



ARTICLE 1

Natural Resource Accounting – Concept, Endeavour in its Implementation and Advantages to be Harnessed in Audit

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Abstract

This article highlights the initiative of the Government Accounting Standards Advisory Board (GASAB) in implementing Natural Resource Accounting (NRA) in India. It also endeavours to highlight the tables designed by GASAB and the datasets captured, and goes on to analyse the importance of these key datasets in policy framing and also their vital utility in Audit, like audit of mining receipts, Goods and Services Tax (GST) and Income Tax Audit.

Keywords

NRA, GASAB, Asset Accounts, Mineral and Energy Resources and Water Resources.

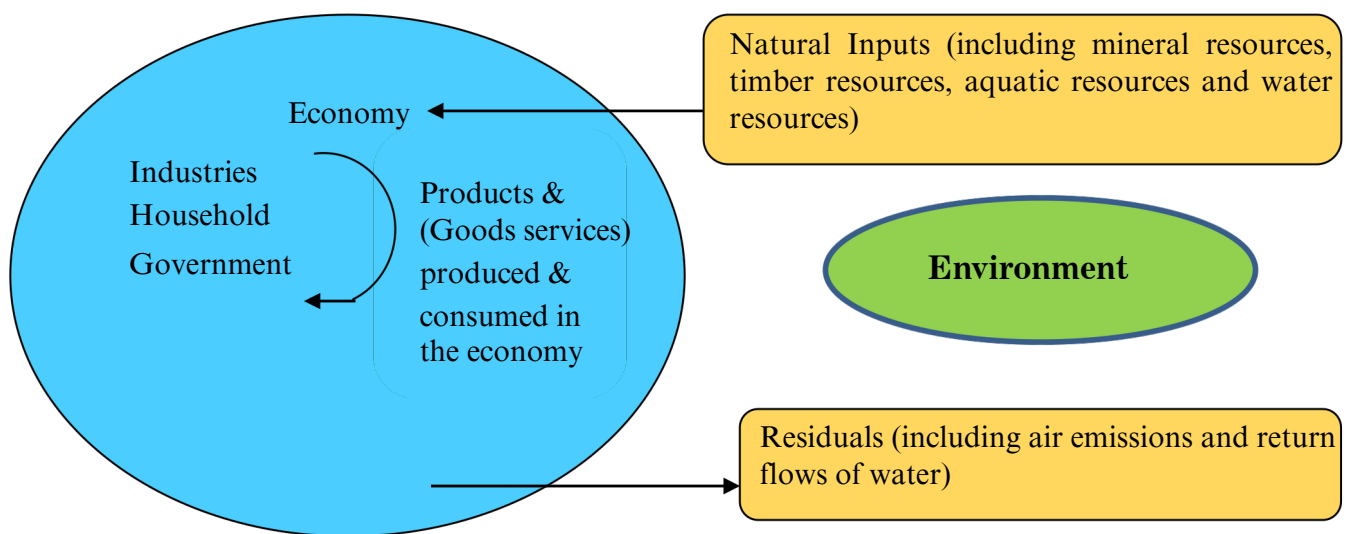
1.1 Introduction

Natural resources play a vital role in the sustainable economic development of any country and are crucial for their inbuilt value of inter-generational equity and sustenance. The rampant over-exploitation of these resources in recent times has resulted in a harmful impact on the environment, giving rise to extreme weather conditions, and issues like climate change and global warming have become a matter of discussion and deliberation around the Globe. Besides, such indiscriminate use of finite and often scarce resources or non-renewable resources has cast doubts on their availability for future generations.

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Conventional accounting captures data for measuring the economic activity only, and such economic indices do not take into account the environmental inputs and expenditure spent on mitigating environmental degradation, so that these can be reduced from the Gross Domestic Product (or commonly known as GDP) to arrive at the Green GDP as elaborated in Figure 1.1 below.

Figure 1.1 : Concept of NRA

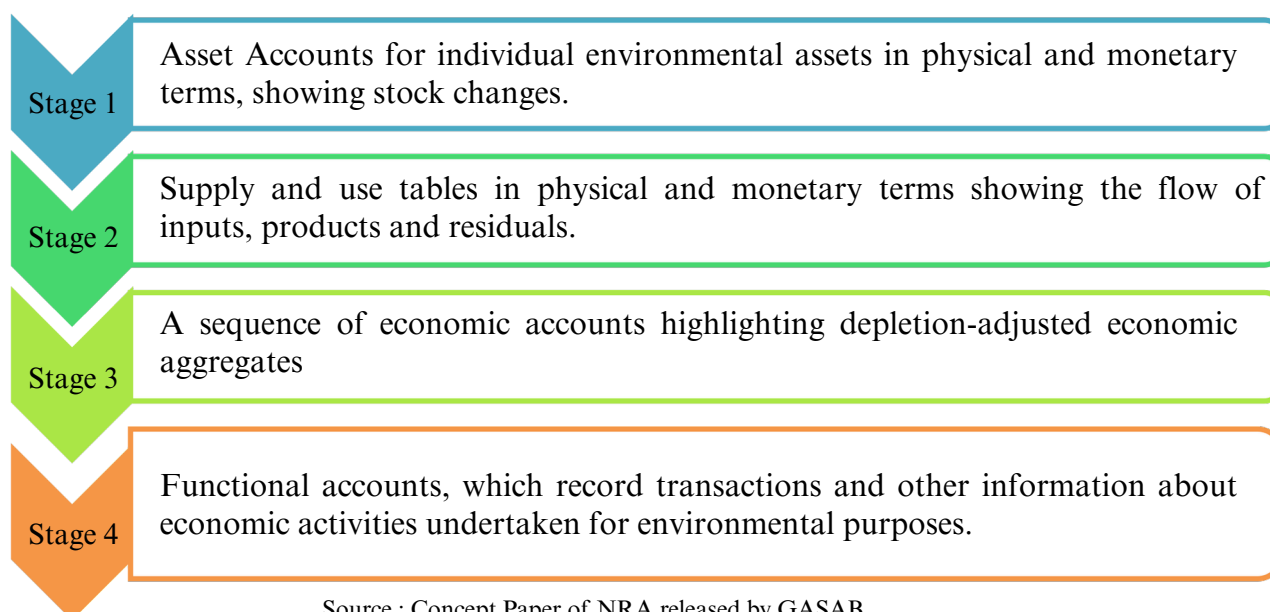


Source : Concept Paper of NRA released by GASAB

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 inputs and output-related costs while arriving at the economic parameters or the GDP to arrive at the Green GDP.

In order to overcome this shortcoming and to capture the intimate interplay between the various components of the natural environment and the economic progress of a country, the concept of NRA has emerged. It is based on the concept 'measurement of a resource leads to its better management'. The four types of accounts and tables which the System of Environmental-Economic Accounting – Central Framework (SEEA-CF) comprise of, was released in the year 2012, and has been depicted in Figure 1.2. It eases our understanding as to how the environmental-economic factors are first measured and then taken into consideration for arriving at the Green-GDP.

Figure 1.2 : Four stage implementation process of NRA



Source : Concept Paper of NRA released by GASAB

The International Organisation of Supreme Audit Organisations (INTOSAI) Working Group of Environmental Auditing (WGEA) had recommended (2010) that in countries where NRA had not been developed, the Supreme Audit Institutions needed to assist the countries in developing the framework of NRA.

Further, under the Constitution of India, C&AG of India has been given a constitutional mandate to render advice on the accounting principles, formats, standard operating procedures and guidelines for the preparation of accounts.

Simultaneous to the efforts of the UN, different developed and some developing nations attempted to draw up their environmental accounts, in which countries like Australia, Canada, France, Germany, Netherlands, Norway, UK are the frontrunners. Some of these are briefly discussed in the Table 1.1 in the following page.

In line with the suggestions of the INTOSAI Working Group, Constitutional provisions enabling the C&AG of India to render advice on forms of accounts and guidance to States on maintenance of accounts and the international experiences, the GASAB had conceptualised, initiated and implemented NRA in India. This was a challenging project as, till 2019, the country lacked a verifiable framework for the implementation of NRA, even after seven years of SEEA-CF coming into force (2012). The steps taken by GASAB towards implementing NRA in India are highlighted in Sections 1.2 to 1.10.



Table 1.1: Compendium of Asset Accounts for the year ended March 2021

Country	International experience in Natural Resource Accounting Resources involved	Time series	Level at which A/cs prepared	Periodicity	Remarks
Australia	Mineral & Energy Resources/ Water Resources	1995-2016	National	Annual	<ul style="list-style-type: none"> Follows SEEA domestic/industry water data Self extracted water data Expenditure on distribution
Physical & monetary accounts					
Canada	Mineral & Energy Resources	1961 - 2017	National and Provincial	Annual	<ul style="list-style-type: none"> Follows SEEA Figures added to National Balance Sheet
Physical & monetary accounts					
Netherlands	Only energy (natural gas and oil accounts)	1990-2017	National	Annual	<ul style="list-style-type: none"> Follows SEEA Government revenue parameter for monetary accounts
Physical & monetary accounts					
United Kingdom	Energy (natural gas and oil) accounts Timber and fish account	1989-2016 Monetary accounts from 2011	National	Annual	<ul style="list-style-type: none"> Follows SEEA
Physical & monetary accounts					
Philippines	Only energy (select) and mineral (select) accounts		National	Annual	<ul style="list-style-type: none"> Selected mineral (gold, copper, chromium and nickel) and energy (coal, oil & natural gas) accounts
Physical accounts for energy resources and both physical and monetary accounts for mineral resources					



1.2 The Concept Paper

The SEEA-CF, which is the latest internationally accepted framework of the United Nations accepted by member countries, allows flexibility in the implementation of the four-stage strategy and enables scope for embedding country-specific needs. Inspired by this, GASAB prepared a Concept Paper (July 2020) and designed a comprehensive three-term plan commencing with accounting of the finite non-renewable resources and then gradually moving towards attaining other stages of the SEEA framework, converging with the SDGs target of 2030.

The Paper also outlined the issues and challenges and the suggested ways and means to overcome them. The Paper also included tentative tables designed to capture the inputs for preparation of the Asset Accounts on various targeted resources. The importance of the private sector was also stressed in a dedicated chapter.

1.3 The Tables

Taking cue from the enabling provisions of SEEA-CF to craft the implementation process as per the country-specific needs and to enable capturing data for evidence-based decision making as well as effective auditing, GASAB designed six tables and also helped the States in filling these tables through regular monthly meetings and guidelines. The work on preparation of the Asset Accounts in the States commenced with joint efforts of the Accountants General Offices and the State Government, with the formation of State NRA Cells. Till 2019, the Ministry of Statistics and Programme Implementation had attempted to compile Asset Accounts in the shape of EnviStats, but the compilation was limited to only the stock of major minerals as appeared on the website of the Indian Bureau of Mines, that too up to 2015. While it lacked up-to-date information, it also lacked the information on minor minerals, which were under the mandate of the State Governments and the most vital aspect of NRA, i.e. compiling the stock and flow for the period of account. Thus, the effort of GASAB was a pathbreaking one as it implemented the essence of SEEA-CF into easy-to-fill-in tables to compile the stock and flow of resources.

1.4 The Compendium of Asset Accounts

GASAB's initiatives resulted in the achievement of the ambitious target of preparing the first-ever Asset Accounts on Mineral and Energy Resources in all 28 States and Union Territory of Jammu & Kashmir for the year 2020-21, released in October 2022.

The subsequent Asset Accounts for 2021-22 were also released in November 2024. These documents aim at compiling the stock, additions and extractions, providing a comprehensive view of resource availability and their usage.

In view of the SEEA framework allowing development of country specific needs, GASAB designed additional tables to capture details of sustainability of resources, bifurcation of resource-usage between Government and private, comparisons between the royalties and market prices, stock and flow of riverine resources, data on illegal mining, segregations of extraction, grade-wise production, production losses, dispatches and closing stock with run of mines and produced resources and percentage share of renewable energy generation vis-à-vis total energy requirements of the country.

1.5 Benefits of NRA

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

1.5.1 General

- Helping with datasets with assurance of two-stage validation – first by the administrative departments and second through a limited test check by the C&AG Field Audit Offices;
- Insights into gaps and non-compliances as brought out by limited test checks by above Audit Offices, helping the administrative ministries in plugging the loopholes and improving the systems and processes to make them fool-proof;
- Implementation of NRA in compliance with the requirements of the SEEA Framework to meet the commitment made under SDGs and monitor progress on declarations under COP 26;
- Tracking stock and flow of resources, along with their values at a glance; and
- Provide pace of exploitation to bring out the sustainability of resources - in years.

1.5.2 Mineral & Energy Resources

- Providing co-relation between the physical volumes and monetary values;
- Easing the assessment and review of royalties through comparisons between revenue vis-à-vis market value/export value;
- Enabling assessment of revenue streams for the future;
- Enabling identification of alternate resources (economic as well as energy); and
- Monitoring mining activities.

1.5.3 Water Resources

- Information on water availability, demand and usage across sectors to bring out areas of imbalance or overuse; and
- Comprehensive picture of India's water needs, challenges, and resources by integrating data from different sectors and regions.



1.6 Harnessing the Inputs Generated by NRA in Effective Auditing

On one hand, GASAB under the aegis of CAG of India has helped the country in attaining the prestigious tag of a country developing environmental accounts; on the other, the designs of the main as well as ancillary tables have rendered capturing invaluable datasets for the Audit Offices to be used in effective auditing of mineral and other resources of the country. Some instances of how the datasets being generated as part of NRA initiatives could be used in auditing are discussed in the following paragraphs.

1.7 360 Degrees Profiling of Mineral Extraction and Use

The Government of India has effected an amendment in the Mineral Conservation Development Rules in 2011 requiring all miners, transporters, stockists, end users, exporters, etc. to get registered, have a unique registration number and provide monthly reports on extraction, productions, dispatch, sale, transportation, use and exports to the Indian Bureau of Mines (IBM) as well as the State Governments.

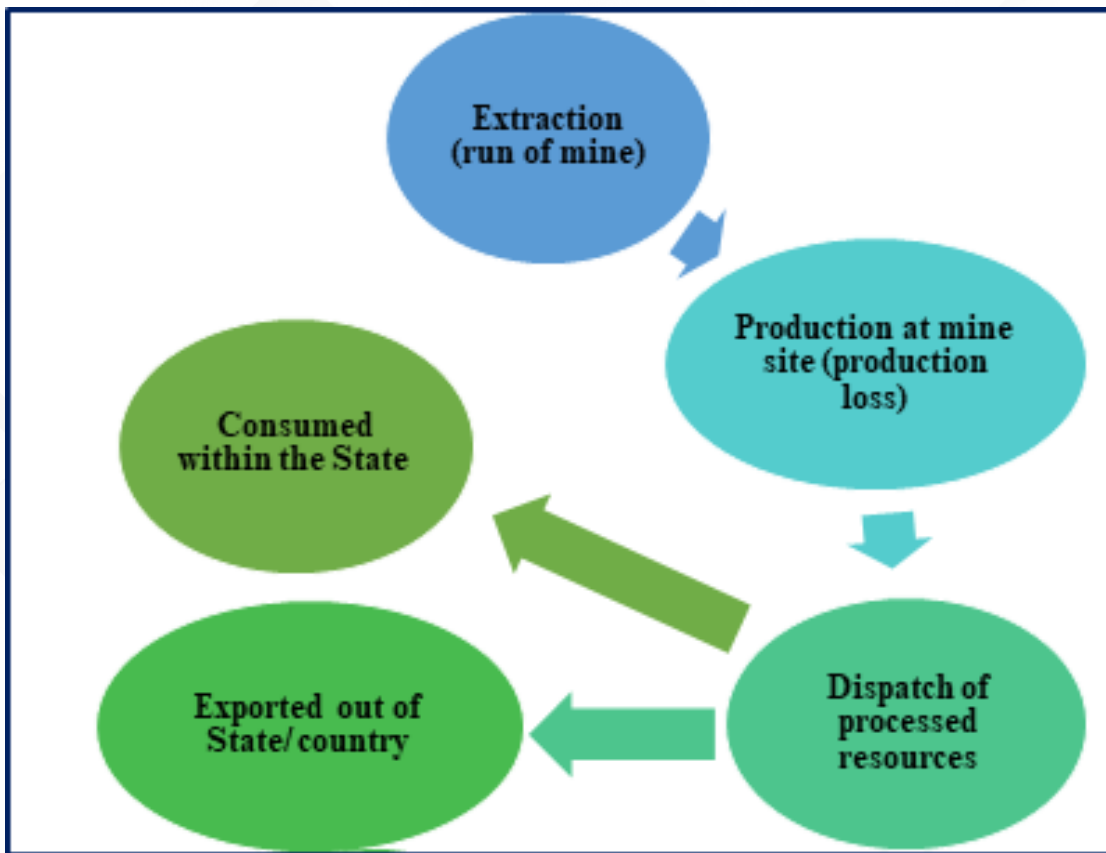
GASAB had designed the tables to capture this data. Effective implementation of a system of generating Asset Accounts on Mineral and Energy Resources in the States would aid in evidence-based good governance through a 360-degree profiling of the mineral resources from extractions till their final usage/export, as depicted in Figure 1.3. Also, through the tables, movement of minerals and levy of royalties and other taxes and duties, including GST, could be analysed by the audit teams.

1.8 Assessment of Mineral Royalties

For major minerals, royalties are calculated on an ad valorem basis on the average sale price, which is based on the grades of minerals. Again, as per the system, rates of royalties are notified by the Government of India, while the States levy and collect them. This makes it imperative to have the details of the production of grade-wise minerals and their dispatch. The Indian Bureau of Mines (IBM) has a well-defined system of month-on-month reporting, which captures comprehensive data on extraction, production, production loss, dispatch, average sale price, etc.

Collecting the datasets compiled from the monthly reports of lessees to the IBM by the State Audit offices through the Audit offices having jurisdiction over IBM would enable more effective auditing, enabling cross verification of royalty payable based on data on grade-wise productions, dispatch and average sale price, and royalties actually paid.

Figure 1.3: Movement of minerals from mine-head till destination



At present, disclosure of the average sale price (ASP) of minerals, based on which royalty is calculated, is made by the lessees, and there is no scope for independent verification of these figures. More importantly, these figures are mainly reported to IBM while the State Governments are the more interested parties as their machineries have to ascertain the royalty payable based on the correct disclosure of ASP. This is another area of potential interest to audit.

1.9 Addressing Illegal Mining

GASAB had designed a specific table for capturing the details of illegal mining detected and finalised by the State Governments. These data could provide the starting lead to the Audit teams, and then the datasets available with the IBM and the State Governments on resource sale/use by lessees, stockists, traders, end-users/exporters could be resorted to for further scrutiny of illegal mining. Some other areas which could provide vital leads for audit are:

- The inspection reports of the inspection wings of IBM, which are mandated to inspect each mine every five years. The volume of extraction found is tallied with the quantity reported, and any excess is charged with penalties. These inspection reports could be collected through the Audit Office having jurisdiction over IBM by the State Audit Offices and cross-verified during the audit of mining departments.

- The Government of India had laid down a system of raising red flags based on the inputs from satellite imageries which monitor extractions outside 500 meters of the designated mining area.
- These red flags are posted State-wise on the website of IBM/Ministry of Mines, which could be cross-verified in audit through joint inspections with the Officers of the mining department as per the existing protocol of our department.
- The mines and other areas could be independently examined through satellite data with the help of the National Remote Sensing Centre (NRSC), Indian Institute of Science (IISc) and cross-verified with the mining reported and royalties paid.
- Similarly, supply and use of resources could be cross-verified with the end-users, exporters, and user agencies to ascertain unauthorised mining and non-realisation of royalties. These datasets are being captured by IBM monthly and annually which can be obtained and analysed for audit. Figure 1.4 below shows the methodology which could be adopted for the purpose.

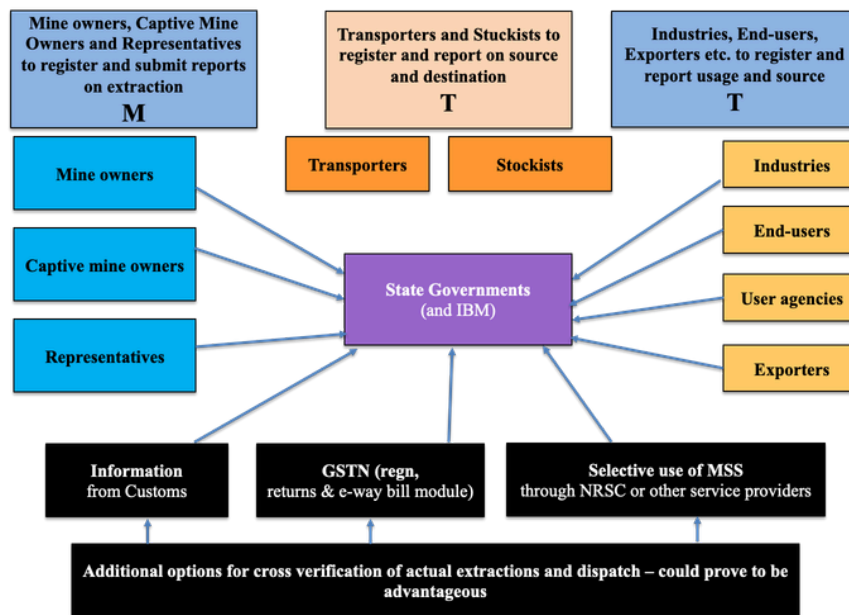


Figure 1.4: : Cross verification Concept Mapping Supply and Use of Mineral Resources

1.10 Usage of NRA Data by Other Audit Wings

While the State mining Audit teams remain the primary beneficiaries of the NRA data being captured through the Asset Accounting method led by GASAB, other receipt audits, such as GST audits or Income Tax audits, can also harness the benefits of the data generated through NRA.



Conclusion

The unique endeavour of GASAB in applying the international frameworks into country specific need based informative tables not only listed India among countries preparing their Asset Accounts periodically, but are also intended to aid in evidence-based good governance. These datasets could be leveraged by the Audit Wings for providing assurance on collection of mining receipts as well as use them in auditing the mining, GST and income tax turnover declarations and tax discharge.

Data Availability

No new data has been introduced.

Ethics Statement

This document meets the ethical guidelines and legal requirements of the country.

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Conflict of Interest

None

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GASAB.

References

1. Comptroller and Auditor General of India, Government Accounting Standards Advisory Board (GASAB). (2020, July). Concept paper on Natural Resource Accounting (NRA) in India.
2. Comptroller and Auditor General of India, Government Accounting Standards Advisory Board (GASAB). (2022, October). Compendium of asset accounts on mineral & energy resources.
3. Comptroller and Auditor General of India, Government Accounting Standards Advisory Board (GASAB). (2024, November). Compendium of asset accounts on water resources for the year 2021-22.
4. Comptroller and Auditor General of India, Government Accounting Standards Advisory Board (GASAB). (2022, April). Guidelines/SOPs for preparation of asset accounts.
5. Comptroller and Auditor General of India, Government Accounting Standards Advisory Board (GASAB). (2021, October). Templates of asset accounts on mineral and non-renewable energy resources.

Biswas, S. (2025). Natural resource accounting – Concept, endeavour in its implementation and advantages to be harnessed in audit. *Manthan: Journal of Public Sector Auditing and Accounting of SAI India*, 1(1), 01-10