Ethical Government Accounting

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Abstract

The System of National Accounts 2008 (SNA) and the Government Finance Statistics Manual 2014 (GFSM) are undergoing revision to better capture the extraction of mineral assets. We discuss current practices and the proposed changes and argue that they give a misleading picture of governments' effectiveness as mineral owners in capturing the economic rent, leading to hidden wealth transfers to extractors. Case studies from Australia and Goa, India, illustrate the magnitude of wealth loss during the liquidation of mineral assets and the inadequacy of the current standards. The proposed split asset treatment could obscure potentially large and legally contentious wealth transfers. A case study based on Statistics Canada's sectoral balance sheet illustrates this. Our suggestions align with the principle that mineral resources are inherited wealth, necessitating a stewardship role by mineral owners. We propose a framework that more accurately reflects impacts on national and public sector sustainability.

JEL Codes:E01, H83, Q56

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1. Introduction

According to the UN system, nations have permanent sovereignty over natural resources (UN General Assembly, 1962). Under national legal systems, sub-soil mineral resources are usually owned by some level of government, although many variations occur (Flomenhoft, 2018). In some countries like the US and Canada, owners of surface rights and other private entities may own sub-soil minerals. In many countries, sub-soil mineral ownership is vested in sub-national levels of government, e.g., states like Goa in India. For the purposes of this paper, we distinguish between the role of the government unit that owns the sub-soil minerals (Mineral Owner) from the role of governments as taxation authorities.

Some countries, India included, hold that natural resources are owned by the people and are held in trust for their benefit by the state (Danso et al., 2020). In the US and Canada, indigenous peoples' rights to sub-soil minerals are held on their behalf in trust by the national government.

In this conceptualisation, the state acts as a trustee not only for the current generation but also for generations to come, as the state itself is a timeless entity. The state as a trustee thus has two connected goals – a) it must preserve the value of the wealth entrusted to it on behalf of its current and future generations (non-declining wealth), and (b) enhance its value by investing in alternative assets that are rising in value faster than the capitalised value of the resource.

If the state monetizes the mineral assets, the mineral sale proceeds ought to be invested in alternative assets that yield at least the social discount rate. In a market economy, it is reasonable to expect the assets to yield the market rate of return or, better still, the economy's growth rate.

Extracted minerals are usually monetised through the sale of the mineral ore. In exchange for the minerals sold, Mineral Owners receive Mineral Sale Proceeds (MSP) in the form of royalties and other amounts. Mining is effectively a form of asset stripping or asset monetisation. As the World Bank (2019) put it, "*the purpose*

of mining is for societies to capture the rent that can be obtained by commercialising natural resource deposits which are a national asset."

It then follows that sale of minerals by the Mineral Owner needs to be accounted as a capital transaction. However, following long-standing customary practice, governments around the world treat royalties and other Mineral Sale Proceeds from extracted non-renewable mineral resources like metal ores and fossil fuels as revenue (Basu, 2016).

This is one of the points at which the national accounts statistics and the government financial statistics intersect. In international accounting standards like the IMF's Government Finance Statistics Manual 2014 (GFSM), mineral sale proceeds are treated as revenue, although some flexibility is provided. This accounting method creates adverse incentives for liquidation of assets to meet current needs for revenue.

To illustrate the magnitude of lost wealth through the liquidation of mineral assets, during the decade (2000-2010), Australia experienced a significant gap between the states' sale proceeds from mining and the resource rents realised in the market, with the state receiving a mere AU$ 47.4 billion in exchange for minerals extracted valued at AU$ 266.2 billion (Obst & Vardon, 2014). This apparent loss of AU$ 218.8 billion (82% of the resource rent) underscores a global issue where Mineral Owners may not capture the true value of the minerals extracted, leading to substantial losses for the Mineral Owners. Similar instances globally merit attention in the ongoing debate about the accounting treatment of mineral sale proceeds.

While the debate on accounting of mineral sale proceeds (revenue versus capital) has received much attention, the issue of loss to the Mineral Owner (captured by the extractor & other rent-seekers) has received scant attention. The allocation of resource rents is crucial for the sustainability discourse, addressing both contemporary and inter-generational equity concerns.

The International Monetary Fund (IMF) requires governments to compile data on public finances using the Government Finance Statistics Manual 2014 (GFSM) and

on international trade using the Balance of Payments Manual 2009 (BPM6). The United Nations System of National Accounts 2008 (SNA) governs the collection of Gross Domestic Product (GDP) and other macroeconomic statistics of a country. The SNA provides definitions and concepts for all macroeconomic variables which are used for cross-country economic comparisons by analysts, including for the GFSM and BPM6. These are the frameworks of conventional macroeconomic, trade and public finance data.

Over the last three decades, concerns about sustainability (Brundtland Commission, 1987) have led to the UN developing the System of Environmental-Economic Accounting (SEEA), which operates as a satellite to the SNA. The current updates of these frameworks should unify definitions for all the conventional macroeconomic data (SNA, GFSM, and BPM6) by 2025. These revisions seek to remedy concerns with the current method of accounting for exhaustible resources (like oil and gas, iron ore) which provide misleading signals for resource management and deviates from the goal of sustainability of the economy.

This paper questions whether the proposed changes go far enough. We explore the way the GFSM and the SEEA could hide losses and mislead the public on the real performance of their governments. The split asset proposal for the SNA update is an improvement, but its extension to the GFSM would require additional steps.

These issues are important in tracking the Government's performance as stewards of non-renewable resources looking after the interests of current and future generations. Similarly, it is also important for all stakeholders to know what their intergenerational wealth status is.

The rest of the paper is organised as follows. In section 2, we look at how various international standards have evolved to manage mineral wealth. In section 3 we discuss the process of monetizing minerals, how Loss and Loss Rate can be estimated and comparing this with current practice. Section 4 examines how government and national accounting currently deals with mineral monetization. Section 5 examines the SEEA approach and an alternative approach, using simple examples and case study from Australia, and question whether the goal of the public

sector net worth is appropriate. Section 6 examines the split asset approach proposed in the upcoming SNA update, with a case study from Canada. In section 7, we discuss whether recognition of the mineral asset at discovery could increase governance issues, and our recommendations on implementation. Finally, in Section 8, we conclude!

2. Public Sector Accounting Standards

A system of unified common method of computing national income for all countries was started with the publication of the System of National Accounts (SNA) in 1953. The SNA has been revised 5 times since then – 1960, 1964, 1968, 1993 and most recently in 2008.

As well as the SNA for the measurement of national income, other accounting systems have been developed to provide international consistency. In the post-WW2 era, with the decline of the gold standard, developing countries became more prone to international payments crises due to imbalance between exports and imports.

The International Monetary Fund (IMF), created to ensure global financial stability, was given powers to scrutinise the finances of member countries (Article IV consultations). In 1986, the IMF developed the first Government Finance Statistics Manual (GFSM) that member countries were required to use for reporting purposes. The current version was issued in 2014.

An effort has been made to unify definitions and concepts used in the SNA with other major economic accounting statistics including the GFSM and BPM6. There is now an effort to align the International Public Sector Accounting Standards (IPSAS) of the IPSAS Board with the GFSM.

Environmental and resource use issues are also considered by the UN's System of Economic and Environmental Accounts (SEEA) which operates as a satellite to the SNA but also informs SNA developments.

This paper focuses on the GFSM as that is the principal standard applicable to Mineral Owners in terms of measuring their efficacy in capturing the full value of the mineral in the interests of current and future generations.

Definition of terms

In the reviewed literature, terms such as royalty, rent, and depletion rate, among others, have been used in multiple ways. For the sake of uniformity in the discussion that follows, we have adopted the following definition for each term (Table 1).

Table 1: Definition of Terms	
Term	**Definition and Source**
Revenue	*an increase in net worth resulting from a transaction* (GFSM:5.1)
└ Taxes	Taxes form part of Revenue "*are compulsory, unrequited amounts receivable by government units from institutional units*" (GFSM:5.2)
└ Other Income	Other Income forms part of Revenue *"all revenue receivable excluding taxes, social contributions, and grants."* (GFSM:5.6)
└ Property Income	Property Income is part of Other Income "*is the revenue receivable in return for putting financial assets and natural resources at the disposal of another unit*" (GFSM:5.107)
└ Rent	Rent is part of Property Income "*is the revenue receivable by the owners of a natural resource (the lessor or landlord) for putting the natural resource at the disposal of another institutional unit (a lessee or tenant) for use of the natural resource in production*" (GFSM:5.122)

Expense	"*is a decrease in net worth resulting from a transaction.*" (GFSM:6.1)
Net Operating Balance (NOB)	"*Revenue minus expense equals the net operating balance, reflecting the total change in net worth due to transactions. … The net operating balance is a summary measure of the sustainability of the reporting sector or subsector's operations.*" (GFSM:4.17-4.18)
non-resource Operating Balance	"*Total revenue excluding natural resource-related revenue minus total expense excluding natural resource-related expense*" (GFSM:Table 4A.2)
Asset	"*asset is a store of value representing a benefit or series of benefits accruing to the economic owner by holding or using the resource over a period of time.*" (GFSM:3.42)
Resource Rent or Economic Rent	Resource Rent or Economic Rent is the in-situ value of the mineral (i.e., prior to extraction). "*Economic rent is best considered to be the surplus value accruing to the extractor or user of an asset calculated after all costs and normal returns have been taken into account.*" (SEEA-CF:5.113)
Mineral Sale Proceeds (MSP)	The sale consideration received by the mineral owner in exchange for the mineral sold. Depending on the constitutional, legal and fiscal structures, this may include royalties, severance taxes, corporate tax, resource rent tax, windfall tax, export duties, production shares and dividends from stakes in the extractor. MSP is similar to Rent, except it is in exchange for minerals, not for the temporary use of minerals. (Defined by authors)

Depletion	"*5.76 Depletion, in physical terms, is the decrease in the quantity of the stock of a natural resource over an accounting period that is due to the extraction of the natural resource by economic units occurring at a level greater than that of regeneration.* *5.77 For non-renewable natural resources, such as mineral and energy resources, depletion is equal to the quantity of resource that is extracted because the stock of these resources cannot regenerate on human timescales. Increases in the stock of non-renewable natural resources (e.g., through discoveries) may permit the ongoing extraction of the resources. However, these increases in volume are not considered regeneration, and hence do not offset measures of depletion. The increases should be recorded elsewhere in the asset account.* *5.79 Depletion is not recorded when there is a reduction in the quantity of an environmental asset owing to unexpected events such as losses due to extreme weather or pandemic outbreaks of disease. These reductions are recorded as catastrophic losses. In contrast, depletion must be seen as a consequence of the extraction of natural resources by economic units.* *5.80 Depletion can also be measured in monetary terms by valuing the physical flows of depletion using the price of the natural resource in situ. … It is noted that the monetary value of depletion is equal to the change in the value of the natural resource that is due to physical depletion.*" (SEEA-CF:5.76, 5.77, 5.79,5.80)
Loss	Difference between the in-situ value of the mineral (Resource Rent) and the Mineral Sale Proceeds received by the Mineral Owner. (Defined by authors)

Loss Rate	Loss divided by the Resource Rent. (Defined by authors)

3. How mineral wealth is monetized

Mineral wealth is monetised when the mineral is discovered, extracted and sold in the market for money. Like the family silver, minerals are inherited wealth, and their mining is like the sale of the family silver, it is the responsibility of the Mineral Owner to minimise any loss in value during the monetisation. However, this is difficult with minerals for a variety of reasons. The size of a deposit, its quality of ore and the cost of extraction is often highly uncertain. Further, the market price for many minerals is very volatile as supply constraints and new mines, new uses for a mineral or a cheaper substitute can all have significant impacts on mineral prices. Consequently, the future path of resource rents is also highly uncertain and likely volatile.

In the face of this uncertainty, Mineral Owners have used different methods to monetise their minerals. They can explore and extract the minerals on their own and sell it through their own agencies (e.g., State Owned Enterprises). Alternatively, mineral owners can outsource the extraction but retain ownership over the extracted minerals (e.g. Telangana, India for construction sand).

A more common practice is where the government gives a private entity a mining lease to extract and sell the ore after paying a defined price, often termed “royalty”. In the case of low-value minerals like building stone & construction sand, the practice is for the royalty rate to be set by the government with the ability to unilaterally change it to meet the conflicting objectives of keeping mining going on and simultaneously minimising losses. The logic is that if the royalty rate is set too high, extractors could stop extracting.

Unilaterally variable pricing is workable when the extractor has low capital committed to the project. In large oil, gas and mining projects however, extractors demand fiscal certainty as their capital investment is early in the project cycle and can subsequently be held hostage by price changes. Consequently, there is a growing push to insist on detailed extraction contracts along with compensation for any

changes in laws and further protection under Investor–State Dispute Settlement (ISDS) treaty provisions.

Goa Case Study

Basu (2015) studied the iron ore industry in Goa, India for an eight year period (2004-12), using financial estimates from the largest extractor to estimate per unit resource rent. This was scaled up using volume metrics from the industry association and compared with the mineral sale proceeds recorded in the state financials. Figure 1 depicts a waterfall chart for how the mineral value was allocated.

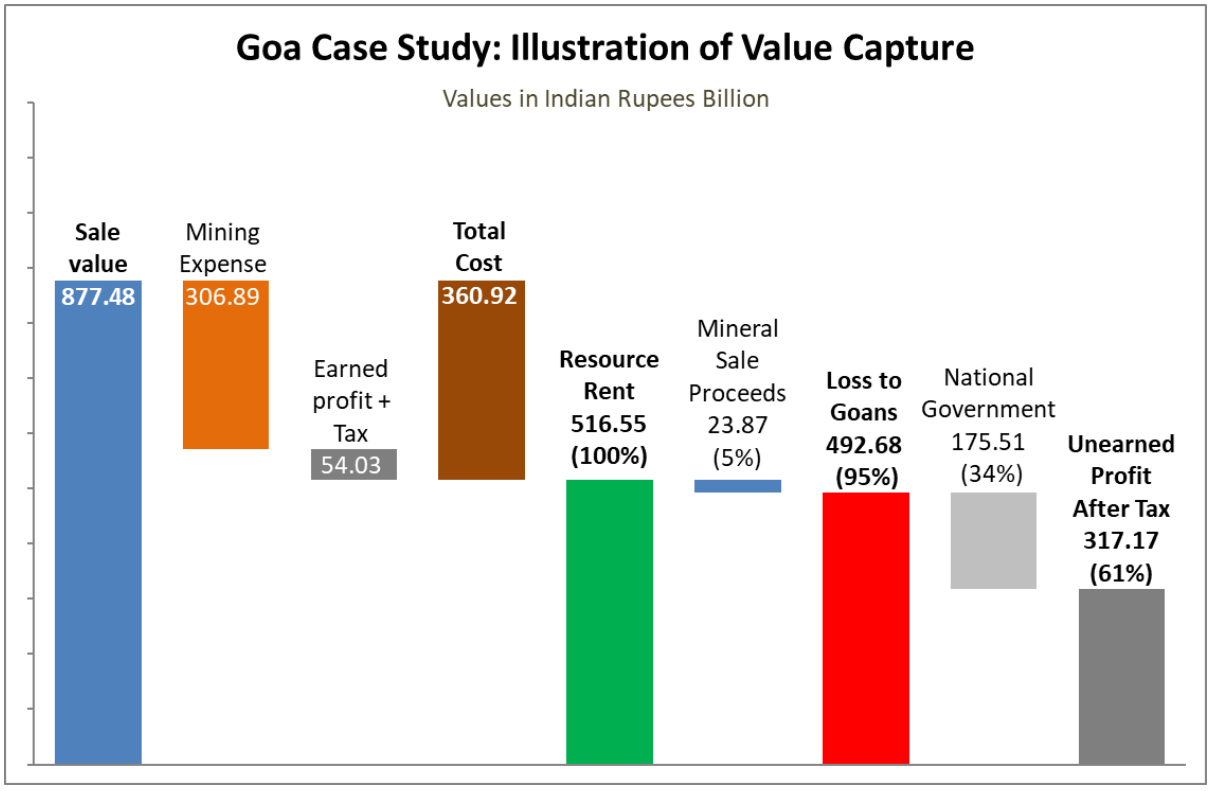

Figure 1: Over eight years (2004-12), iron ore worth Rs.877 billion was exported. Total cost including expenses (Rs.307 billion) and a 20% after tax return on capital employed, grossed up for corporate tax (Rs.54 billion) was Rs.361 billion. Resource Rent was Rs.517 billion. The state of Goa as public trustee received Mineral Sale Proceeds of Rs.24 billion (5%), implying a loss of Rs.493 billion (95%). The national government captured 34% and the extractors 61% as unearned profit after tax.

As can be seen from Figure 1, the state of Goa lost over 95% of the Resource Rent of the iron ore extracted and exported. In effect, minerals worth Rs.100 were sold for Rs.5, a loss of Rs.95. Of this, 34% was captured by the national government by way of export duties on iron ore and corporate taxes, while the extractors captured the lion's share. Under India's fiscal transfer system, there is no connection between taxes raised in a state and the fiscal transfers to that state, implying that the amounts captured by the national government are also a loss to the state of Goa as Mineral Owner. (Consider the case where minerals are explicitly held in trust, e.g., the US Department of Interior for their Indian tribes. In this case, any reduction in the corpus of the trust due to rent-capture by other entities including government units are a loss to the trust beneficiaries).

4. Current Government & National Accounting

The GFSM provides the Net Operating Balance (NOB, revenue - expense) as a measure of sustainability of the Mineral Owning government entity. It treats the mineral sale proceeds as a part of Rent, in turn part of Property Income, which is a component of Other Income, which forms part of Revenue. There is no recognition of the loss of mineral wealth due to sale of minerals in this method. Similarly, the Resource Rent forms part of the Goa State GDP (GSDP) but there is no recognition of the reduction in the remaining stockpile of ore.

The GFSM also provides a set of non-resource metrics, prominent of which is the nonresource operating balance (NROB defined as nonresource revenue - nonresource expense). However, since the mineral asset is not recognized as an asset, the Loss is not measured in the GFSM. While the SNA does not explicitly consider non-resource metrics, a non-resource GDP can be developed by subtracting Resource Rent from GDP.

Goa Case Study continued

The Goa government reported mining revenues at around 8.71% of total revenue (Table 2). This would not indicate significant resource dependence. The NOB is also reported at -2.46% of GDP, not worryingly large.

Table 2: Goa Case Study: Government Financials 2004-12			
			Amounts in Rs. billion / % of GDP
	As Reported	**Non-resource (IMF GFSM)**	**Reality**
Total Revenue	274.02	250.15	250.15
Of which: “Revenue” from mining	23.87	0	0
Total Expense	320.08	320.08	812.76
Of which: Loss from mining	0	0	492.68
NOB (Revenue - Expense)	-46.06	-69.93	-562.51
Goa GDP	1,872.97	1,356.42	1,356.42
NOB as % of GDP	-2.46%	-5.16%	-41.47%

However, the true position is that there is no revenue as it is the sale of inherited wealth; instead, there is an enormous hidden capital loss which is 153.92% of reported expense. True NOB is -41.47% of non-resource GDP, which is 12 times larger than the reported NOB. This is clearly alarming as the required fiscal adjustment to bring the NOB to zero is enormous. Goa’s public sector net worth has declined enormously. This is clearly unsustainable!

Current government accounting incentivizes further extraction under these adverse terms - doubling mining would double mining revenue, improving the NOB. The truth unfortunately is with a Loss Rate of 95%, doubling mining would make a bad situation much worse (Basu & Pegg, 2020).

These incentives to extract are at the root of many other issues. Successful rent-seekers push for more extraction, along with Mineral Owners, everyone competing in the race to consume the family silver. Local communities and the environment become obstacles in the race to capture rent. With such incentives, it is hard to see how fossil fuel extraction will ever cease.

5. UN SEEA approach

It is in the UN System of Environmental-Economics Accounts - Central Framework 2012 (SEEA-CF) that we first find a recognition in official accounting methods that sub-soil minerals should be recorded as assets. How should extraction be treated?

Following an academic debate between El Serafy (1989) and Vanoli (1995), the SEEA-CF adopted El Serafy's approach, wherein the extraction of mineral ore would be accounted as a depletion of assets. Depletion is defined as the difference between opening mineral wealth and closing mineral wealth. The SEEA framework deducts the depreciation of physical capital and the depletion in natural capital from Net Domestic Product (NDP) to arrive at green NDP.

In physical terms, the opening and closing balance are based on the mineral reserves and the extent of extraction. In order to arrive at the monetary values of the minerals, the SEEA-CF estimates the discounted stream of resource rent over the remaining life of the deposit (typically truncated at 25 years).

From the perspective of a Mineral Owner, the natural metric to examine is Mineral Sale Proceeds minus Depletion. If this is near zero, it would appear that public sector net worth is non-declining, and therefore this is sustainable.

Relationship between Resource Rent and Depletion

The mineral value can be estimated as follows:

$$V_t = \sum_{T=1}^{N_t} \frac{RR_{t+T}}{(1+r_t)^T} \qquad \dots 1$$

Where V_t is the value of the mineral deposit at time t; N is the asset life; RR is the stream of resource rents; and r is a nominal discount rate (SEEA-CF 5.151). Depletion of natural resources is the fall in value of natural resources caused by its extraction, or closing balance minus opening balance. Therefore,

$$Depletion_{(t)} = V_{(t-1)} - V, = RR_t - rV_t \qquad \dots 2$$

The latter element (rV_t), called “Net Return to Environmental Assets” in the SEEA (SEEA-CF:Table 5.5) is the increase in value of the remaining sub-soil minerals as a result of discounting for one less period. Following Obst & Vardon (2014), we shall call this Return on Natural Resources (RoNR).

We can restate equation 2 as

$$RR_t = Depletion_{(t)} + rV_t \qquad \ldots 3$$

Or Resource Rent = Depletion + Return on Natural Resources (result in SEEA-CF:Table 5.5)

Since Return on Natural Resources (RoNR) will never be negative, Resource Rent will exceed Depletion. If RoNR is sufficiently large, Depletion can become negative.

Incorporating Loss

Vanoli (1995) suggested that instead of deducting Depletion, we should be deducting Resource Rent, as that is the value of the mineral extracted. The Return on Natural Resources would be recorded as a part of income, balancing the books. In this presentation, Loss can easily be computed as Resource Rent - MSP. We support Vanoli’s approach as Loss is a better indicator of managerial performance and is made explicit. Using Depletion - MSP as the main indicator can be misleading.

Simple example

Let us begin with a simple example to illustrate this. Consider a single mine with an in-situ value (resource rent) of $100. Let us also assume that it is completely extracted and sold instantaneously at the end of year 1. Let us assume a discount rate of 4% (used by the World Bank in their Changing Wealth of Nations 2021).

Let us assume that this is a fair transaction, i.e., the Mineral Sale Proceeds equals the Resource Rent.

At the start of the year, the reserve has a discounted value of $96.15 assuming it is fully exploited at the end of the year. At the end of Year 1, the mineral owner has cash from the sale of mineral wealth = $100.

Now think of an unfair transaction, where the Mineral Sale Proceeds are lower than the Resource Rent. Suppose the Mineral Sale Proceeds are $97, a loss of $3.

In this case, at the end of Year 1, the mineral owner has cash from sale of mineral wealth of $97, in effect an increase in net worth of $0.85 relative to the $96.15 original value of the reserve. On the face of it, wealth has been maintained and even increased (Table 3).

Table 3: SEEA Simple Example (Unfair Transaction)				
	SEEA (El Serafy)		**Vanoli**	
Mineral Account				
Opening Balance		$96.15		$96.15
Add:			RoNR	$3.85
Less:	Depletion	$96.15	Resource Rent	$100.00
Closing Balance		$0		$0
Cash Account				
Opening Balance		$0		$0
Add:	MSP	$97.00	MSP	$97.00
Closing Balance		$97.00		$97.00
Combined Accounts				
Opening Balance		$96.15		$96.15
Revenue	MSP	$97.00	RoNR	$3.85
Expense	Depletion	$96.15	**Loss on sale of assets**	**$3.00**

=> Increase in NW	**$0.85**	$0.85
Closing Balance	$95.00	$95.00

If we follow Vanoli's approach, we find that revenue is only RoNR, while Loss is explicitly expensed. From the perspective of the Mineral Owner, separately disclosing the Loss and the Return on Natural Resources provides more useful information.

Extended simple example

Let us extend this scenario to a mineral deposit where minerals worth $100 of Resource Rent are extracted at the end of each of 25 years. In this case, the Mineral Wealth at the beginning of year 1 is $1,562.21. If this were a fair extraction contract, then at the end of Year 25, the mineral owner should have received $2,500 ($100 x 25 years). And if the cash received were invested at the 4% discount rate, then the wealth at the end of Year 25 would be $4,164.59.

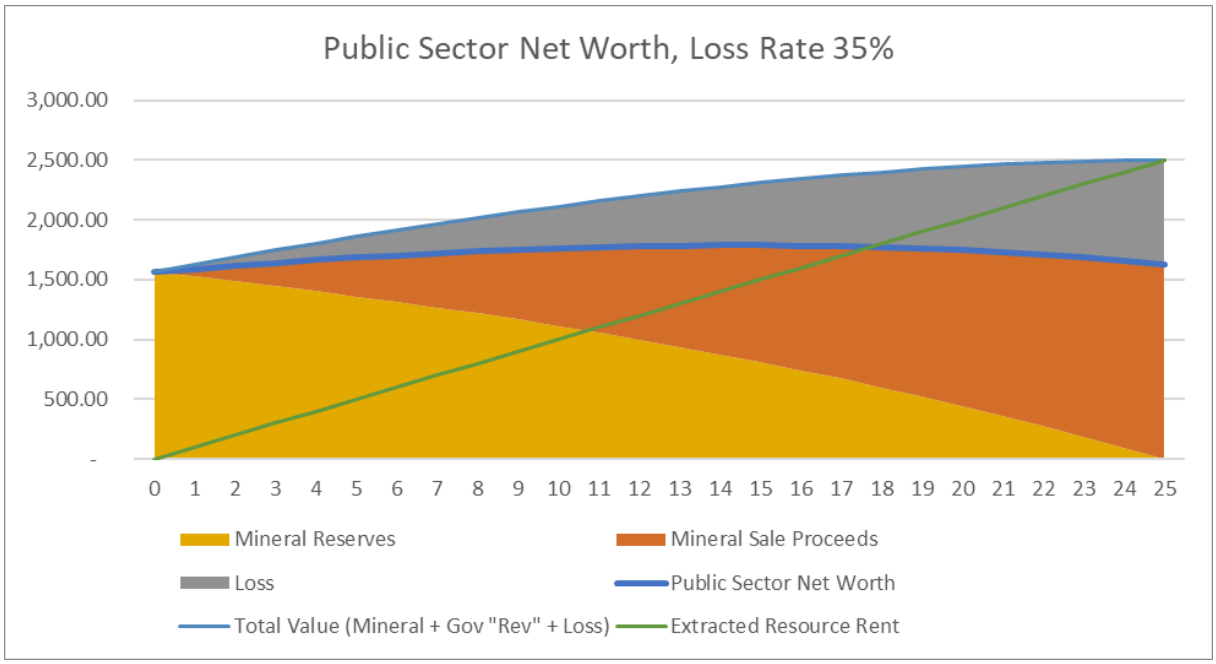

Figure 2: The evolution of the public sector net worth in the extended simple example with an unfair contract. The discounted value of minerals reserves reduces to zero, while the minerals extracted increases to $2,500, divided between mineral

sale proceeds (65%) and the loss (35%). Public sector net worth is the mineral reserves + mineral sale proceeds, which peaks at $1,786.09 at the end of year 15.

Now consider an unfair contract, where the mineral owner receives only $65 for each $100 of Resource Rent (Figure 2). In this case, we find that at the end of Year 25, the mineral owner has received $1,625 ($65 x 25 years), resulting in an increase in net worth of $62.79. At first glance, this may appear to be an acceptable outcome. However, beneath the surface, there exists a concealed loss of $875 ($35 x 25 years). Looking from the Year 25 perspective, this annual loss could have been invested to generate a 4% return, escalating the overall loss to $1,457.61.

Table 4: SEEA Simple Example Extended (Unfair Contract)				
	SEEA (El Serafy)		**Vanoli**	
Mineral Account				
Opening Balance		$1,562		$1,562
Add:			RoNR	$938
Less:	Depletion	$1,562	Resource Rent	$2,500
Closing Balance		$0		$0
Cash Account				
Opening Balance		$0		$0
Add:	MSP	$1,625	MSP	$1,625
Closing Balance		$1,625		$1,625
Combined Accounts				
Opening Balance		$1,562		$1,562
Revenue:	MSP	$1,675	RoNR	$938

Expense:	Depletion	$1,562	**Loss on sale of assets**	**$875**
=> Increase in NW		**$63**		$63
Closing Balance		$1,675		$1,675

As can be seen, on the face of it, the performance by the Mineral Owner is quite impressive, increasing public sector net worth despite extraction of minerals. The reality is that there is an enormous hidden Loss of 35% of the asset value, which should be unacceptable in any normal situation (Table 4).

Goal for Public Sector Net Worth?

One open question is the goal of the public sector net worth (Table 5). If we adopt El Serafy's approach, it would seem that maintaining public sector net worth at $1,562 would ensure sustainability. If we adopt Vanoli's approach, the goal would be to achieve zero loss, and the ending public sector net worth of $2,500 would be acceptable. A more realistic proposal would be to reinvest the mineral sale proceeds at the social discount rate, achieving a closing net worth of $4,165. And at the moment, the IMF is most concerned with global financial stability and monitors the national debt / GDP ratio. This implies that even a zero closing net worth is acceptable.

Table 5: Target Closing Net Worth	
SEEA (El Serafy)	$1,562
Vanoli	$2,500
Reinvestment	$4,165
IMF debt sustainability	$0

It is worth pointing out that if the discount rate increases, then the El Serafy target would reduce (more discounting), while the reinvestment case would be higher. If we

use a 5% discount rate the starting balance is $1,409 (El Serafy) and the reinvestment ending balance target is $4,772. At a zero discount rate, the El Serafy, Vanoli and reinvestment cases are identical at $2,500. This would suggest that lowering the social discount rate can dramatically increase the public sector net worth in resource-rich nations.

Extended simple example with Reserve Replacement

In the extractives industry, there is a continuous effort to find new reserves to replace that which is extracted. Put simply, the effort is to maintain the amount of reserves still to be extracted.

In this case, the closing balance of minerals is the discounted value of $100 over 25 years or $1,562, identical to the opening balance. On the face of it, even if all the minerals are stolen or gifted away, the public sector net worth is unchanged. But has wealth truly been maintained?

Australia Case Study

Obst & Vardon (2014) analysed the SEEA data from the Australian Bureau of Statistics for the decade 2000-2010 (Table 6). On the face of it, since Mineral Sale Proceeds is greater than Depletion, public sector net worth has marginally increased by AU$ 0.3 billion, which is a positive performance.

Table 6: Australia Case Study	
	Amounts in AU$ billion
Basic Data	
Resource Rent	$266.2
Return on Natural Resources	$222.4
Depletion	$47.1
Mineral Sale Proceeds	$47.4

Note: Resource Rent ($266.2) is not exactly equal to Depletion + Return on Natural Resources ($269.5)	
SEEA (El Serafy)	
Depletion	$47.1
Mineral Sale Proceeds	$47.4
Increase in Government Net Worth	**$0.3**
Our Perspective (Vanoli)	
Resource Rent	$266.2
Mineral Sale Proceeds	$47.4
Loss/Unrequited Capital Transfer	**$218.8**
Loss % of Resource Rent	82%

The reality is that Australia received a mere AU$ 47.4 billion in exchange for minerals extracted valued at AU$ 266.2 billion. This enormous loss of AU$ 218.8 billion, representing 82% of the resource rent, is hidden in the SEEA approach by the substantial Return on Natural Resources (Table 7). Since the Australian population in those years was around 21 million, the loss is effectively a hidden per head tax of AU$ 10,000 per man, woman and child, redistributed to the extractors (and their government cronies). This is a massive driver of inequality and is plainly unfair.

Table 7: Comparing GFSM, SEEA and Reality

Amounts in AU$ billion

	No Asset Recognized			**Asset of Mineral Owner**	
	Standard	**Non-resource (GFSM)**	**Reality**	**SEEA (El Serafy)**	**Vanoli**
Revenue	**$47.4**	**-**	**-**	**$47.4**	**$222.4**

MSP	$47.4	-	-	$47.4	-
RoNR			-		$222.4
Expense	**-**	**-**	**$218.8**	**$47.1**	**$218.8**
Depletion	-	-	-	$47.1	-
Loss	-	-	**$218.8**	-	**$218.8**
Net Operating Balance	**$47.4**	**0**	**$-218.8**	**$0.3**	**$3.6**
Note: The NOB in the SEEA and Vanoli cases are different as in the original data, Resource Rent is slightly lower than Depletion + RoNR.					

As we can see, explicitly disclosing Loss would likely result in significantly different behaviours and outcomes. Arguably, the no asset reality case is a better depiction, as the Return on Natural Resources is an artifice of discounting.

6. Split Asset Accounting

Under the previous approaches, the mineral wealth is recognized as an asset of the Mineral Owner, and as extraction takes place, the mineral asset reduces partly counterbalanced by the mineral sale proceeds, with the difference being the Loss. However, in large extraction projects, there are often strong commercial contracts with protection against changes in terms. In this case, it is quite possible for the contract to result in a significant Loss at execution, i.e., a part of the future flows of resource rent will be captured by the extraction under the contractual terms.

The Reko Diq Case (2022) illustrates this well. An exploration and mining JV contract was signed between Tethyan Copper Company (TCC, then owned by BHP Billiton) and the Baluchistan Government, Pakistan in 1983. When the Baluchistan government refused a mining lease in 2011, TCC took the Pakistan government to court claiming investment of $220 million and damages of $11.43 billion. Eventually in 2019, the World Bank Group's International Centre for Settlement of Investment Disputes (ICSID) awarded $5.976 billion to TCC. It is clear that there has been a

hidden public wealth transfer of over $5 billion from the Baluchistan government to TCC.

As a part of the update to the SNA, GFSM and BPM6, it is proposed to adopt a split asset accounting approach to minerals (UN Statistics Division, 2023). In effect, the discounted future stream of resource rents will be split between the Mineral Owner and Extractor, and both would recognize their part of the asset. The asset recorded by the Extractor is the NPV of Future Loss as a result of the binding contract. As extraction takes place, the SEEA approach of deducting depletion would take place for the Mineral Owner and Extractor separately.

Extended example with Split Asset Accounting

For example, in our simple 25-year example above with a 35% loss rate, the Mineral Owner will record an asset of $1,015.44 while the balance $546.77 would be recorded as an asset against the extractor, totalling to $1,562.21. It is not yet clear if and how the mineral owner will record the capital transfer of $546.77 to the extractor, the NPV of the future loss.

As the minerals are extracted, we presume the mineral sale proceeds would continue to be recorded as revenue for the mineral owner (and an expense for the extractor). Depletion would also be split between the mineral owner and extractor. At the end of 25 years, the Mineral Owner will record revenue of $1,625, significantly greater than their total depletion allocation of $1,015.44. The difference represents the mineral owner's share of the Return on Natural Resources (Table 8).

Table 8: Extended Example under Split Asset approach

	UN SNA Proposal		**Our proposal**	
At contracting				
Asset Recognized		$1,015		
NPV of Resource Rent		-		$1,562

NPV of MSP		$1,015		-
Less Expense: Loss at contract		-		**$547**
Balance after Contracting		$1,015		$1,015
Net Operating Balance		**-**		**$-547**
During extraction				
Opening Balance		$1,015		$1,015
Revenue:	MSP	$1,675	RoNR	$610
Expense:	Depletion	$1,015	**Loss on sale of assets**	**$0**
=> Increase in NW		**$610**		$610
Closing Balance		$1,675		$1,675

As can be seen, under the split asset approach, during extraction, net income of $610 is recorded. Recognizing the full asset by the Mineral Owner, with the contractual loss of $547 recorded explicitly, followed by recognizing the Return on Natural Resources of $610 as revenue would provide a better depiction of the situation.

Canada Case Study

Since December 2015, Statistics Canada (StatCan) has been providing estimates of national natural resource wealth on a quarterly basis, disaggregated by sector – government, corporate and household. The methodology is set out in their paper, “Natural resource wealth statistics in the National Balance Sheet Accounts” (StatCan, 2015).

The paper says “*The situation in Canada is one where governments have a custodial function with respect to natural resources, holding them "in trust for the nation". …*

Governments in Canada do not account for natural resource stocks in their financial statements (public accounts), which is the general off-balance-sheet treatment for assets held in trust. Notably, the inclusion of natural resource stocks on government balance sheets is not included in the IMF Government Financial Statistics manual."

For the nation, "*The natural resource asset value is calculated in two steps: a) resource rent is derived as resource sales revenue less extraction costs; and b) the discounted sum (or net present value) of the stream of resource rents is estimated.*"

The natural resource wealth of the government is "*the government's share of natural resource wealth on the net present value (NPV) of the expected revenue stream paid by resource extractors to governments (i.e. (that is to say), royalties and special taxes).*"

Household natural resource wealth is estimated at zero – few own natural resources prior to extraction or hold extraction contracts.

The corporate sector natural resource wealth "*is calculated as total resource wealth less the above NPV (net present value) of the expected stream of royalties and special taxes. This residual amount is allocated to the corporate sector as its share of resource wealth. Assuming that the government's share is estimated accurately,* ***this is equivalent to the value of an intangible corporate asset reflecting the government-conferred right to extract and sell the nation's natural resources.***" (our highlights).

Note that since natural resource wealth is based on resource rents, which in turn ensures a normal profit for the extractor, this is a pure wealth transfer. In other words, the corporate sector's natural resource wealth is the NPV of the future stream of Losses (NPV Loss). Ideally, this should be zero. And we can estimate a NPV Loss Rate defined as the Corporate Sector Natural Resource Wealth (or NPV Loss) divided by the total resource wealth.

StatCan's quarterly natural resource wealth data series begins with Q1 1990 (StatCan, 2024). As Figure 3 shows, the NPV Loss Rate varies between 44% and 86% with a median of 73% and terminal value of 74%.

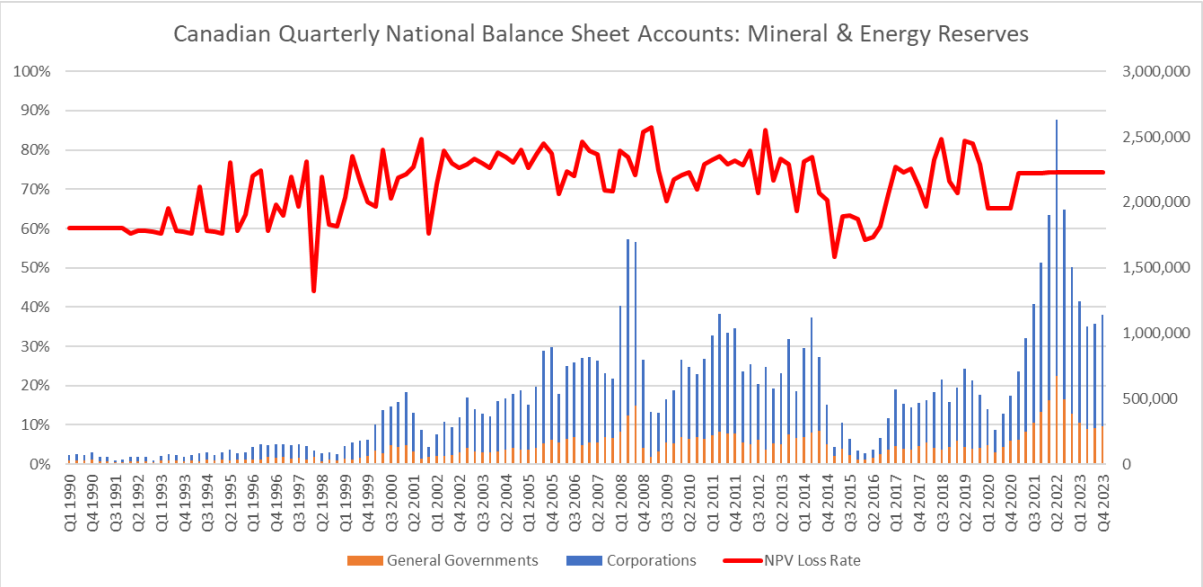

Figure 3: Canada's quarterly balance sheet value of natural resources allocated between General Governments and Corporations using split asset valuation (Q1 1990 – Q4 2023). The red line shows the % of total value allocated to Corporations, or the future loss by General Governments.

The latest data point, as of 31-Dec-2023, indicates Canada has CA$1,141.057 billion worth of minerals – measured as the NPV of future resource rent streams. Of this value, the government will receive only CA$291.926 billion, effectively losing CA$849,131 billion! The NPV Loss Rate is 74%.

As can be seen, it would be preferable to first recognize the entire asset without recording revenue, treat the contractual Loss as an expense, resulting in the same closing balance. However, the Net Operating Balance would record the contractual Loss as it reduces the Public Sector Net Worth. It should be noted that accounting standards for private extractors do not allow asset recognition of the NPV of the Resource Rent that they have contractually captured.

7. Discussion

Should we recognize the mineral asset?

In the split asset approach, the initial allocation to the extractor represents the future loss when contracted, in effect a capital gift. If the mineral sale proceeds are treated as revenue or a part of GDP, then only the nonresource Net Operating Balance or NDP would measure sustainability as the mineral sale proceeds are non-recurring in nature.

The split asset approach implicitly assumes that minerals are recognized as an asset when there is a contract to extract it, and that once the contract is entered into, the mineral owner cannot change the terms unilaterally. This is true for larger deposits and especially if investor protection agreements or treaties are negotiated.

However, traditional methods of mineral management, especially for smaller value deposits, allow the government to change the royalty rate payable by the extractor. This flexibility is intended to enable increase in royalty rates when prices and per-unit Resource Rents are high. In this scenario, arguably a split asset approach is inappropriate.

The number of extractive projects with ISDS protection are increasing, implying a split asset approach may be appropriate. The $5 billion contractual loss at Reko Diq or the CA$956 billion contractual loss in Canada is material. However, there is still a large volume of other minerals where the terms of the contract / laws, especially the mineral price, can be altered unilaterally, and splitting the asset may not be appropriate.

There are three strong reasons to prefer a no-asset recognition approach (as at present). First, asset values are difficult to estimate and involve highly subjective assumptions. There is a strong incentive for the government to adopt either optimistic assumptions and borrow against future extraction, risking the Presource Curse (Cust and Mihalyi, 2017), or to apply a high discount rate to show better

performance from the higher Return on Natural Resources, which could be recorded as income.

Second, asset values with constant assumptions are still highly volatile due to the high volatility of commodity prices. If minerals are recognized as assets, in resource-rich nations, asset revaluations will swamp everything else. Brekke (1997) found "*If the capital gains associated with resource price changes are counted as income, this may easily be the dominating factor determining income. Below, we will present estimates of these uncertain changes in Norwegian petroleum wealth. It turns out that if they were added to income, NNI would be doubled in some years while it would be negative in others.*" Cazebon & Henn (2018) estimated in 2017 that Norway's remaining oil & gas was worth 149% of GDP, based on an oil price of $60 / barrel and a 5% discount rate. Even a $1 / barrel change in oil prices will change public sector net worth by more than 1.5% of GDP

Third, with the coming dislocations to the global economy as a result of the transition, many mineral deposits, notably fossil fuels, may see their value evaporate. This would put pressure on the Mineral Owners to extract while these deposits still have value. In the context of fossil fuels, this would have the perverse impact of accelerating the climate catastrophe. This is the Green Paradox (Sinn, 2012), and will be exacerbated by asset recognition.

It is worth noting that under the International Financial Reporting Standards (IFRS), private companies are not permitted to recognize their portion of the split asset.

Implementing Loss & Loss Rate disclosures

In summary, we recommend that we understand mineral extraction as the process of liquidating mineral wealth in exchange for mineral sale proceeds. This implies that mineral sale proceeds be treated as capital inflows from an asset exchange, while losses, if any are recorded as expenses, and the Return on Natural Resources be recorded as revenue. Depending on the nature of the mineral deposit and contractual terms for extraction, the split asset approach may be appropriate.

With smaller or more uncertain mineral deposits, recording the mineral sale proceeds as a capital receipt may be a first step. If estimates for resource rent are available (e.g., from the financial statements of the extractor), then loss can be recorded as an expense each year.

From a national income statistics perspective, GDP is used as a measure of gross output which is related to military and geopolitical power. Treating mineral sale proceeds as revenue and a part of GDP incentivizes unsustainable extraction and should not be allowed. Further, it has long been recognized that net metrics like NDP are superior to gross metrics like GDP from a sustainability perspective. The appropriate recording would be to deduct the resource rent in the recording of mineral value addition for GDP purposes.

Further, in many resource-rich nations such as Guyana, large extractors are foreign entities. To the extent that public wealth is lost to such extractors, the domestic product can dramatically overstate the national income, leading to over-optimism and problems like the Presource Curse (Cust and Mihalyi, 2017). In such cases, Net National Income (NNI) is the appropriate metric for social planners to target.

As far as the Balance of Payments are concerned, the resource rent of minerals traded should be recorded on the capital account, not the current account. Clearly this will be nearly impossible for imports. An alternative would be to treat the entire mineral value as a capital item, since arguable even the opportunity for value addition by labour, capital and government is a finite shared inheritance that depletes with extraction.

Further, it is clear that there is no consensus on the goal for the public sector net worth, and this is an area that needs further work.

8. Conclusion

We have tried to show that the present approaches to treatment of mineral sales by mineral owners, whether government or the nation, are inappropriate and severely misleading. The sustainable level of government revenue is overstated as is GDP.

Further, real and significant losses are hidden, even when depletion is deducted as a charge. Governments and nations are far less sustainable than they seem.

We recommend that (a) mineral owning governments treat mineral sale proceeds as capital receipts, (b) record losses of mineral value when selling or contracting to sell minerals as an expense, (c) for national accounts, the entire resource rent, regardless of who captures it, be treated as a capital item and not part of GDP, (d) to the extent resource rent is lost to foreign entities, it be deducted to arrive at NNI, and (e) if estimates are available, the return on natural resources be recorded as part of government revenue and GDP.

This treatment is in keeping with the character of the transactions. We recognize that there are significant political and geopolitical incentives to record higher government revenue and GDP and disregard losses of resource rent. Unfortunately, this is not sustainable, and threatens the sustainability of governments, nations and even civilization.

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