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AN ANALYSIS OF NATURAL RESOURCES ACCOUNTING FRAMEWORK IN INDIA

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Abstract *The social and economic development of a country is dependent on the efficient use, conservation, and protection of natural resources. Today, we are in a globalised era, and India is one of the fastest-growing economies across the globe, so there is more utilisation of natural resources. It is a matter of sustainability of natural resources in the country; therefore, accountability of utilisation of natural resources by both private and government enterprises is to be efficiently done. For this purpose, there is a need to have an accounting framework, which is possible through Natural Resources Accounting (NRA). The present paper attempted to evaluate the current status of NRA from the Indian perspective, valuation approaches used in NRA, and to analyse the perception of academicians in the stream of accounting and economics. To analyse the data, descriptive statistics and Levene's independent t-test are used. It can be concluded that the academicians of both the streams are aware of NRA practices and its importance on various aspects of the economy of a particular country, and the globe at large. Further, it is found that there is some level of awareness, and perceived impact of NRA is observed by both accounting and economics teachers in the Indian context.*

Keywords: *Natural Resource Accounting, Natural Resource Valuation Methods, GASAB*

JEL Code: *M41, M43, M47*

INTRODUCTION

Natural resources can be considered economic assets, even though they do not deal with market transactions directly. Nowadays, there has been increasing awareness about environmental issues across the globe, and a growing concern about the protection of the environment from depletion and degradation of natural resources. For this purpose, countries are continuously undertaking initiatives that protect the environment and lead to sustainable development. Among various initiatives, efficient accounting of natural resources is one of the important aspects.

The concept of natural resources accounting emerged in various international contexts, such as the UN Conference on Human Environment, in 1970 and the Brundtland Commission and the Earth Summit at Rio de Janerio, in 1992. In addition to these developments, the UN released the international standards for maintenance of national accounts in 1993, which was updated in 2009. Further, the UN also adopted the System of Environmental and Economic Accounting (SEEA) – Central Framework, in 2012. At present, we can see the widespread international efforts for the concept and implementation of Natural Resource Accounting (NRA). One of the important global developments has been the System of National Accounts (SNA). SNA provides an accounting framework for the recognition and measurement of the economic aspects of production, consumption, and accumulation of wealth in an economy; it also helps in analysing and reviewing the performance of an economy during a particular timeframe. The System of Environmental and Economic Accounting (SEEA) describes the interactions and interrelationship between the economy and the environment.

CONCEPT OF NRA

Natural resource accounting is the collection, analysis, and review of data relating to natural resources within an accounting framework. NRA is an accounting system that focuses on stocks and changes in the stock of natural assets, such as biota, subsoil assets, water, and land, with their aquatic and terrestrial ecosystems. Natural resources accounts may be maintained both in physical units and monetary values. The resources may consist of both resources, which contribute to marketable forms of production, as well as non-commercial environmental resources such as air, water, and biological life. Natural resources accounts are the means

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of establishing links between the environment and the economy. The natural resource accounting process is carried out by maintaining two accounts, physical and monetary. Natural Resource Accounting is also termed as Green Accounting and Environmental Accounting. NRA provides certain parameters, which may help in determining the GDP (gross domestic product) of a country scientifically, as the present method employed in determining the GDP across the globe does not consider the level of environmental damage. GDP calculated by considering the level of environmental damage in a country will represent a more realistic value for a particular nation (Pettman & Herath, 2005). The natural accounting process is shown in Fig. 1.

Source: Compiled by Authors.

Fig. 1: Natural Resource Accounting Process

PURPOSE AND AIM OF NRA

- The main purpose of NRA is to provide data on the current status of natural resources and their changes during a particular timeframe. As such, it is an important link in the chain of sustainable development.
- Another aim 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.
- 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.

NRA AND ENVIRONMENTAL IMPACT ASSESSMENT

For sustainable development, it is necessary to have a standardised method for Environmental Impact Assessment (EIA). Natural resources are limited and can only be optimised through the internalisation of environmental considerations and policies within the process of the development of the country. Natural Resource Accounting provides the base for environmental impact assessment through asset accounts of resources, state-wise, along with the whole framework for calculating the overall gains in the economy during accounting for the natural resources used in the country's developmental process. The environmental impact assessment can be undertaken by the government itself, or by a private organisation or through private-public partnership methods. This impact assessment through the NRA helps in efficiently managing the environmental resources, to achieve sustainable development by combating the changes in the environment through standardised models.

NRA AND CLIMATE CHANGE MANAGEMENT

Effective climate change management system depends on the strong database concerning the complex nature of climate change and the data related to the cost incurred to prevent the negative impact on the natural environment. To frame a sound policy on climate change, the government needs accurate data. Environmental accounts can play a vital role in supporting the governmental bodies in making decisions concerning climate change aspects. Natural Resource Accounting provides a set of statistical and monetary information, which aids in making a useful framework for monitoring, measuring, and analysing climate change.

India has a long historical research backup on environmental aspects. Various studies have been undertaken in the areas of forest, wetlands, coastal marine, and other natural environmental aspects. In India, environmental accounts and NRA are still in the infancy stage. So, there is a need to develop a systematic, standardised, and comprehensive method that allows the maintaining of natural accounts and the NRA, to ensure that natural capital, resource depletion, and environmental effects are accounted for. One of the particular major drawbacks to NRA is the collection of accurate data of natural resources and valuation of the same by assigning monetary values. In the present paper, an attempt has been made to explain the fundamental conceptual aspects of NRA; the current status of NRA from the Indian perspective; valuation approaches used to value the natural resources; and the perception of academicians in the stream of accounting and economics.

REVIEW OF LITERATURE AND RESEARCH GAP

Natural resource accounting plays a vital role in measuring the welfare of nations and the level of sustainable development. The manner of determination of GDP of nations has certain limitations (Pettman & Herath, 2005). The sustainable development of the nation, and the world at large, depends on the efforts of both private and public enterprises in protecting natural resources (Ashok et al., 2019). Assessment of environmental performance is one of the predominant factors to be considered while determining business success. Their needs have an expertise team

for environmental accounting practices. With the help of environmental accounting, a new concept (i.e., Green Gross Domestic Product) can be used while assessing the sustainable development by the policymakers (Rounaghi, 2019). The current methods used in measuring national income are not feasible, as they underestimate the contribution of natural resources consumption to the income. So it is necessary to have a framework that determines natural capital losses and accurate level of sustainability in India (Gundimeda et al., 2006). The main drawback in the determination of GDP is that it does not consider the damages to natural resources. By having a framework for natural resources accounting, the drawback of the determination of GDP can be resolved. For this purpose, there is a need to have an interdisciplinary framework through the collaboration of accounting and the economics stream (Okafor, 2012). Measurement of overall business performance should not only be based on return on investment, but should also consider the consumption level of natural resources and its contribution towards micro and macroeconomic aspects of sustainable development (Bardy & Massaro., 2013). Institutionalising the environmental accounting process creates more accountability on utilisation of natural resources, which in turn will contribute to the sustainable development of the country (La Notte & Burritt, 1999). Water is one of the natural resources; the accountability on its consumption is a controversial aspect, and as per the stakeholder's agreement, there is a need to have a standardised method of accounting and disclosure of natural resources like GPWA (General Purpose Water Accounting) in Australia (Tello et al., 2016). Environmental accounting for the management of biodiversity is successful only when the accounting practices are backed by an organised information system for biodiversity conservation. To accomplish this, there is a need for strong research and practice support in a particular environment (Feger & Mermet, 2017). Poor management and governance of the consumption of natural resources negatively impact the assessment of sustainable development of a country, which indirectly impacts the overall development of the economy (Bassey et al., 2020). An attempt is needed to modify the methods followed in determining national income by considering valuation aspects of natural resources accounting (Common, 1991). The increase in depletion of natural resources is gaining momentum in the environmental and natural accounting literature. Identification of eroding trends in the reserve of natural resources has led to implementing the value of natural resources in the cost-benefit analysis for the growth and development of an economy (Mozumder, 2004). While framing the policies for implementation of natural resources accounting framework, the study of international standards, such as Global Reporting Initiatives Sustainability Reporting Standards, is necessary (Parameshwar & Abhishek, 2020; Shivalingegowda et al., 2019).

From the extensive analysis of earlier studies, both at the national and international level, it is found that most of the studies have focused on analysing the need for natural resources accounting and revisiting the methods used in determining the GDP of the nation by considering the damages to natural resources. No studies have focused on examining the current status of natural resources accounting in India, and analysing the awareness level of natural resources accounting among the academicians in accounting and economics streams. Hence, the present study is intended to focus on theoretically analysing the current status of natural resources accounting and empirically evaluating the awareness level of academicians in the stream of accounting and economics from the Indian perspective.

OBJECTIVES OF THE STUDY

By analysing the summary of the literature survey and research gap, the following objectives were framed for the current study.

- To analyse the current status of natural resources accounting in India.
- To study the various valuation approaches available to value natural resources.
- To examine the recognition, measurement, and disclosure aspects of NRA from the Indian perspective.
- To evaluate the awareness level of academicians, in the stream of accounting and economics, on natural resources accounting from the Indian perspective.

HYPOTHESIS FOR THE STUDY

To achieve the third objective of the paper, the following hypotheses are framed.

H_0: *There is a significant difference in the level of awareness and perceived impact of NRA among academicians in the stream of accounting and economics.*

H_1: *There is the same level of awareness and perceived impact of NRA among academicians in the stream of accounting and economics.*

METHODOLOGY

Data Collection

The current study is of a qualitative and empirical nature, based on both primary and secondary sources of information. Primary sources of information are gathered from the structured questionnaire. Secondary sources of information are gathered through academic journals, articles, newspapers, government reports, and other archival data.

Primary Data Collection Process

To collect primary data, a list of accounting and economics teachers in universities in the state of Karnataka is prepared, based on the information obtained from the university websites. From the list, 50 accounting and 50 economics teachers were randomly selected. A structured questionnaire was sent to the selected teachers through e-mail. For getting the responses from the teachers, a reminder e-mail was sent three times in 15-day intervals. Finally, 34 accounting and 31 economics teachers responded. All the collected responses were considered for further statistical analysis.

Statistical Tools Used

The paper employs descriptive statistics, such as mean, standard deviation, and ranks. It also uses an inferential statistical tool, Levene's independent t-test, for analysing the perception of academicians in the field of accounting and economics.

CURRENT STATUS OF NATURAL RESOURCES ACCOUNTING IN INDIA

In India, the relationship between nature and man is like a mother-child relationship. Over time, this relationship erodes due to the unsatisfied greed of man towards nature. By observing the exploitation of nature, the Indian government has committed to protect the environment and ensure the sustainability of natural resources. Furthermore, it has taken this issue as a developmental agenda need for a healthy environment; its importance has gained in India since 1970. In this period, laws related to the protection of the environment were introduced and enacted.

CSO (Central Statistics Office) under the MoSPI (Ministry of Statistics and Programme Implementation) is a central agency that prepares the official statistics on the environment in India. The first plan on NRA in India was taken in the 1990s. In this initiative, a technical working group on NRA was formed. By considering the suggestions of the group, a pilot project on NRA was commenced in Goa from 1999 to 2000. Many works were commissioned by the CSO in this area.

On 4 August 2011, a most important step was taken towards the execution of NRA in India, by creating an expert group; it was carried out by the MoSPI, under the guidelines of the then prime minister of India. Professor Sir Partha Das Gupta, University of Cambridge, was the chairman of the group. The main intention of the expert group was to develop a framework for 'Green National Accounts in India', and forming a mechanism for its execution. The expert group submitted its report in March 2013. The report mainly stressed the manner of preparation of natural resources accounts.

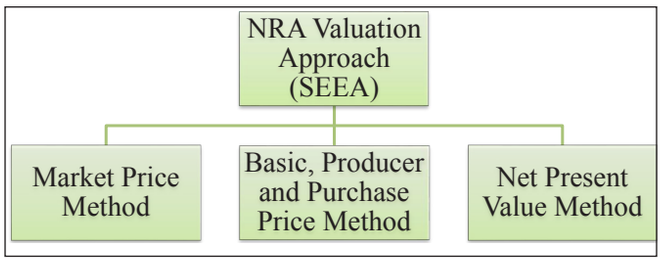
Within five years, i.e., 2013-2018, CSO published two publications, namely statistics related to climate change and Envistats-India. These reports supplemented data related to four major resources and their stock positions in India. The four major natural resources are land, forest, mineral, and water, in all the states in India. These suggestions were based on the recommendations of Professor Sir Partha Das Gupta's expert group. Further, for compilation of accounts, the Envistats started the presentation of aggregate environment accounts for India, in line with the asset accounts, in physical terms, of the four natural resources mentioned earlier.

In the 35th meeting of the Government Accounting Standards Advisory Board (GASAB) held on 3 February 2020, the importance of NRA and its role in the environmental impact assessment of projects was stressed. In the meeting, they also discussed the prominence of the NRA in estimating the usage of resources. The advisory board has formulated standards relating to revenue recognition, prior period adjustments, external assistance, and contingent liability for compliance purposes. Furthermore, a draft has been prepared and a pilot study was conducted in two states for formulating policies and accounting standards related to financial transactions involved in the usage of land, forest, mineral resources, and water. These standards are on par with the cash-based accounting practices prevailing in the global arena.

VALUATION APPROACHES IN NRA

Valuation of natural resources means a process that involves assigning monetary values to environmental goods and services. However, for attributing a monetary value to the resources there are no particular standardised methodologies. Certain approaches are popularly used to value natural resources. These approaches are described in this section.

Valuation methodologies can be divided into two categories, namely the SEEA methodology and other methodologies.



Source: SEEA.

Fig. 2: Natural Resource Valuation Methods (SEEA)

Market Price Method: The market price method involves assigning monetary values to the natural resources based on buyers willing to pay to acquire something from willing sellers; this is called arm's length price.

Market price of natural resource = Arm's length price

Basic, Producer, and Purchaser Price: The basic price is the method in which natural resource is measured by considering the price most relevant to the producer's decision-making.

Under the producer's price method, natural resources are valued based on the amount receivable by the producer from the purchaser for a particular unit of a good or service produced as output, minus any value added tax, or similar tax leviable by the government before invoicing to the purchaser.

Producer's price = Consideration receivable fewer taxes and transportation charges collected separately

Further, it also excludes any subsidies received on such products purchased.

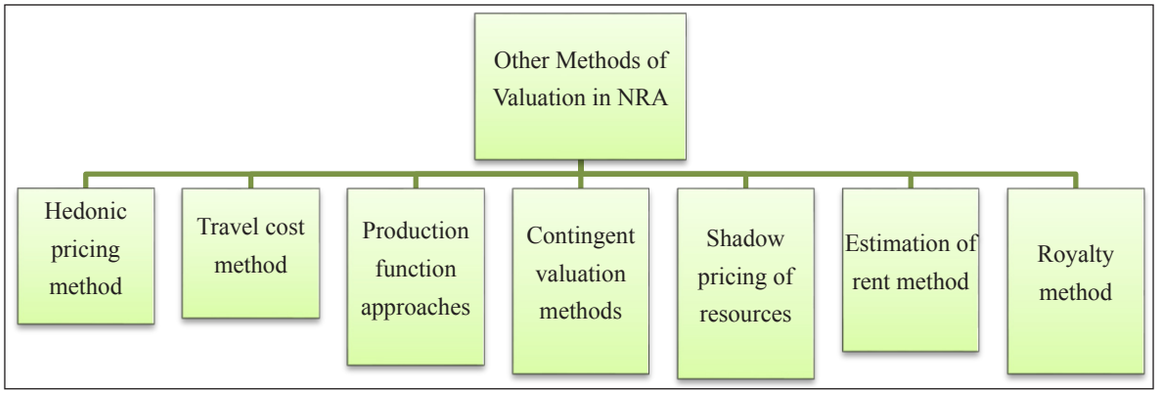
As per the purchaser's price method, the natural resources are valued based on the amount paid by the purchaser, excluding any VAT or similar tax deductible by the purchaser to get the unit of a good or service at the time of delivery by the purchaser. The price includes any transport charges paid separately by the purchaser to take delivery at the required time and place.

Purchaser's price = Price paid by purchaser + Transportation charges paid separately less VAT and other levies

Under the net present value method, natural resources are valued based on the present value of their future earnings. This method is applied only when there are no relevant market transactions or set of acquisition prices that would be used for valuing natural resources in the previous two approaches.

OTHER METHODS

Other methods of natural resources valuation are those methods that are not based on the SEEAs approach. The various techniques used to assign monetary value to the natural resources under the other categories of valuation are shown and described in this section.



Source: Secondary Data.

Fig. 3: Other Methods of Valuation of Natural Resources

Hedonic Pricing Method: Under this method, environmental resources are valued based on the characteristics of goods or services, rather than the good or service itself. Thus, prices will reflect the value of a bundle of environmental characteristics that people consider important when purchasing a good.

Hedonic price = Value of characteristics of good or service

Travel Cost Method: This method is also termed as recreation demand modelling approach. This method involves assigning monetary value to natural resources by using travel costs as a proxy for the price of visiting outdoor recreational sites for fishing, hunting, boating, and touring the forests.

Travel cost price = Price of visiting outdoor recreational sites

Production Function Approach: This method is also known as the change-in-productivity approach. The valuation is based on the relationship between environmental characteristics and the output level of economic activity. The underlying assumption of this approach is that, when an environmental characteristic enters a firm's production function, environmental changes and economic impacts may be measured by looking at the effect on production, and by valuing such effect at market output prices.

Value of natural resource = Environmental impact at market output prices

Contingent Valuation Methods: Under this method, natural resources valuation is done based on non-market value by considering the responses of individuals on their willingness to pay for a good or service. It is a survey- or questionnaire-based approach to the valuation of non-market goods and services.

Shadow Pricing of Resources: Under this method, the value of the natural resources are determined by imputing a social value to every capital asset and multiplying each asset's stock by its social value and adding across all the assets (the social value may be in quantitative or qualitative terms). The social value of a natural asset is called shadow price, which is the product of society's well-being and its capital.

Shadow price of resources = Society's well-being x value of the capital asset

Estimation of Rent Method: Under this method, natural resources are valued by differentiating the annual cost of extraction of natural resources and the revenue generated from the sale of such resources. The difference between the annual cost of extraction and sale proceeds is termed rent. Costs of extraction consists of both operating, and supplies and capital costs. Operating costs consists of wages and other expenses, and supplies and capital costs consist of expenditure on exploration, infrastructure, and equipment. The total value associated with the stock is determined as the present value of all future annual rent that the stock is expected to yield.

Estimated rental value of natural resources = Sale proceeds – Annual cost of extraction of natural resources

Royalty Method: This method is most popularly used in mineral extraction activities. As per this method, the user of the mining land is a lessee who is granted the right to use mineral resources, and he is required to pay a certain amount in respect of the mineral extracted, in proportion to the quantity extracted. The amount payable by the lessee is termed royalty.

Value of mineral resources = Royalty collected from the lessee

RECOGNITION, MEASUREMENT, AND DISCLOSURE ASPECTS OF NRA FROM THE INDIAN PERSPECTIVE

After assigning monetary values to the natural resources, the next aspect to be considered is the disclosure of the same. It is easy to collect data about the gross revenue realised through the exploration and exploitation of natural resources. However, identification and recognition of potential sources of the amount spent on environmental resources management and environmental damage mitigation activities are difficult tasks. In India, Government Accounting Standards Advisory Board suggested a framework for the preparation of disclosure statements on NRA. The disclosure aspects of NRA are:

- Gross revenue collected from extraction and abstraction of resources.
- Expenditures made on environmental management and damage mitigation activities:
  - Direction and Administration Expenses.
  - Collection Costs.
  - Mitigation of Environmental Degradation Costs, and so on.
- Difference between gross revenue collected and expenditure incurred.

ANALYSIS OF THE AWARENESS AND PERCEIVED IMPACT OF NRA AMONG ACADEMICIANS IN THE INDIAN PERSPECTIVE

This section of the paper deals with the analysis of primary data gathered from academicians in the stream of accounting and economics. Further, it involves the empirical evaluation of the perceptions by performing various statistical tests.

RESULTS AND DISCUSSIONS

Table 1: Group Statistics on Perceived Awareness of NRA among Academicians in the Stream of Accounting and Economics

Aspects of NRA from the Indian Perspective	Stream	N	Mean	SD	Rank
NRA helps assess the current status of natural resources	Accounting	34	3.94	.886	10
	Economics	31	4.06	1.031	
NRA helps measure sustainable development	Accounting	34	4.18	.869	6
	Economics	31	4.13	.922	
Through NRA accountability on natural resources can be ensured	Accounting	34	4.15	1.105	7
	Economics	31	4.16	1.036	
NRA helps in assigning monetary value to the natural resources utilised	Accounting	34	4.32	.843	4
	Economics	31	4.26	.965	
NRA helps in the assessment of environmental impact by policymakers	Accounting	34	3.97	1.087	9
	Economics	31	4.45	.723	
NRA provides a new method for determining GDP	Accounting	34	4.38	.817	2
	Economics	31	4.19	.873	
NRA helps in climate change management	Accounting	34	4.29	.799	3
	Economics	31	4.39	1.054	
Effective adoption of NRA should be backed by multidisciplinary research	Accounting	34	4.44	.705	1
	Economics	31	4.35	.839	
In India, there are government initiatives to streamline the accounting of natural resources	Accounting	34	4.26	1.024	5
	Economics	31	4.19	1.108	
Effective implementation of NRA needs professional support from various professional organisations like ICAI, ICMAI, ICSI, and so on	Accounting	34	4.03	.834	8
	Economics	31	4.42	.720	

Source: Survey Data, Compiled by Authors.

Table 1 depicts the results of the descriptive statistics concerning the perceived awareness of NRA among academicians in the stream of accounting and economics. By observing the mean value of their responses, it is clear that they are aware of NRA practices and its importance on various aspects of the economy of a particular country, and the globe at large. Their awareness level is also ranked and shown in the table, according to the higher mean value of their responses.

Table 2: Results of Levene's Test for Equality of Variances on Perceived Awareness of NRA among Academicians in the Stream of Accounting and Economics

Aspects of NRA from the Indian Perspective	Levene's Test for Equality of Variances			t-test for Equality of Means		
	F		Sig.	t	df	Sig
NRA helps assess the current status of natural resources	Equal variances assumed	.855	.359	−.519	63	.606
	Equal variances not assumed			−.515	59.480	.608
NRA helps measure sustainable development	Equal variances assumed	.161	.690	.214	63	.832
	Equal variances not assumed			.213	61.577	.832
Through NRA accountability on natural resources can be ensured	Equal variances assumed	.064	.801	−.053	63	.958
	Equal variances not assumed			−.054	62.945	.957
NRA helps in assigning monetary value to the natural resources utilised	Equal variances assumed	.313	.578	.292	63	.771
	Equal variances not assumed			.290	59.901	.773
NRA helps in assessment of environmental impact by policymakers	Equal variances assumed	.965	.330	−2.080	63	.042
	Equal variances not assumed			−2.118	57.823	.039
NRA provides a new method for determining GDP	Equal variances assumed	.014	.907	.901	63	.371
	Equal variances not assumed			.898	61.442	.373

Aspects of NRA from the Indian Perspective	Levene's Test for Equality of Variances			t-test for Equality of Means		
	F		Sig.	t	df	Sig
NRA helps in climate change management	Equal variances assumed	.816	.370	−.403	63	.688
	Equal variances not assumed			−.398	55.738	.692
Effective adoption of NRA should be backed by multidisciplinary research	Equal variances assumed	.477	.493	.451	63	.654
	Equal variances not assumed			.447	58.874	.656
In India there are government initiatives to streamline the accounting of natural resources	Equal variances assumed	.000	.992	.269	63	.789
	Equal variances not assumed			.268	61.188	.790
Effective implementation of NRA needs professional support from various professional organisations like ICAI, ICMAI, ICSI, and so on	Equal variances assumed	.051	.823	−2.008	63	.049
	Equal variances not assumed			−2.022	62.821	.047

Source: Survey Data, Compiled by Authors.

Table 2 depicts the results of Levene's independent samples t-test. This test is performed to check the differences between the perceived level of awareness of NRA practices and its impact among academicians in the stream of accounting and economics. In all aspects of NRA, there are no significant differences in the level of awareness and perceived impact of NRA in the Indian context among accounting and economics teachers. Hence, the null hypothesis (H_0) is rejected at a 5% level of significance and the alternative hypothesis (H_1) is accepted. Therefore, there is some level of awareness, and perceived impact of NRA is observed by both accounting and economics teachers in the Indian context.

FINDINGS AND CONCLUSION

From the analysis of both primary and secondary data, it is found that India is taking an effort in streamlining the natural resources accounting practices, in par with global practices. Furthermore, it is found from perception analysis that both streams of academicians are aware of NRA practices and their importance on various aspects of the economy of a particular country, and the globe at large. There is some level of awareness, and perceived impact of NRA is observed by both accounting and economics teachers in the Indian context. Finally, it is concluded that environmental accounting is the most essential part of the information system to be used in environmental impact assessment and damage mitigation activities. By applying natural resource accounting tools, the government can formulate a policy that guides sustainable environmental decision-making. Furthermore, interdisciplinary collaborative research from people in the accounting and economics stream will motivate the government to streamline the NRA framework, in par with global practices. The effective application of a combination of policies, procedures, and methods, like NRA in environmental management activities, will result in achieving the United Nations Sustainable Developmental Goals (Parameshwar & Abhishek, 2020).

SCOPE FOR FURTHER RESEARCH

The study has suffered some limitations. These limitations may become an opportunity for conducting future studies by researchers who are working in the area of natural resources accounting. The present study is mainly focused on analysing the perception of academicians in the field of accounting and economics, and not focused on analysing the perception of regulatory authorities, industrialists, and other stakeholders. Future research may concentrate on the stakeholders. Furthermore, the study is not focused on the empirical aspects of natural resources accounting, such as record keeping, role of technology in implementing NRA efficiently in the Indian context, and so forth.

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