen plotted in the State of Tamil Nadu.
2. E-office is not implemented and KOMPAS portal implementation is not completed in the squad offices.
3. Squad office was not using coordinates data from the KOMPAS portal plotted in google earth to find out the excess mining, if any, especially outside the boundary coordinates and buffer zones.
4. There was no monitoring or stipulation regarding the use of the KOMPAS portal and google earth data for inspection and monitoring of the leasing system as well as illegal mining.
5. The geo-tagged mineral map of the State is not maintained in the Department.



5.2.2 Asset Account – the tables

The Asset Accounts on Mineral and Energy Resources are brought out in six tables. The list of tables and its nomenclature are as detailed in below:

Table Number	Name of the Table
1	Basic asset account on Mineral and Energy Resources
2	Asset accounts on physical flows of Mineral and Energy Resources along with sustainability of resources
2A	Physical flows of riverine resources (*)
2B	Valuations of riverine resources (*)
3	Mineral and Energy Resources with valuation of resources
3A	Information on illegal mining
4	Analysis of extraction, production and dispatch of resources (#)
5	Analysis of District Mineral Foundation
6	Progress in generation and use of renewable energy resources

(*) Not included as Sand mining from rivers not done since 2016 due to want of Environmental clearance based on the SO.141(E) dated 15th January 2016, Amendments in the Environment Impact Assessment Notification, 2006.

(#) Not included as the breakup of extraction, production and dispatch for major minerals was not readily available.

TABLE- 1

Basic Asset Account on Mineral & Energy Resources (Major minerals)

Major Minerals								
Name of Minerals	Ilmenite	Leucoxene	Rutile	Zircon	Sillimanite	Monazite	Lime Shell*	Lime Stone
	<i>(in tonnes)</i>							
Opening stock of environmental asset (01.04.2020) ***	3835290	13767	204689	487299	710407	10135	NA	8950000
Growth in stock	NA	NA	NA	NA	NA	NA	NA	NA
Discoveries of new stock	NA	NA	NA	NA	NA	NA	NA	NA
Upward reappraisals	NA	NA	NA	NA	NA	NA	NA	NA
Reclassifications	NA	NA	NA	NA	NA	NA	NA	NA
Total addition of stock	NA	NA	NA	NA	NA	NA	NA	NA
Reduction of stock								
Extractions during 2020-21***	113800	42	2481	6316	13580	0	400	312735
Normal loss of stock	NA	NA	NA	NA	NA	NA	NA	NA
Catostrophic losses	NA	NA	NA	NA	NA	NA	NA	NA
Downward reappraisals	NA	NA	NA	NA	NA	NA	NA	NA
Reclassification	NA	NA	NA	NA	NA	NA	NA	NA
Total reduction in stock	113800	42	2481	6316	13580	0	400	312735
Revaluation of stock	NA	NA	NA	NA	NA	NA	NA	NA
Closing stock of environmental assets(31.03.2021)	3721490	13725	202208	480983	696827	10135	NA	8637265
*used for industrial purpose; **used for domestic purpose								
*** Source-Directorate of Mining & Geology								
NA-Not Available								

TABLE- 1

Basic Asset Account on Mineral & Energy Resources (Minor minerals)

Minor Minerals											
Name of Minerals	Granite Building Stone	Granite Dimension Stone	Laterite (Building)	Laterite (Cement)	River Sand	Ordinary Sand	Lime Shell**	Ordinary Earth	Brick Clay	China Clay	Silica Sand
	(in tonnes)	(in Cum)	(in tonnes)								
Opening stock of environmental asset (01.04.2020)***	556002662	112144	680626	615200	NA	NA	NA	NA	NA	5699411	359211
Growth in stock	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discoveries of new stock	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Upward reappraisals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Reclassifications	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total addition of stock	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Reduction of stock											
Extractions during 2020-21***	36327007	1106	456114	56417	0	213604	747	6970371	138540	180300	16648
Normal loss of stock	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Catostrophic losses	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Downward reappraisals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Reclassification	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total reduction in stock	36327007	1106	456114	56417	0	213604	747	6970371	138540	180300	16648
Revaluation of stock	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Closing stock of environmental assets(31.03.2021)	519675655	111038	224512	558783	NA	NA	NA	NA	NA	5519111	342563
*used for industrial purpose; **used for domestic purpose											
*** Source-Directorate of Mining & Geology											
NA-Not Available											
The opening balance of Ordinary Sand, Lime Shell, Ordinary Earth and Brick Clay were not readily available.											

TABLE-2

Asset Accounts on physical flows of Mineral and Energy Resources along with sustainability of resources

Classification	Sub-classification/ UNFC Code	Unit	Opening stock of proved reserves as on 01.04.2020***	Addition to stock	Reduction in stock during 2020-21***				Closing stock of proved reserves as on 31.03.2021	Sustainability of resources in years
					Extracted by/for		Other extractions	Total extraction		
					Govt Sector	Private Sector				
Major Minerals	Ilmenite	Tonnes	3835290	NA	113800	0	0	113800	3721490	32.70
	Rutile	Tonnes	204689	NA	2481	0	0	2481	202208	81.50
	Zircon	Tonnes	487299	NA	6316	0	0	6316	480983	76.15
	Sillimanite	Tonnes	710407	NA	13580	0	0	13580	696827	51.31
	Leucoxene	Tonnes	13767	NA	42	0	0	42	13725	326.79
	Monazite	Tonnes	10135	NA	0	0	0	0	10135	NA
	Lime Shell*	Tonnes	NA	NA	0	400	0	400	NA	NA
Lime Stone	Tonnes	8950000	NA	312735	0	0	312735	8637265	26.72	
Minor Minerals	Granite Building Stone	Tonnes	556002662	NA	0	36327007	0	36327007	519675655	14.31
	Granite Dimension Stone	Cum	112144	NA	0	1106	0	1106	111038	100.40
	Laterite (Building)	Tonnes	680626	NA	0	456114	0	456114	224512	0.49
	Laterite (Cement)	Tonnes	615200	NA	0	56417	0	56417	558783	9.90
	China Clay	Tonnes	5699411	NA	0	180300	0	180300	5519111	30.61
	Silica Sand	Tonnes	359211	NA	0	16648	0	16648	342563	20.58
	River Sand	Tonnes	NA	NA	0	0	0	0	NA	NA
	Ordinary Sand	Tonnes	NA	NA	0	213604	0	213604	NA	NA
	Lime Shell**	Tonnes	NA	NA	0	747	0	747	NA	NA
	Ordinary Earth	Tonnes	NA	NA	0	6970371	0	6970371	NA	NA
Brick Clay	Tonnes	NA	NA	0	138540	0	138540	NA	NA	
Other resources, if any	NA									
NA-Not available										
Sector-wise (Government/Private/Other extractions) data not readily available with the Directorate of Mining & Geology.										
*Used for industrial purpose; **used for domestic purpose; ***Source-Directorate of Mining & Geology										

for the year 2020-21

TABLE- 3

Subsidiary Asset Accounts linking detailed physical flows in respect of Mineral and Energy Resources with the valuation of resources.

Particulars	Classification/Sub-classification of minerals(as per the priorities of the State Governments)/ UNFC Code	Unit	Physical Unit (in tonnes/cum) extracted showing Govt. Private and other Sector				Rate of Royalty(in `)***	Valuation of resources					
								Revenue receivable (` in crore)			Total revenue receivable (` in crore)	Average Market Price ***	Average Market Value(`.in crore)
Opening stock/availability of resources as on 01.04.2020***	Major Minerals		Govt.	Private	Other sector	Total Reserves		Govt.	Pvt.	Other sector			
	Ilmenite	Tonnes				3835290	271				103.94	13550.00	5196.82
	Leucoxene	Tonnes				13767	1023				1.41	51150.00	70.42
	Rutile	Tonnes				204689	1800				36.84	90000.00	1842.20
	Zircon	Tonnes				487299	2142				104.38	107100.00	5218.97
	Sillimanite	Tonnes				710407	350				24.86	14000.00	994.57
	Monazite	Tonnes				10135	125				0.13	NA	NA
	Lime Shell*	Tonnes				NA	80				NA	NA	NA
	Lime Stone	Tonnes				8950000	90				80.55	550.00	492.25
	Minor Minerals												
	Granite Building Stone	Tonnes				556002662	24				1334.41	600.00	33360.16
	Granite Dimension Stone	Cum				112144	6000				67.29	24000.00	269.15
	Laterite(Building)	Tonnes				680626	24				1.63	500.00	34.03
	Laterite(Cement)	Tonnes				615200	95				5.84	1050.00	64.60
	River Sand	Tonnes				NA	40				NA	NA	NA
	Ordinary sand	Tonnes				NA	40				NA	NA	NA
	Lime Shell**	Tonnes				NA	75				NA	NA	NA
	Ordinary earth	Tonnes				NA	20				NA	NA	NA
	Brick Clay	Tonnes				NA	40				NA	NA	NA
	China Clay\$	Tonnes				5699411	50				28.50	800.00	455.95
	Silica Sand	Tonnes				359211	250				8.98	3300.00	118.54

for the year 2020-21

Particulars	Classification/Sub-classification of minerals(as per the priorities of the State Governments)/ UNFC Code	Unit	Physical Unit (in tonnes/cum) extracted showing Govt. Private and other Sector				Rate of Royalty(in `)***	Valuation of resources					
								Revenue receivable (in crore)			Total revenue receivable (in crore)	Average Market Price ***	Average Market Value(in crore)
Additions for the year 2020-21													
Growth in Stock						NA							
Discoveries of new stock						NA							
Reclassification						NA							
Total Addition						NA							
Actual reductions during the year 2020-21													
Extractions as reported by the State Government Department of Geology and Mining(on recovery of Royalty, Cess, Fees NPV etc)	Major Minerals												
	Ilmenite	Tonnes	113800			113800	271				3.08	13550	154.2
	Rutile	Tonnes	2481			2481	1800				0.45	90000	22.33
	Zircon	Tonnes	6316			6316	2142				1.35	107100	67.64
	Sillimanite	Tonnes	13580			13580	350				0.48	14000	19.01
	Leucoxene	Tonnes	42			42	1023				0	51150	0.21
	Monazite	Tonnes				0	125				0	NA	NA
	Lime Shell*	Tonnes		400		400	80				(@)	NA	NA
	Lime Stone	Tonnes	312735			312735	90				2.81	550	17.2
	Minor Minerals												
	Granite Building Stone	Tonnes	0	36327007	0	36327007	24				87.18	600	2179.62
	Granite Dimension Stone	Cum	0	1106	0	1106	6000				0.66	24000	2.65
	Laterite (Building)	Tonnes	0	456114	0	456114	24				1.09	500	22.81
	Laterite (Cement)	Tonnes	0	56417	0	56417	95				0.54	1050	5.92

Particulars	Classification/Sub-classification of minerals(as per the priorities of the State Governments)/ UNFC Code	Unit	Physical Unit (in tonnes/cum) extracted showing Govt. Private and other Sector				Rate of Royalty (in `)***	Valuation of resources					
								Revenue receivable (in crore)			Total revenue receivable (in crore)	Average Market Price ***	Average Market Value(in crore)
	River sand	Tonnes	0	0	0	0	40				0	NA	NA
	Ordinary Sand	Tonnes	0	213604	0	213604	40				0.85	NA	NA
	Lime shell**	Tonnes	0	747	0	747	75				(@)	NA	NA
	Ordinary Earth	Tonnes	0	6970371	0	6970371	20				13.94	NA	NA
	Brick Clay	Tonnes	0	138540	0	138540	40				0.55	NA	NA
	China clay\$	Tonnes	0	180300	0	180300	50				0.9	800	14.42
	Silica Sand	Tonnes	0	16648	0	16648	250				0.09	3300	5.59
Other extractions not taxed (if any)						NA							
Normal reductions in stock						NA							
Catastrophic losses including natural and man-made disasters						NA							
Downward reappraisals						NA							
Reclassification						NA							
Production loss						NA							
Exports						NA							
Reduction due to mining activities not approved by Departments													
						NA							
Closing Stock as on 31.03.2021	Major Minerals												
	Ilmenite	Tonnes				3721490	271				102.58	13550	5042.62

for the year 2020-21

Particulars	Classification/Sub-classification of minerals(as per the priorities of the State Governments)/ UNFC Code	Unit	Physical Unit (in tonnes/cum) extracted showing Govt. Private and other Sector				Rate of Royalty(in `)***	Valuation of resources					
								Revenue receivable (` in crore)			Total revenue receivable (` in crore)	Average Market Price ***	Average Market Value(` in crore)
Closing Stock as on 31.03.2021	Rutile	Tonnes				202208	1800				36.69	90000	1819.87
	Zircon	Tonnes				480983	2142				103.77	107100	5151.33
	Sillimanite	Tonnes				696827	350				24.77	14000	975.56
	Leucosene	Tonnes				13725	1023				1.41	51150	70.2
	Monazite	Tonnes				10135	125				0.13	NA	NA
	Lime Shell*	Tonnes				NA	80				NA	NA	NA
	Lime Stone	Tonnes				8637265	90				79.95	550	475.05
	Minor Minerals												
	Granite Building Stone	Tonnes				519675655	24				1292.53	600	31180.54
	Granite Dimension Stone	cum				111038	6000				67.14	24000	266.49
	Laterite (Building)	Tonnes				224512	24				0.46	500	11.23
	Laterite (Cement)	Tonnes				558783	95				5.69	1050	58.67
	River sand	Tonnes				NA	40				NA	NA	NA
	Ordinary Sand	Tonnes				NA	40				NA	NA	NA
	Lime shell**	Tonnes				NA	75				NA	NA	NA
	Ordinary Earth	Tonnes				NA	20				NA	NA	NA
	Brick Clay	Tonnes				NA	40				NA	NA	NA
	China clay\$	Tonnes				5519111	50				28.04	800	441.53
	Silica Sand	Tonnes				342563	250				8.89	3300	113.05
(@)-Negligible; NA-Not Available; #Source of data-State Finance Accounts (HOA-0853-Non-ferrous Mining and Metallurgical Industries-102-Mineral Concession, Fees, Rents and Royalties)													
Revenue related to exploitation of resources out of total revenue included in Statement 14 of State Finance accounts - ₹201.90 crore. This includes ₹67.12 Crore on illegal mining.													
Source: - State Finance Accounts (HOA-0853-Non-ferrous Mining and Metallurgical Industries-102-Mineral Concession, Fees, Rents and Royalties)													
*Used for industrial purpose;**used for domestic purpose;***Source of data-Directorate of Mining & Geology.													
\$Average Market Price extends from Rs.400 to Rs.1200, hence Rs.800 the average value is taken.													

Table 3A
Tables showing information on illegal mining (₹ in crore)

Name of the district	Authority which detected the offence (dept/Police/ Enforcement/ Others)	Detection of illegal mining by the departmental authorities on which challans issued and offence report registered				
		Name of the Minerals with grade	Physical quantity /Volune	Revenue involved	Amount recovered	Provisions under which compounding done
					67.12	

Table 5
Tables showing analysis of District Mineral Foundation (₹ in crore)

Name of Mine/ Mineral/District	Volume of Minerals on which DMF was realizable	Rate at which DMF realizable	Total DMF realizable (₹)	Total DMF realized (₹)	Variations if any	
					In %	Percentage
Thiruvananthapuram				1.146	0	0
Kollam				2.234	0	0
Pathanamthitta				0.874	0	0
Alappuzha				0.013	0	0
Kottayam				0.432	0	0
Idukki				0.199	0	0
Ernakulam				1.081	0	0
Thrissur				0.729	0	0
Palakkad				1.922	0	0
Malappuram				1.036	0	0
Kozhikode				0.506	0	0
Wayanad				0.071	0	0
Kannur				0.493	0	0
Kasaragod				0.097	0	0
Total				10.833	0	0

Table 6
Progress in generation and use of renewable energy resources

Sector	Energy requirement by sector during the year (in MU)	Total energy requirement in the State (in MU)	Generation/additional generation of energy during the year (in MU)						Percentage share of non-renewable energy resources vis-a-vis total requirement	
			Non-renewable (N/R) Energy/ Fossil fuel sources (MU)	Renewable energy (MU)						
				Solar	Wind	Hydel	Others (*)	Total	NRE	RE
Industries	3827.00									
Domestic	12716.47									
Agriculture	412.22									
Commercial	4171.66									
Traction & Railways	150.94									
Others	873.31									
Total	22151.60 \$	22151.60	7.845	368.88	137.60	7206.58 (#)		7713.06 (#)		34.82%
\$ Excluding open access and energy adjusted from captive generation.										
Consumption excluding Bulk licensee, Open Access and Hydro = 14130.74MU										
* Others include Bio Mass waste to energy, Geo-thermal etc.										
(Source: Office of the Dy. Chief Engineer, Tariff and Regulatory Affairs Cell, Kerala State Electricity Board Ltd., Thiruvananthapuram).										
(#) Note: - Additional information of 6553.57 MU of large hydro generation is added to 1159.48 MU reported in the Compendium of Asset Accounts released by GASAB										

5.2.3 Findings of the study

- Periodical review and fixation of rates/royalties' vis-a vis the market rates were not seen done by the Department.
- Compilation of data/ information regarding the resources in the State was not seen maintained in an organised/ proper form in the Department.
- State's generation of renewable energy resources vis-à-vis total requirement during the year was 34.82 *per cent*.
- State Government provided all inputs on opening balance, extraction, royalties and average market prices which aided in the preparation of the accounts. However, the State Government did not readily have the opening balances of Lime Shell, Ordinary Sand, Ordinary Earth and Brick Clay.
- The Sustainability of resources ranged between 1 year to 327 years.
- Variation between the royalties and market prices ranging between 300 and 4900 *per cent*

5.2.4 Recommendations

- Proper Geo tagging of mines in KOMPAS portal.
- Implementation of e-office and KOMPAS portal in squad offices.
- Preparation of Mineral Map of State with GPS co-ordinates.
- Modification of KOMPAS portal for generation of reports on requirements in auto mode.
- Periodical review of the fixation of rates by State Government is needed to fill the gap between the royalties levied and the market rates of the minerals extracted.
- Management information system may be implemented to make available ready information/ data on mineral resources/ exploitation/ use/ transport.
- Variations between the figures of State Government Departments and those maintained by the IBM needs reconciliation.
- To provide opening balance of Lime Shell, Ordinary Sand, Ordinary Earth and Brick Clay.

CHAPTER 6

FUTURE CONTINUITY PLAN

6.1 Guidelines / SoPs issued by GASAB

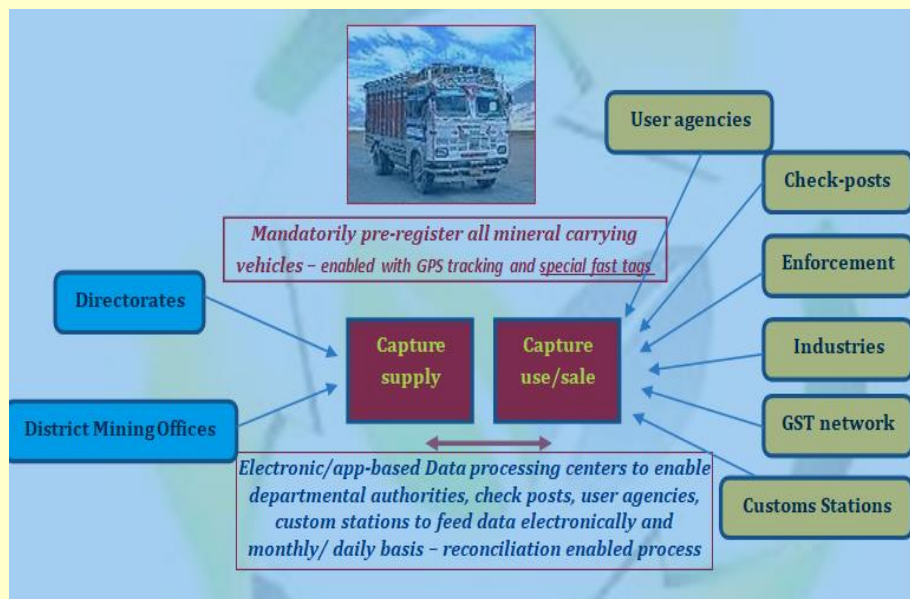
Asset Accounting process for Mineral and Energy Resources is to be a continuous process now onwards. Hence, there is a need for instituting systems and procedures for regularly capturing the data on physical flows of resources, while other inputs like addition in stock, average revenues, market prices, extractions not approved by the DMG and subsequently detected by various agencies could be collected from different sources while finalizing the Asset Accounts.

GASAB has issued Guidelines/SoPs in June 2022 suggesting methodologies for quarterly reporting framework and novel initiative of mapping the supply and use of resources. These will ensure timely collection and collation of data for the Asset Accounts. The mapping of supply and use of resources will enable 360 degrees profiling of mineral extraction and their use for effective management and optimisation of resources for the State exchequer. These are discussed in the succeeding paragraph.

6.2 Need for mapping the supply and use/sale/export.

Revenues from Minerals and Energy Resources consists of substantial part of State's receipt and largely help the entities welfare fund and other planned activities of the State. Hence, it is imperative to implement cross-verification mechanism to prevent misuse of resources and optimize revenue yields from exploitation of minerals. A robust framework must be put in place to ensure zero tolerance on resource and revenue pilferage.

A suggested mechanism for enhancing the control measures for optimizing monitoring on resource sale/use/consumption for better resource management and revenue yields to be adopted as per the following flowchart:



Source: GASAB

The DMG agreed to furnish the data as envisaged in the guidelines circulated by GASAB and issued a memo to all District Offices to furnish the required information and required change management in e-permit system is in process.

6.3 Quarterly Reporting Framework.

From the April 2022, the quarterly reporting framework for Asset Account on Minerals and Energy Resources has to be implemented as suggested by the GASAB.

The DMG has agreed to implement the quarterly reporting framework for the Asset Account from April 2022. Prescribed formats have been circulated to District Offices to submit their information on asset account on quarterly basis to DMG.

At present, the DMG will collect the information from all District Offices and submit the quarterly report to AG office manually. A meeting was held with Joint Director, DMG and all the points were discussed in detail for the preparation of Asset Account for the year 2021-22 and report for quarter ending June 2022. The department has assured their full co-operation in this regard.

6.4 Recommendations for improving management of mineral and energy resources of the State and optimization of revenue yields therefrom

The following approaches are recommended to make the system robust and inclusive in the best interest of conservation, sustainability of resources, optimisation of revenues for the State exchequer.

a) Statutory approach

- The State as part of enhanced statutory controls over mining activities, extractions/ productions/ dispatch and revenue yields should automate the e-permit system, with bar-coding of permits real time information sharing on permits issued pre-registration, GPS tagging of carriage vehicles with unladen weight and special fast tags for easy monitoring of minerals carried at the weigh bridges.
- The State may consider making it mandatory for the check posts (both intra and inter-State/customs check posts at international borders)/receiving points at industries to e-verify the permits – making them invalid for re-use. Else, movement/receipt should be allowed only upon full payment of royalty, fees, fines, etc.
- The State may consider enacting laws for making the lease holders/their personnel, departmental officials, industries/their personnel authorised to receive produces - personally liable for recovery of royalty, fees, fines, etc., in cases of movement/acceptance/consumption of minerals without valid permits/multiple use of permits. Also, enhancing the nature and quantum of penal measures to act as high deterrent on illegal mining activities.
- The State may consider introducing rewards scheme in the lines as prevalent in Central Excise and Customs Department for suitably rewarding the informers/Officers/whistle blowers leading to detection of illegal mining.

b) Other approach:

The following could consist of the probable steps (in addition to those taken/being taken by the States) leading to a complete monitoring mechanism on usage/sale of mineral produces.

- Statutory interventions for ensuring strict monitoring on permitted mining activities and deterring illegal mining and their sale/use as discussed under statutory approach.
- Mapping the contact points through which minerals are passed within and outside the State/country, user agencies, consuming industries, wholesale/bulk selling points (getting them registered similar to the practice in Forest Department to register the sawing mills).
- Establishing seamless flow of information from these sources to the Directorates managing the resources on usage and sale of resources and their continuous validation vis-à-vis the e-permit system.
- Installing systems for automated verification mechanisms as above to raise red flags on unauthorised supply/consumption of minerals – issuing notice for further action.

For further detail recommendation in Chapter VII of compendium of Asset Accounts on Mineral and Energy Resources released by GASAB in October 2022 may be referred (<https://gasab.gov.in/gasab/pdf/Compendium-of-Asset-final.pdf>)

c) Need for GPS/geo-tagged district-wise mineral maps

The GPS/geo-tagged district-wise mineral map would help in consolidation at the national level for providing precise data on availability of resources across the country along with their pace of extractions, revenue generations, market values, available stock of resources. Mine and Resource wise collection of GPS co-ordinates will help in creation of resource-wise maps by each States with mine indicators as per their GPS co-ordinates.

Gradually, other data sets like that of Indian Bureau of Mines, Directorate of Hydrocarbons, etc. could be possible to be mapped into these GPS enabled mapping system for resources. Requisite mapping could be enabled navigating the readers to the latest Asset Accounts providing information on total stock of resources in the district, annual extraction, revenue realised, and other details captured through our Asset Accounting processes in the districts and compiled State-wise. State of Maharashtra has prepared district wise mineral map with GPS/geo-tagged.

Annexure- I**List of Nodal Cell & Consultative Committee members**

Office/Department	Name of the official & Designation	E-mail ID
Finance Department	Smt. N Sreelatha Sukumaran, Joint Secretary (Nodal Officer)	sreelathasukumaran1234@gmail.com
Survey & Land Records	Shri. Rajan C, Joint Director (Survey)	rajansurvey91@gmail.com
Survey & Land Records	Shri. Salim S, Survey Superintendent	salimsmaths@gmail.com
Mining & Geology Directorate	Shri. Dr Sajikumar S, Geologist	saji.geology@gmail.com
Water Resource Department	Shri. Sreedevi P, Dy. Chief Engineer, Irrigation (Work)	psreedevimadhu@gmail.com
Forest Department	Shri. Dr. R Adalarsan, IFS Conservator of Forest (ABP)	radalifs@gmail.com
Environment & Climate change Directorate	Awaited	Awaited
Economic & Statistics Directorate	Lathakumari C S, Additional Director (SI)	ecostatis@gmail.com
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O/o PAG (A&E)	Shri.Nanda Kumar D, Assistant Accounts Officer	<u>nandakumd.ker.ae@cag.gov.in</u>