Natural Capital Accounting in the Australian Mining Sector

CASE STUDY REPORT

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Acknowledgements

Citation

Maybee, B. [a], Waterer, S. [b], Pantelic, L. [c], Meney, K. [c], Parkhurst, T. [d], Standish, R.J. [d], Mackay, W. [e], Regan, C. [e], Summers, D [e]. 2023 Natural Capital Accounting in the Australian Mining Sector: Case Study Report. CRC TiME, Australia

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Executive Summary

Executive Summary

Increasingly, organisations are being asked to account for their impacts and dependencies on nature and their stewardship of the natural capital under their ownership and or management.

Growing concern about risks to economic stability associated with changing climates and declining biodiversity have generated calls for greater action from the private sector.

The prominence of natural capital accounting and natural capital assessment in responding to these calls for improved disclosure has accelerated considerably over the last decade, which has seen the emergence of numerous initiatives, frameworks, metrics and targets, all aimed at improving the consistency and comparability of reporting in relation to natural capital.

ABOUT THIS PROJECT

The mining sector environmental and economic accounting project was initiated by the Australian Government's Department of Climate Change, Energy, the Environment and Water with the aim of increasing the preparedness of the resources sector for the changing reporting and disclosure regimes associated with rising expectations for disclosure of nature and climate-related risks.

The project was jointly led by CSIRO and CRC TiME and aimed to test the applicability of Natural Capital Accounting (NCA) in the mining sector, build capability, better understand the readiness of the industry for adoption, and to provide guidance to promote consistent application and reporting of natural capital information.

Key activities in the project included a series of mining-specific natural capital case studies. The case studies were led by university research teams and partners (Curtin University, Murdoch University, Syrinx Environmental PL, The University of South Australia) working with industry partners (Alcoa, BHP, Hanson) to test the applicability of the processes on industry data.

Insights and lessons learnt from these case studies were used to inform an analysis of the business case and indicative roadmap for implementation and to produce guidance materials to assist with building capability and promoting broader adoption across the sector.

ABOUT THIS REPORT

This document presents an in-depth analysis of the application of NCA in the mining sector, exploring its potential to integrate environmental considerations into corporate and national accounting systems. Through detailed case studies (Alcoa, BHP Beenup, BHP Olympic Dam, and Hanson) the report evaluates the challenges and opportunities associated with implementing NCA in the mining sector.

The document begins with an overview of Natural Capital Accounting, a framework that quantifies the stocks and flows of natural resources and ecosystem services. It emphasises the need for incorporating these values into accounting and reporting systems to drive more sustainable practices.

It then provides synopses of four case studies to test the applicability of the System of Environmental Economic Accounting–Ecosystem Accounting (SEEA–EA) framework principles at different stages of operations in the mining sector as follows:

- **Alcoa Case Study:** Focuses on rehabilitation success in the Northern Jarrah Forest of southwest Western Australia.

- **BHP Beenup Case Study:** Explores the applicability of NCA principles at BHP's closed and rehabilitated Titanium Minerals Sands site, and is the first attempt at applying NCA principles in the mining industry.

- **BHP Olympic Dam Case Study:** Assesses NCA's applicability at the Olympic Dam operation, considering the unique characteristics of an operating site with substantial land holdings.

- **Hanson Case Study:** Examines NCA at the Gaskell Avenue Quarry, highlighting challenges and insights in applying NCA at transitional mining sites.

The document identifies key challenges to implementing NCA at the project level in the mining sector, which includes aspects such as data availability, the complexity of valuing natural assets, and the need for robust methodologies.

It also highlights opportunities like better management of natural resources, enhanced stakeholder trust, and alignment with sustainability goals, and underscores the potential strategic value of NCA in aiding decision-making, enhancing environmental impact assessment, and guiding rehabilitation efforts.

In this framing, the use of NCA for forecasting in the Hanson Gaskell North case study stands out as an innovative approach, demonstrating its potential as a planning tool in the mining sector.

The document recommends a focused approach to overcoming identified challenges, including the standardisation of methodologies, improvements in data collection and processing, and the integration of NCA into regular business practices, before concluding that while NCA presents challenges, its integration into the mining sector is vital for more sustainable resource management and environmental stewardship. It calls for collaborative efforts from corporations, governments, and regulatory bodies to realise the full potential of NCA.

Overall, this document provides a comprehensive exploration of NCA at various stages of operations in the mining sector, presenting it as a crucial tool for sustainable development and environmental conservation.

It serves as a valuable resource for stakeholders in the mining industry, including policymakers, and environmental conservationists.

Introduction

Introduction

WHAT IS NATURAL CAPITAL ACCOUNTING (NCA)?

Natural capital is a term used to describe the world's stocks and flows of natural assets (Thwaites & Walsh, 2021), such as native forests and associated ecosystem functions, which provide ecosystem services that sustain human activity.

Natural assets presented as "Capital" assist the understanding that the environment is comprised of stocks of renewable and non-renewable assets, which can be invested to generate value, or degraded resulting in depleted value.

"For this reason, Natural Capital is an attempt to better convey the true value of nature and an untapped market opportunity rooted in truly sustainable returns" (Deloitte, 2022).

The combination of soil, air, water, minerals and living things like mammals, fish, plants and microbes contribute more than US$125 trillion to the global economy every year (Bilmes, 2021). According to Iredele and Moloi (2020):

> Natural capital has proven to be the basis for other capital. This is because it is the basis not only for production but also of life itself. Human well-being arises from the use of a combination of types of capital: social capital, human capital and built capital, but these are all based on natural capital.
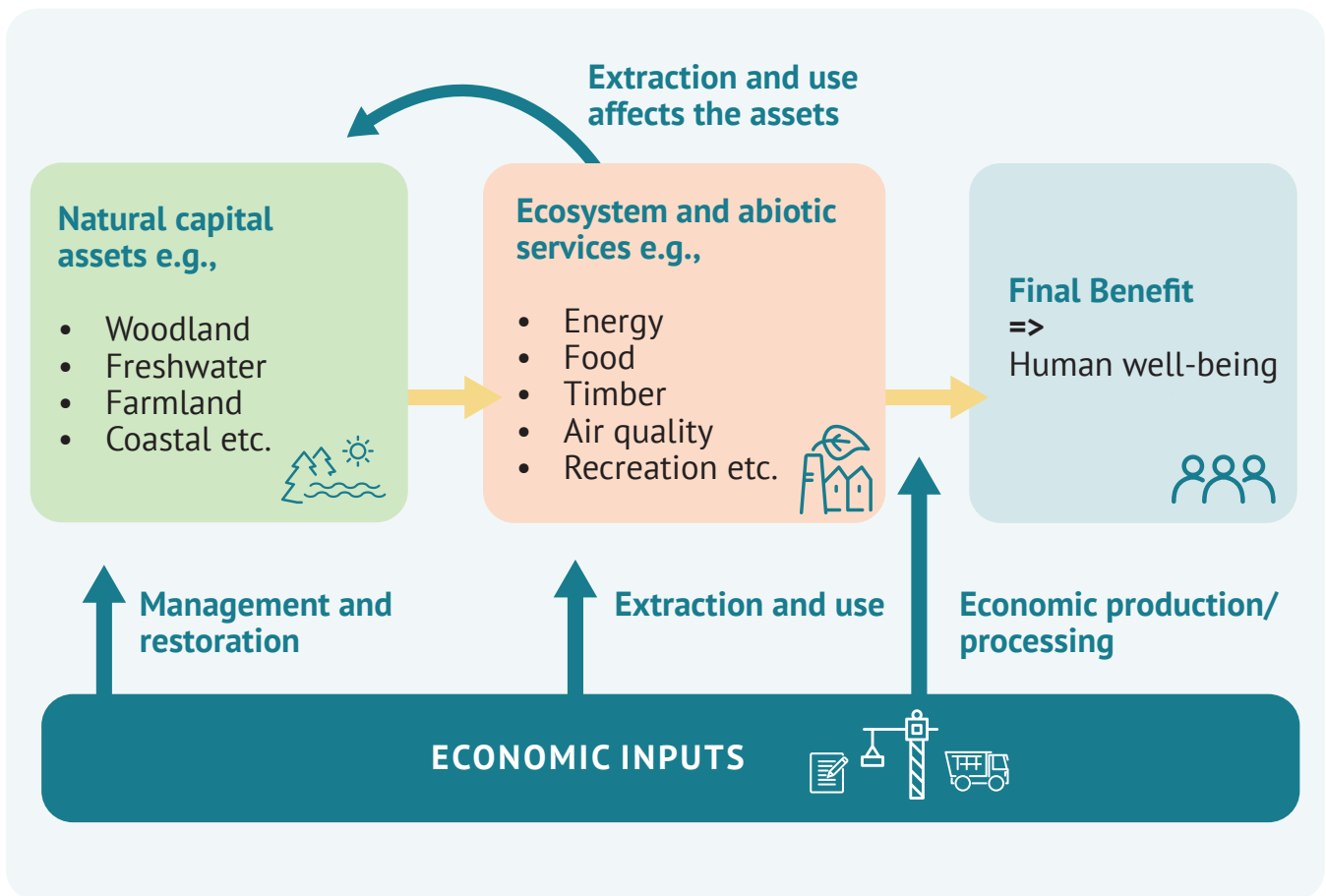
Figure 1: Linking Natural Capital Assets, Ecosystem Services and Human Well-being
Source: Department for Environment, Food and Rural Affairs (DEFRA), Office for National Statistics.

As depicted in Figure 1, humans are not just reliant on stocks of natural capital, but also on the services they provide, known as Ecosystem Services (ES). This includes carbon absorption, water filtration, pollination of crops, and mitigation of flooding by wetlands and coral reefs, which present a buffer that protects the coast from waves, storms and floods (Beck et al., 2018), to name a few.

A good example are Mangrove ecosystems. These dense coastal forests, which store more carbon than land-based tropical rainforests, also provide breeding grounds for marine biodiversity and protection against extreme weather events (Conversation International, 2023).

Thwaites and Walsh (2021) note that natural assets represent a major opportunity to achieve positive climate outcomes and many of the United Nations' Sustainable Development Goals (SDGs), as they provide the world's population with a variety of critical products and services (e.g., food, fibre, wood, fuel, water, protection against natural disasters, spiritual fulfilment, aesthetic enjoyment).

Unfortunately, these natural assets and services are being undervalued by human societies and, in some cases, depleted recklessly. Some studies warn it would take 1.6 Earths to maintain the world's current living standards (Bilmes, 2021).

Thus, natural capital needs to be treated like any other capital (e.g., financial, built (or physical), human and social), requiring accurate monitoring, measurement and valuation so that it can be properly accounted for to facilitate action (NSW Department of Planning and Environment, 2022).

Natural Capital Accounting (NCA) is the process of measuring the total stocks and flows of natural capital and integrating the value of environmental assets and ES into accounting and reporting systems at international, national, regional and local levels.

NCA can generate unbiased data about the use and/or consumption of natural capital that is material to ecosystems, businesses and regions supporting sustainable behaviour, by informed governments, corporations and consumers. Notably, natural capital accounts can be physical, monetary, or both.

In 2022, environmental and social issues ranked as the number one risk for mining and metals companies (Ernst & Young, 2022). In response to initiatives like the Taskforce for Nature-related Financial Disclosure (TNFD), such organisations are exploring the nature of their activities' impacts and their dependencies on natural capital, and, importantly, how these could be disclosed to the markets and other stakeholders in a robust and transparent manner.

For businesses and stakeholders, NCA helps to assess their risks and opportunities by bringing together environmental and economic information. Indeed, as an environmental accounting framework, NCA provides a systematic way of measuring and reporting on natural capital assets and ecosystem services, which complements traditional financial accounting.

> " (NCA) involves compiling consistent, comparable and regularly reported indicators of natural capital and associated flows of ecosystem services, within an accounting framework.
> *CSIRO, 2017*

THE NCA FRAMEWORK

Environmental Economic Accounting (EEA) frameworks can provide a comprehensive and unbiased approach for private sector NCA.

This allows businesses to better understand their impacts and dependency on natural capital and thus inform various natural resource management decisions. For example, in the Netherlands (Hein et al., 2020), national scale ecosystem accounts following the SEEA–EA methodology show that in peat areas used for dairy farming, the combined costs of maintaining infrastructure and controlling water levels and carbon dioxide emissions considerably exceeds the profits earned by farmers. This led to new policies aimed at reducing drainage in peatlands and converting farmland back to natural ecosystems.

Despite significant global efforts to develop frameworks for applying NCA at a government and business scale, practical application within the private sector remains in its infancy, with sector-specific case studies rare.

It is essential to have a globally uniform framework with standards and principles that provide guidance to countries adopting and implementing NCA.

The United Nations has endorsed the SEEA-EA as the international standard for nations to use when establishing their own natural capital accounts.

The SEEA-EA is a quantitative statistical framework established to measure and report on the extent, condition and associated ecosystem services provided by natural capital assets, as well as their economic values for a particular ecosystem or region, and how these change over time.

This allows the degradation, stabilisation or enhancement of ecosystems to be tracked through a framework that integrates economic and environmental data, to provide a more comprehensive and multipurpose view of the interrelationships between the economy and the environment.

The conceptual SEEA-EA framework is depicted in Figure 2, which shows the measurement of stocks of biophysical assets, the assessment of condition of the assets, the flows of goods and services that environmental assets provide in various landscapes or regions, and the estimated value of these assets and services to the community, government and businesses based on market transactions or non-market valuation techniques.

This framework uses a structure and classifications that are consistent with the System of National Accounts (SNA), an internationally agreed accounting framework to gather, organise and report information in a consistent and transparent manner.

Where the SNA presents monetary values, the SEEA-EA presents information regarding asset stocks and flows between the environment and the economy, as well as economic activity related to the environment, in both physical and monetary terms, to support policy and decision-making and enhance a better balance between social, economic and environmental outcomes.

While the SEEA-EA framework has been adopted as a standard for reporting the environmental-economic link, it is structured for application at a national level. Therefore, it requires some adaptation for application at a regional or business level.

Recognising that the business case for companies implementing NCA systems is an important first step in adapting the framework for sectoral or regional adoption, several opportunities have been identified through an initial scan of the literature and global application of NCA. While there are opportunities that warrant adoption, there are also challenges that may provide barriers to adoption. These opportunities and challenges need to be assessed and refined from various stakeholder perspectives that have interest in a mining operation, or the region in which such an operation is located.
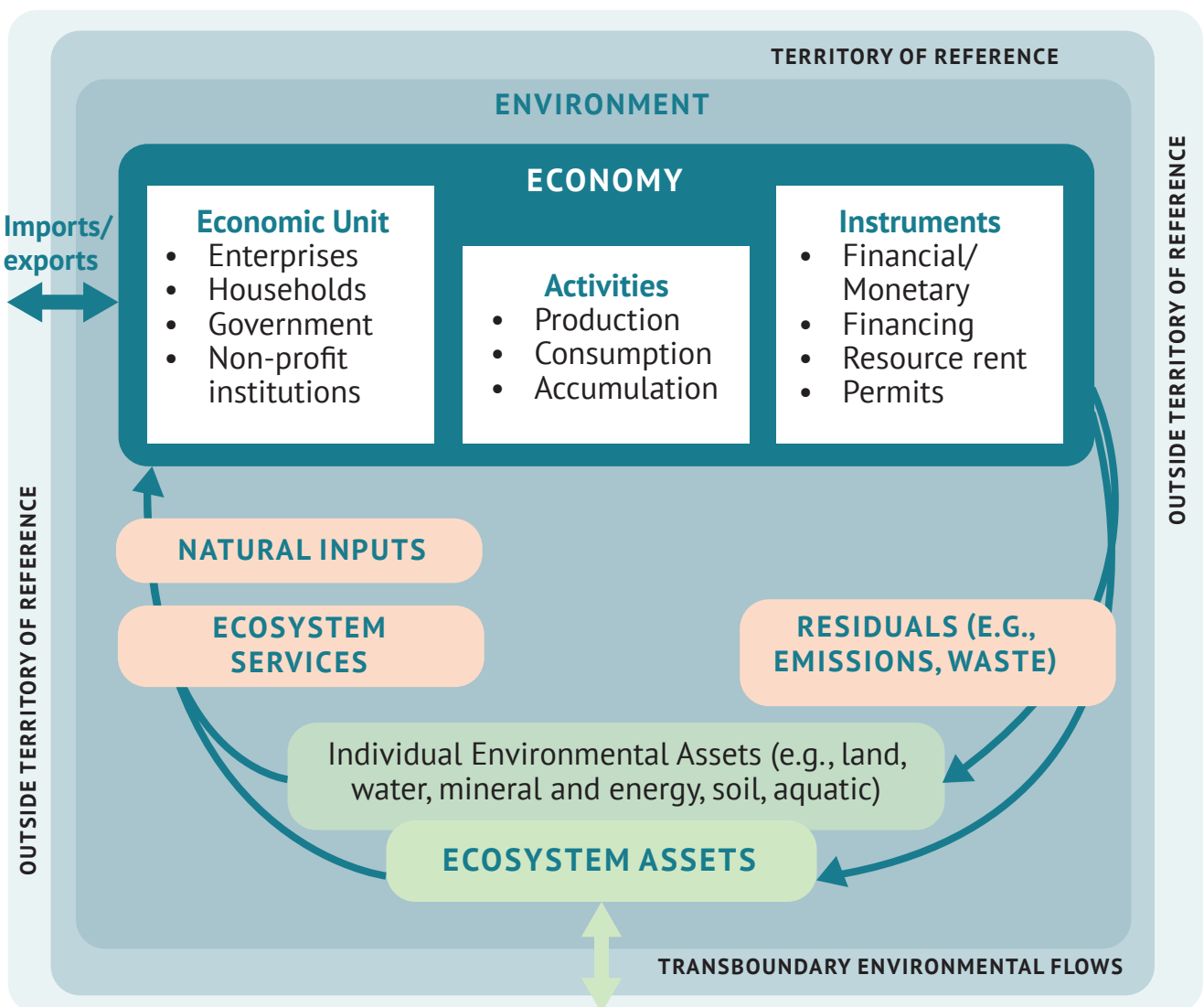

Figure 2: SEEA-EA Conceptual Framework

Source: https://unstats.un.org/unsd/envaccounting/workshops/Malaysia_2016/2.%20Introduction%20to%20Core%20Accounting%20Principles%20on%20SEEA%20and%20SNA.pdf

NCA USES

A summary of key NCA uses within the mining sector is as follows:

- Adding ecosystem assets and natural resource-related impacts and dependencies to the familiar business and government balance sheet and income statement formats, to help businesses better manage natural assets (maintain biodiversity, restore ecosystems).

- Providing a set of tools for nations, states and corporations in the mining sector to better identify and capture the interrelationships between business, society and the environment.

- Helping to evaluate the impact of mining activities on the environment in the form of habitat destruction and the degradation of forests, water resources and biodiversity.

- Helping to mitigate environmental risks from mining activities and minimise their ecological footprint.

- Improving decision-making by facilitating the assessment of environmental risks and opportunities associated with operations, e.g., enabling investors to consider nature and ecosystems before releasing funds towards investment to facilitate 'nature-positive' outcomes.

- Improving stakeholder engagement and trust by providing greater transparency for investors, customers, communities and regulators on their environmental footprint and performance.

- Making informed decisions regarding supplier selection based on their environmental stewardship.

- Providing businesses, policy-making bodies and society with a framework to better understand the costs and benefits associated with the extraction and use of natural resources, and therefore collecting and disclosing information that may become a requirement to meet evolving demands from such policymakers and regulators.

- Identifying market opportunities that align with sustainable development goals, facilitating cost-saving innovations, creation of novel revenue streams, and enhancing business model innovation.

- Managing and building resilience to environmental risks by identifying potential vulnerabilities associated with scarcity, degradation and regulatory change, allowing the strategic design of adaptation measures.

- Tracking targeted conservation and management actions to improve environmental assets and reduce potential liabilities, e.g., threatened species and threatening processes listed under the EPBC Act.

- Establishing, monitoring and reporting timelines, rehabilitation schedules and milestones.

- Providing supporting information (quantitative and qualitative data) for internal and external mine closure documentation, to show compliance with mine closure and mine restoration standards.

- Providing valuable insights on data requirements to present ecosystem rehabilitation outcomes in an NCA format.

Key Insights

Key Insights

The preparation of the four case studies to test the applicability of NCA in the mining sector contributed to the identification of several challenges that are described and discussed in the Gap Analysis and Roadmap section of the accompanying ***Business Case, Gap Analysis and Roadmap for implementation*** (Maybee et al., 2023).

These challenges predominantly relate to the availability and suitability of data, the ability to value natural assets and ecosystems, and the capacity and capability available to prepare natural capital accounts. When reviewing the collection of case studies, four key insights emerge; not as direct hurdles to implementation, but as integral aspects of the NCA process that demand consideration:

- **Diverse Methodologies:** Different methodological approaches can be applied when preparing natural capital accounts. While all case studies shared the objective of assessing the applicability of the SEEA–EA framework for corporate-level mining sector accounts, the involvement of distinct groups across Australia highlighted the flexibility of applicable methodologies. As such, this framework serves as a guiding framework rather than a rigid template for account preparation, suggesting that standardisation may be required in some areas to facilitate comparison.

- **Time Commitment:** The accurate preparation of natural capital accounts necessitates a substantial time commitment. Three of the case studies were conducted within a condensed 10-month timeframe, utilising pre-existing data not originally collected for this purpose. It became evident in these cases that mapping initial ecosystem extent and condition accounts demands significant time due to data identification and collation requirements, along with ongoing framework development. The maintenance of good natural capital asset registers can help to streamline this task.

- **Purposeful Planning:** Establishing the rationale for creating natural capital accounts is a crucial initial step. Mining environments can be data-rich in certain areas based on specific purposes. However, this can lead to significant challenges in developing natural capital accounts across an estate and may lead to tangential investigations that are unrelated to the intended purpose of natural capital account creation. Effective planning of account objectives informs data requirements, directing account preparers to gather relevant supplementary data needed for the task.

- **Strategic Value of Data:** Data collection for NCA can hold strategic value. A forecasting pilot study, conducted as an extension of the Gaskell Avenue Sand Quarry case study, illustrated what is believed to be the first application of existing data that was repurposed for use within an NCA framework being used for strategic planning purposes. This novel approach showcased the potential of NCA information in supporting strategic decision-making within companies and assisting regulatory bodies during approval processes by projecting the expected trajectory of progressive rehabilitation activities as part of the pre-mining planning process. While this study was preliminary, and relied on certain assumptions, it demonstrated the potential for quantifying challenging-to-value assets, such as topsoil for rehabilitation, within mining operations.

Overall, these insights underscore the dynamic nature of NCA in the mining sector, emphasising the need for adaptability, planning and recognition of the strategic value that data can provide for an organisation.
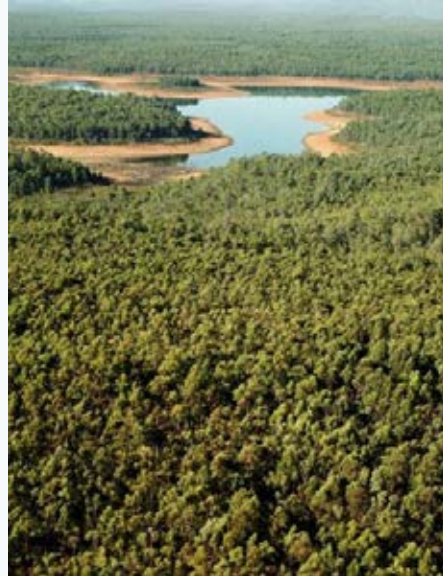
Alcoa Case Study

Alcoa Case Study

TESTING THE SEEA-EA FRAMEWORK IN THE CONTEXT OF MINE REHABILITATION

1980

2001
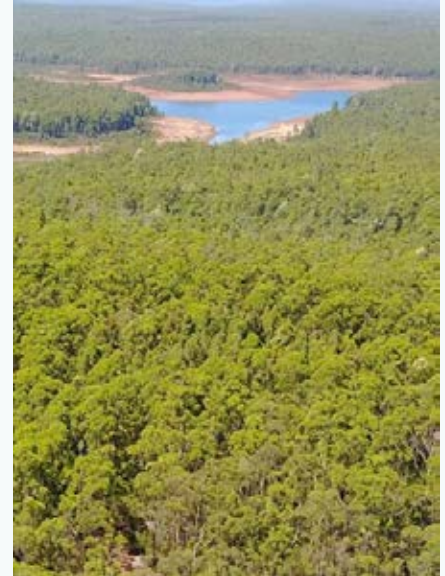
2017

INTRODUCTION

There is a need for best practice data management to provide accurate information for the assessment of changes to natural capital stocks and flows following mining operations.

In standardising the NCA approach, the United Nations developed a universally coherent framework to capture and organise multiple scales and types of ecosystem information – the System of Environmental Economic Accounting – Ecosystem Accounting (SEEA-EA).

The Alcoa case study assessed the suitability of the SEEA-EA framework in the mining context – in particular, the assessment of the rehabilitation success, by evaluating key ecosystem condition variables at varying temporal and spatial scales.

The resultant accounts are the first assessment of Alcoa's restoration outcomes in the Northern Jarrah Forest using the SEEA-EA framework, and, worldwide, one of the first environmental accounts to document change after mine restoration interventions.

KEY FINDINGS

NCA accounts can provide potential benefits to Alcoa including:

- the assessment of outcomes at larger spatial and temporal scales than previous assessments (i.e., over the entire period of rehabilitation efforts until mine closure).

- a full ledger of assets and liabilities to facilitate prioritisation of research and provide information to support future management efforts.

- quantitative data to assess compliance with mine restoration and closure standards.

But:

- the selection of characteristics must be carefully considered and planned, reflecting agreed ecosystem indicators, metrics and monitoring programs. For example, soil chemistry may be an important component of assessing the health of a specific ecosystem, and so it should be decided whether this needs to be assessed based on specific sampling data acquired through a structured monitoring program, or if successful vegetation establishment and growth can be a reasonable surrogate for desirable soil characteristics.

THE CHALLENGE

Alcoa's bauxite mining lease is within the Northern Jarrah Forest, part of the SW Australian global biodiversity hotspot and an area supporting a range of threatened listed fauna.

To value changes in natural capital assets following Alcoa's mine site rehabilitation efforts (specifically, at the Jarrahdale, Huntly and Willowdale mine sites), these ecological assets and liabilities needed categorisation according to their abiotic and biotic characteristics (United Nations et al., 2021).

They could then potentially provide valuable data to highlight the sites' impacts on the ecosystems under management, and their recovery over time.

To calculate the changes between the chosen dates for assessment, pre-1988 to 2022, the three mine sites were subset spatially into three ecosystem accounting areas

(EAAs): State Forest within the Northern Jarrah Forest bioregion, Rehabilitated Mine Areas, and Unrehabilitated Mine Areas.

An ecosystem condition account was then set up to organise data based on the characteristics of each EAA, and was compared to a favourable and unfavourable reference ecosystem condition in line with the SEEA-EA framework. Key NCA procedures adopted included the identification of natural capital stocks, a natural capital inventory (types and classes of assets), and accounts focusing on the natural capital extent and condition of the assets.

THE OPPORTUNITY

The case study has provided opportunity for the following:

- An NCA assets and liabilities register, to track targeted conservation actions to improve environmental assets (e.g., listed species) and reduce environmental liabilities (e.g., key threatening processes).

- To track monitoring timelines, rehabilitation schedules and associated milestones, and provide quantitative data for nature-related impacts, dependencies and risk reporting.

- The optimisation of environmental monitoring programs, alignment with other frameworks such as

mine closure and rehabilitation standards, informing research needs, data management requirements, and exploring potential future natural capital accounts to expand the depth and breadth of NCA capabilities.

- The potential for ecosystem accounts to provide internal and external mine closure documentation, including qualitative data to show compliance with mine closure standards and mine restoration standards.

- Quantitative data to underpin the mining company's nature-related impacts, dependencies and risk reporting.

OUTCOMES

Outcomes have shown that an NCA approach within the mining sector is possible, and could be beneficial in helping to manage and maintain natural capital assets for the benefits of conserving nature, human wellbeing and economic sustainability, but that it comes with challenges:

- The unit of assessment classification was suitable for all assessment categories but one – the IUCN Global Ecosystem Typology, Level 3 ecosystem functional group classification, which did not provide a suitable entry for unrehabilitated/active mine pits. All other units of assessment were classified into habitat, ecosystem and other land-type categories.

- Key ecological assets and liabilities were identified in the Northern Jarrah Forest, which are relevant to assessing Alcoa's mine rehabilitation program. Specifically, key abiotic factors are topsoil and ground cover characteristics such as large logs, woody debris and leaf litter, and key biotic factors

are native vegetation groups, characteristic flora species, native fauna, characteristic fauna, and threatened fauna species.

- The condition accounts for the four different management timeframes (pre-1988, 1988-2004, 2005-2015 and 2016 onwards) showed some key ecosystem condition differences and highlight gaps in the data, which was collected without NCA in mind. There is also overlap between accounts for mine areas and eras of management given Jarrahdale was rehabilitated and closed in 1998, and Huntly and Willowdale are active mine areas. This meant that some accounts could only provide an example of condition.
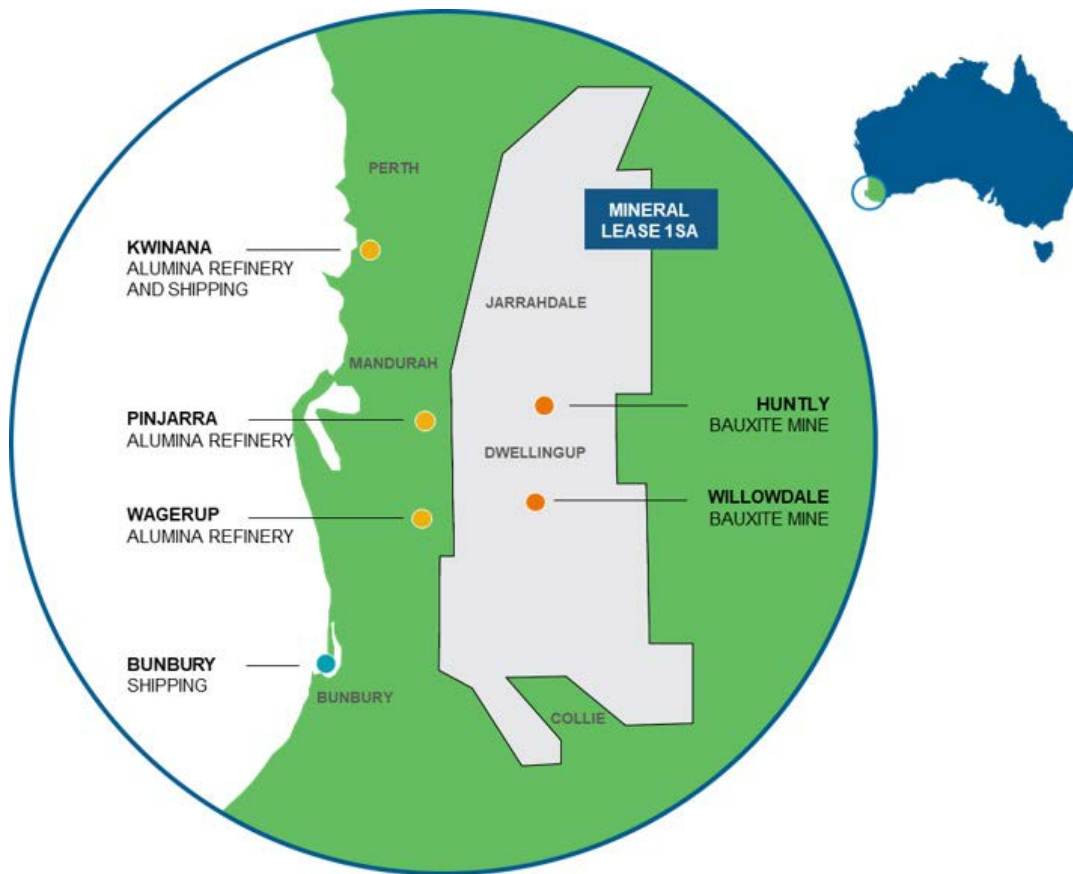
Map showing Alcoa's mine locations in the northern Jarrah Forest bio region

NEXT STEPS

There is potential to undertake further in-depth assessment of available data, and research additional data needs, to, for example:

- inform environmental monitoring programs to overcome the challenge of integrating NCA requirements with already large monitoring programs, which allows for alignment between the two.

- align with other standards and frameworks, including Mine closure standards.

- inform research needs and strategies, including to assess suitability of monitoring programs to accurately capture a change in ecosystem condition post mining rehabilitation.

- explore potential data-related opportunities, through the implementation of smart environmental informatics systems and best practice, high standard data governance structures to capture, store, process, integrate, analyse and preserve ecosystem data.

- create future ecosystem accounts, such as extent accounts, to help further inform impacts of mining and subsequent changes to the landscape integrity due to rehabilitation activities; condition accounts, including the capturing of potential impacts of climate change; and ecosystem services accounts, for provisioning services (e.g., wood, fibre, water), supporting services (e.g., habitat provision, nutrient cycling), and cultural services (e.g., educational, Indigenous cultural).

CASE STUDY PARTNERS

- Alcoa
- Department of Climate Change, Energy, the Environment and Water
- CSIRO
- Murdoch University

REPORTING

Parkhurst T and Standish RJ 2023. *Natural Capital Accounting in the mining sector: The Alcoa case study - testing the SEEA-EA framework in the context of mine rehabilitation.* Internal report prepared by Murdoch University for CRC TiME, August 2023.

BHP Beenup Pilot Case Study

BHP Beenup Pilot Case Study

NATURAL CAPITAL ACCOUNTING FOR THE MINING SECTOR: BEENUP SITE PILOT CASE STUDY

INTRODUCTION

BHP's closed and rehabilitated 'Beenup' Titanium Minerals Project is a 700-ha site located 16 km northeast of Augusta in southwest Western Australia. The pilot tested the application of NCA principles in the mining sector.

Considerable investment in monitoring has been made over the life of the project, meaning only limited additional data collection was required to produce example accounts for asset extent, condition and ecosystem services.

As Beenup is a closed mine and, more materially, had a very brief operational life, the Beenup site is not typical of most operational mines.

However, the pilot case study serves to demonstrate a process, and to help identify the gaps and challenges that need further work to facilitate the adoption of NCA in business reporting for the mining sector.

KEY FINDINGS

The Beenup site pilot case study has provided an important insight into the process and challenges associated with NCA in the private sector. Specific key findings included the following:

- Valuation of ecosystem assets and services is still emerging. The distinction of private benefits and societal benefits of NCA provides useful perspective on natural capital management.

- While natural capital case studies provide some insights into the challenges associated with compiling accounts, future mainstreaming of NCA should be preceded by a comprehensive review of the data requirements and strategies for streamlining data collection, interpretation and synthesis.

- Commonwealth and State Governments in Australia have adopted the United Nations SEEA-EA as the statistical standard for environmental accounting. Yet the integration of complementary approaches to NCA and assessment should be explored deeper to drive more efficient and comprehensive reporting and disclosure.

- Determining the utility of this pilot and the example accounts requires broader stakeholder testing and evaluation.

THE CHALLENGE

At the time of the Beenup mine closure, approximately 355 ha of land had been disturbed including the development of a 40-ha dam and 2.1 km dredge pond.

This NCA pilot was challenged to:

- trial the application of the United Nations SEEA-EA (United Nations 2021).

- contribute to the Taskforce on Nature-related Financial Disclosures' (TNFD) knowledge bank, of which BHP is a member.

- identify the key gaps and conceptual challenges that need to be resolved before the longer-term vision of 'valuing nature' can be achieved for the mining sector.

- Guide future studies and applications of NCA within the mining sector.

THE OPPORTUNITY

Due to BHP's history with the site during the exploration, mining and restoration phases, the project provided an ideal opportunity to pilot the application of NCA in the mining sector owing to:

- its long history of data collection and monitoring over the lifecycle of changing land use, from farming to operating mine site, to ecological restoration.

- its retention of significant corporate memory, including long-standing relationships with the site's operational staff, consultants and community stakeholders.

- the attention to detail in the ecological restoration, and clearly defined community expectations focused on achieving nature-positive outcomes, providing a unique opportunity to test the application of emerging environmental accounting approaches to meet the rising demand for increased reporting and disclosure of environmental performance.

OUTCOMES

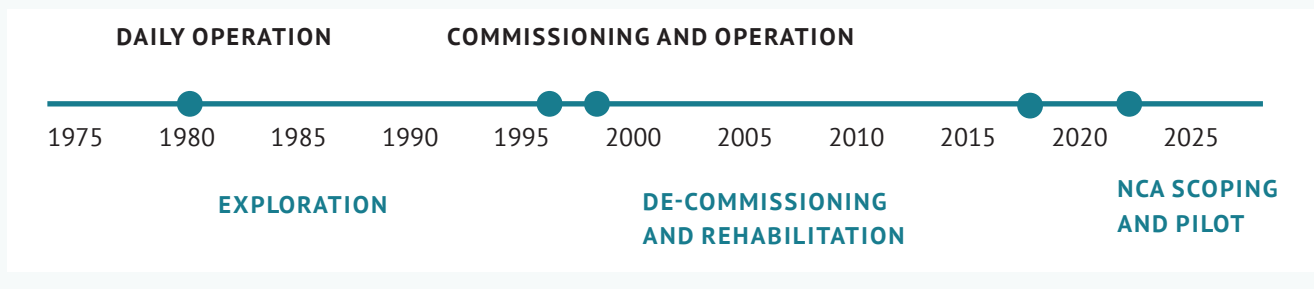The lessons and recommendations from this project were summarised into four themes:

- **Concepts:** the ecosystem accounting perspective provides a framing that is currently missing in enterprise accounting, and explicitly recognises the unique role that ecosystems play in providing a range of provisioning, regulating and cultural ecosystem services that the business and society more broadly are dependent on or potentially impact. Given the growing calls for disclosure of these impacts and dependencies on ecosystems, ecosystem accounting concepts of the United Nations SEEA-EA provide a useful framework that is readily translated into this space.

- **Data requirements:** this pilot was data rich, and although the Beenup Titanium Project has not been operational for many years, there is excellent knowledge of the underlying data and monitoring programs to facilitate the development of natural capital accounts. An ecosystem condition methodology was developed that links the SEEA-EA condition approaches with data likely to be widely available within the mining sector, and linked with the Standards for Ecological Restoration (Young et al., 2022).

- **Frameworks:** SEEA-EA accounting concepts are well suited to NCA at an enterprise scale, with this case study of great interest to the United Nations. It has also helped with developing an understanding of the different purposes and approaches to NCA and assessment and is one of the few attempts at integrating both NCA and the impacts and dependencies thinking associated with assessment.

- **Reporting and disclosure:** presenting the wealth of ecosystem information contained in natural capital accounts in a readily digestible format represents a significant challenge. This pilot trialled the application of ecosystem equivalents of the financial profit and loss statement and balance sheet, demonstrating that natural capital accounts are amenable to this presentation format, although there remain conceptual challenges; the underlying standards and concepts of which are still developing and will continue to evolve.

In summary, the project demonstrated that NCA may be achievable over time within BHP, but broader adoption still has a number of relatively high entry barriers, including cost, efficiency and the utility of the information.

From this perspective, the Beenup pilot case study has contributed to building capability both within and outside of the organisation and thus has been a valuable exercise with some important lessons learnt.

Key conceptual challenges remain around the reporting and disclosure of natural capital data, valuation of ecosystems and ecosystem services, integration with financial accounts, and the utility of natural capital accounts to meet organisational requirements and drive efficiency of the growing sustainability disclosure reporting requirements.

DAILY OPERATION COMMISSIONING AND OPERATION

1975 1980 1985 1990 1995 2000 2005 2010 2015 2020 2025

EXPLORATION DE-COMMISSIONING AND REHABILITATION NCA SCOPING AND PILOT

Timeline of the Beenup Titanium Minerals Project

NEXT STEPS

NCA seeks to provide a way for businesses to understand and measure their impacts and dependencies on nature to inform investment risk assessments, decision making and disclosures and reporting. Whilst this may ultimately be most effectively achieved by integrating natural capital and financial accounts in the consolidated business accounts, in the short term there is much to do to advance the adoption of NCA across BHP businesses and the mining sector more broadly.

This pilot case study has provided the project participants with valuable insights and a framework that sets out a pathway for guiding future studies and applications of NCA. It has also highlighted some key gaps and conceptual challenges that need to be resolved before the longer-term vision of 'valuing nature' can be achieved for the mining sector. Some of these gaps need further research and discussion, while others can be filled by improved data collection and management methods.

Further recommendations to the mining industry include the following:

- The mining sector to continue trialling application of the SEEA-EA framework as the underlying statistical approach for the future development of natural capital accounts.

- The development of a nationally consistent framework of ecosystem classifications that conforms to the IUCN Global Ecosystem Typology (Keith et al. 2020) with approaches for adaptation to local scales. Moving towards an agreed organisational typology and methodology for mapping ecosystem assets will be important for consistency in data collection and organisation-wide accounts.

- Building on the development of a consistent ecosystem typology across assets, to develop a nationally consistent approach to condition assessment to facilitate efficiency in ecosystem

mapping and condition accounting across assets, and facilitate organisation-wide reporting.

- Developing a 'calibration and validation' approach to asset condition assessment. The extent of monitoring could provide very useful inputs to validate models of ecosystem condition. Future remote sensing approaches validated with existing on-ground data collection will provide a powerful approach to future account compilation.

- Developing standards for the validation of on-ground and remotely sensed data, with associated approaches for defining confidence.

- Mining sector organisations to conduct a 'materiality' assessment of the ecosystem services that it wants to address through NCA, focusing on quantifying and valuing a few ecosystem services well rather than many partially. Global imperatives such as net zero emissions and the emerging Nature Positive agenda and how these align with organisations' own objectives and social values statement will provide context for identifying this subset of ecosystem services (e.g., global climate regulation).

- Continuing to explore the potential to build and develop the integrated reporting approach; to be advanced through the Department of Climate Change, Energy, the Environment and Water (DCCEEW) mining sector project. Further development should include testing with both internal and external stakeholders.

- Continuing to support/develop reporting via profit and loss and balance statements, ultimately aiming for a more formal integration of the financial and natural capital statements.

- Further testing this form of presentation with internal and external stakeholders to ensure that it meets their needs for environmental disclosure.

CASE STUDY PARTNERS

- BHP
- Syrinx

REPORTING

Meney, K., Pantelic, L., Cooper, T and Pittard, M. (2023). *Natural Capital Accounting for The Mining Sector: Beenup Site Pilot Case Study*.

Available at:

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BHP Olympic Dam
Case Study

BHP Olympic Dam Case Study

TESTING THE APPLICABILITY OF NATURAL CAPITAL ACCOUNTING AT THE OLYMPIC DAM OPERATION

INTRODUCTION

The BHP Olympic Dam site is located within the Gawler Bioregion, 560 km north of Adelaide, South Australia. The polymetallic copper, uranium, gold and silver mine and processing facility operates within the 18,000 ha of the Special Mining Lease (SML).

It is predominantly a copper mine that is Australia's largest underground mine, and it comprises the single largest uranium ore body in the world, yet less than 3.5% of its associated operating and non-operating lease area is physically affected by mining operations and associated infrastructure.

The Kokatha people are the native title holders of the land on which the Olympic Dam mine operates. BHP works closely with the Kokatha people and other Traditional Owners groups in South Australia who are central to Olympic Dam and the surrounding communities including the Barngarla, Kuyani, Arabana and Dieri peoples.

Ecological surveys of the Olympic Dam leases have classified the vegetation into 24 broad vegetation associations, predominantly consisting of Acacia species woodland and shrublands, Callitris woodland, Casuarina woodland, chenopod shrubland and Eragrostis grasslands.

In addition, the Olympic Dam operation has been subjected to a thorough environmental assessment process from its inception, with intensive and regular environmental research enabling the region to have one of the most comprehensive and long-term environmental data sets of any Australian arid zone locality.

The aim of this pilot case study was to test the applicability of NCA at the project level within the mining industry at an operating site using existing company data sets supplemented by publicly available data where possible.

For this pilot case study, the Ecosystem Accounting Area (EAA) included not just the SML, but also areas surrounding the SML that are under the stewardship of BHP (including 6 pastoral leases: Roxby Downs, Purple Downs, Andamooka, Etadunna, Mulgaria, and Stuart Creek), amounting to a total area of approximately 2.2m ha. For this EAA, the pilot case study sought to:

- develop an illustrative-only value of natural capital account to measure the stocks of natural capital under stewardship and the flow of ecosystem services over time, where possible, in both physical and financial terms.

- highlight potential processes and procedures for creating NCA accounts that require further investigation.

- help build capability to develop NCA accounts for the mining sector and explore opportunities to incorporate NCA and nature-related risks into strategic planning practices.

THE CHALLENGE

There is a growing focus on ESG (environmental, social, governance) activities and disclosures in corporate decision-making and reporting.

This reporting is now required to demonstrate how sustainability is embedded within corporate vision and governance, business strategy, and ultimately financial performance.

While natural capital reporting (using the information compiled in natural capital accounts) has been entirely voluntary in the past, reporting of natural capital information that is material to company value is likely to become best practice, if not mandatory, for many organisations in the near future (for further information, see Appendix A).

Hence, NCA frameworks have been developed to assist with supporting the transition towards environmentally sustainable business models.

THE OPPORTUNITY

The overarching objective of this pilot case study was to assess the opportunities and challenges in developing NCA for mining operations by:

- assessing the applicability of the United Nations SEEA-EA within an operating mining sector application and across the other supportive land uses, including pastoral lease grazing enterprises that surround the OD mine and that are ultimately controlled by BHP.

- identifying datasets and analysis approaches that are suitable to build NCA for the mining sector.

- identifying potential improvements in NCA processes for application at a company level, and requirements for integrating NCA into corporate financial statements in the mining sector.

The approach used a similar framework to the SEEA-EA framework in building an asset register of ecosystem assets, mapping and understanding the extent of these assets, determining the condition of the ecosystems as measured in terms of its abiotic and biotic characteristics, and understanding the relevant ecosystem services that serve as the connecting concept between ecosystem assets and the activity (economic, production and consumption) within the systems.

OUTCOMES

Several challenges and limitations were identified over the course of developing the example ecosystem accounts, including the following:

- Limited availability of data related to some environmental parameters (e.g., ecological, water monitoring, etc.) over the entire time series for some parameters, specifically on the pastoral areas outside the boundaries of the SML.

- BHP is one of multiple users of water from the Great Artesian Basin (GAB), and the cumulative use of water from the GAB contributes to the condition of the aquifer. When assessing the condition of the GAB, it's therefore not possible to attribute impact to different users, which subsequently makes developing an EP&L challenging.

- Impacts and dependencies, or risks, associated with the mine and associated costs of mine development and production, were not always available to support a detailed EP&L statement.

- Much of the data was originally collected to comply with specific legislative monitoring requirements that do not consider the requirements of NCA. In some cases, it could not be easily adapted for NCA.

- Some monitoring was not carried out annually and temporal steps did not relate to financial or calendar years.

NEXT STEPS

This pilot case study presents a platform for further work to support:

- the learning and refinement of NCA methodologies.

- the reporting of corporate business-environmental relationships.

- examples that may guide future studies, learning, and environmental disclosures in the mining sector.
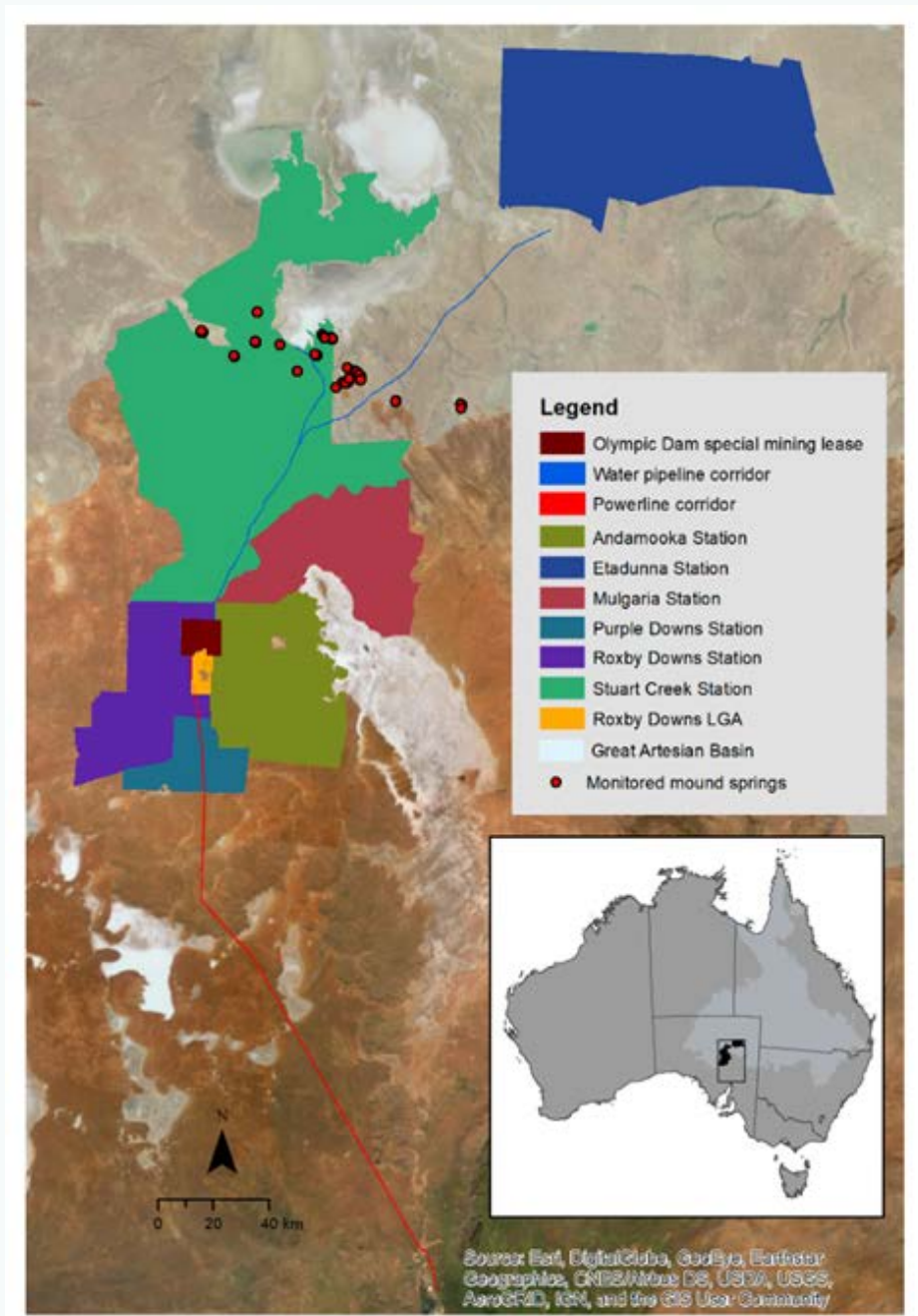
Map showing Olympic Dam special mining lease and 6 pastoral stations under the stewardship of BHP, as well as water and power line corridors related to the running of Olympic Dam mine

CASE STUDY PARTNERS

- University of South Australia
- CSIRO
- Department of Climate Change, Energy, the Environment and Water
- BHP

REPORTING

Mackay, W., Regan, C., and Summers, D. 2023. *Testing the applicability of Natural Capital Accounting at the Olympic Dam Operation*. Confidential report prepared with the use of BHP data through CRC TiME, December 2023.

Hanson
Case Study

Hanson Case Study

TESTING THE APPLICABILITY OF NATURAL CAPITAL ACCOUNTING AT THE GASKELL AVENUE QUARRY

INTRODUCTION

The Hanson Gaskell Avenue Quarry (formerly the Rocla Quarry) is in Lexia, near Ellenbrook, Western Australia. Hanson started rehabilitation and restoration of the quarry in 1995-96.

The mine site excavates and processes concrete sand, filling sand, and high-grade silica sands at an annual capacity of more than 1,500,000 tonnes. Alongside the Gaskell Avenue Quarry, Hanson also expects to operate the Gaskell North site project.

The mining area for this case study is within the Northern Swan Coastal Plain, lying in the Priority 1 area of the underground water pollution control area (UWPCA) of Gnangara Mound. Prior to clearing for mining, most of the area was comprised of native vegetation, predominantly *Banksia* Low Woodland on leached sands, *Melaleuca* wetlands in poorly drained areas, and various woodland species on the less leached soils.

The surrounding area is known to host threatened ecological communities and priority species. The area is occupied by several species of soil borne dieback, including the most destructive pathogen in the native vegetation area, *Phytophthora cinnamomi*.

Human-caused disturbance activities, such as movement of soil in the water mound, vehicle movement, and the activities of native and introduced fauna, are responsible for the spread of this pathogenic disease.

KEY FINDINGS

- The mine site's natural capital accounts were developed using ecosystem communities (Level 3 of the National Vegetation Information System) as the key adopted units of assessment. Importantly, no material difference in the condition accounts and physical and landscape state characteristics were observed for the accounting period from 2017 (opening) to 2022 (closing).

- Changes in the integrated accounts were solely driven by the reduction in the native ecosystem extent that occurred during the accounting period to facilitate progression of the mining operations (this assessment did not look at upstream or downstream impacts and dependencies, nor consider land that Hanson leases but does not own).

- Modelling showed that around 11% of the total reduction in carbon stocks associated with the EAA resulted from the extraction and export of large quantities of sands from the project site. While this is expected, as sands are the key resources mined, it highlights an important characteristic of sand quarrying operations to be considered in the preparation of NCA accounts, which recognises carbon capture and storage as an important ecosystem service.

- There were many challenges with data availability and suitability. Data acquisition for most mining operations was determined by non-NCA-driven monitoring objectives (focused on research, regulatory compliance, and meeting permit conditions only), which influenced the intervals of data acquisition, spatial distribution of monitoring sites across the project boundary area, and types of data collected. Although there was a lot of data, this often did not meet the NCA needs easily due to the formats not aligning.

- A proportion of this project's rehabilitated sites were under the stewardship of Boral Resources, not Hanson, meaning these areas were not included within the EAA, and the monitoring data from these sites not applicable for assessing the extent and condition of the Gaskell Avenue operating area. This is an important consideration when NCA is applied at the corporate/mine site level associated with tenement holdings, lease arrangements and special mining agreements – the ultimate leaseholder may not be the entity that undertakes the mining operations, which can present challenges in identifying what is under the stewardship of the company, and what should be included in their NCA activities.

THE CHALLENGE

There were many existing environmental, socio-cultural and mine closure matters to consider in trying to define units of assessment and developing natural capital accounts for Hanson's Gaskell Avenue mine site, including the following:

- Prior to mining, the Gaskell Avenue Quarry was part of the Gnangara-Moore River State Forest with native transitional vegetation, mainly comprising low open forest and low woodlands of *Banksia* on dunes and *Melaleuca* woodland and sedgelands in wetlands. The mining area is now under the Priority 1 protection area of UWPCA, with Hanson having applied a Groundwater Licence Operating Strategy for identification, management, and contingencies for potential water abstraction impact.

- Quarrying operations have created noise, emitted greenhouse gases and dust, and increased traffic that may affect nearby communities (both human and ecological). As such, Hanson's mining activities are subject to WA's state, and federal, government regulations to ensure compliance with environmental, safety and health requirements.

THE OPPORTUNITY

The NCA reporting period selected for this case study was from July 2017 to June 2022, with the specific objectives of this case study set to:

- test the applicability of NCA (specifically the SEEA-EA framework) at the project level within the mining industry at a transitional site.

- generate example NCA accounts and related natural capital statements in line with accompanying guidance materials, where possible.

- highlight processes and procedures for creating NCA accounts that require further investigation.

- build capability within the mining sector to develop NCA accounts by supporting Hanson to explore opportunities to incorporate NCA and nature-related risks into strategic planning practices.
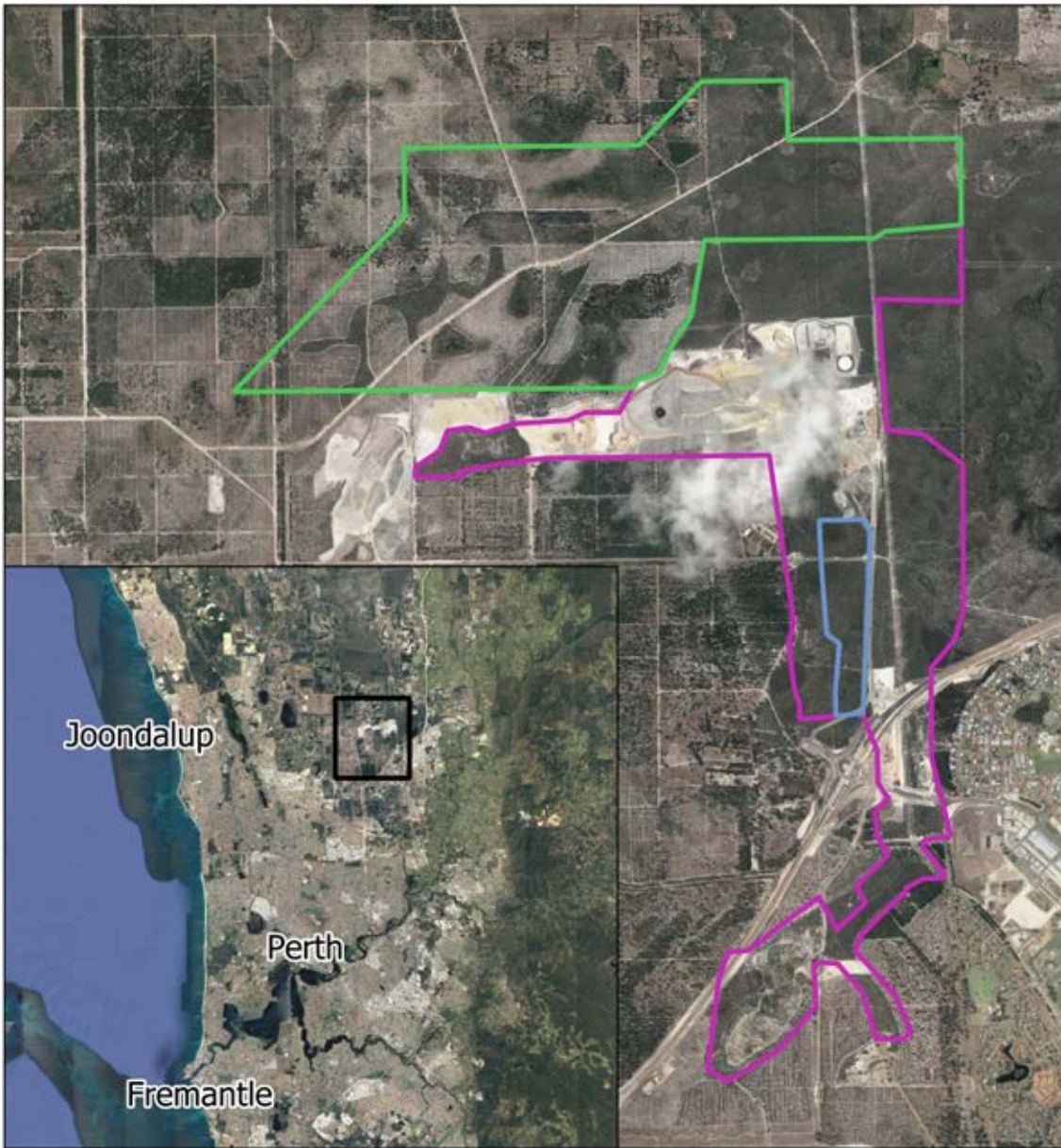
Figure 1: Hanson NCA - Site Location

Area Extent

- Gaskell North Owned (M70/1366)
- Gaskell Owned (M70/238)
- Southern Reference Sites

EPSG: 20350
Scale Inset: 1:500000
Scale Map: 1:35000
Google Earth (2018)
Published 03 March 2023

The Hanson Gaskell Avenue mine site NCA project area – spatial boundary

OUTCOMES

The following key challenges were identified for Hanson's Gaskell Avenue mine site:

- Alignment is required between the environmental data format needed for meeting NCA requirements and the format in which the data has been historically collected. As a result of the misalignment:

  » NCA location-specific monitoring data for the rehabilitated and reference areas could be limited in availability due to difficulties aligning a rigid accounting framework with fluid environmental attributes.

  » some data sets were not fit-for-purpose, having been collected for specific research studies or to comply with specific legislative monitoring requirements.

  » annual data, for some parameters, was either not available or not collected from the same location during the specific NCA period (2017-2022).

- a significant amount of the effort required to prepare the accounts was devoted to identifying data, and sorting and classifying data, to produce ecosystem asset extent and condition accounts for the opening and closing time periods, because data had not been collected for this purpose.

- The outsourcing of some historical monitoring and data collection meant that required data was not readily accessible and/or not in the digitised format required to easily map the NCA ecosystem assets.

- Over time with the refining of the monitoring programs, different recording methods were adopted, which resulted in difficulties in easily accessing the data required, in a consistent way, to produce NCA accounts easily for some parameters over the selected time series.

NEXT STEPS

To improve these accounts, further NCA-related research at Hanson's Gaskell Avenue Quarry mine site is required to:

- collect data and characterise elements other than flora and vegetation that are required for a more comprehensive condition assessment, such as fauna-related data, data on recruitment/breeding, landscape connectivity.

- better understand the vegetation monitoring metrics required within the regrowth areas to maximise NCA outcomes.

- undertake more comprehensive soil chemical data profiling.

- better characterise biocarbon stocks and flows.

- better understand and quantify the changes in the soil carbon stock and sequestration potential caused by sand mining activities, to potentially initiate conversations regarding the need to address (and include) lost soil carbon and resulting changes in the overall soil quality, as part of post-mining restoration efforts.

CASE STUDY PARTNERS

- Hanson Construction Materials Pty Ltd.
- Department of Climate Change, Energy, the Environmental and Water (DCCEEW)
- CSIRO
- Syrinx
- Curtin University

REPORTING

Pantelic, L., Maybee, B., Meney, K., and Hossain, S. 2023. *Testing the applicability of Natural Capital Accounting at the Gaskell Avenue Quarry*. Internal report prepared for Hanson Construction Materials through CRC TiME, November 2023.
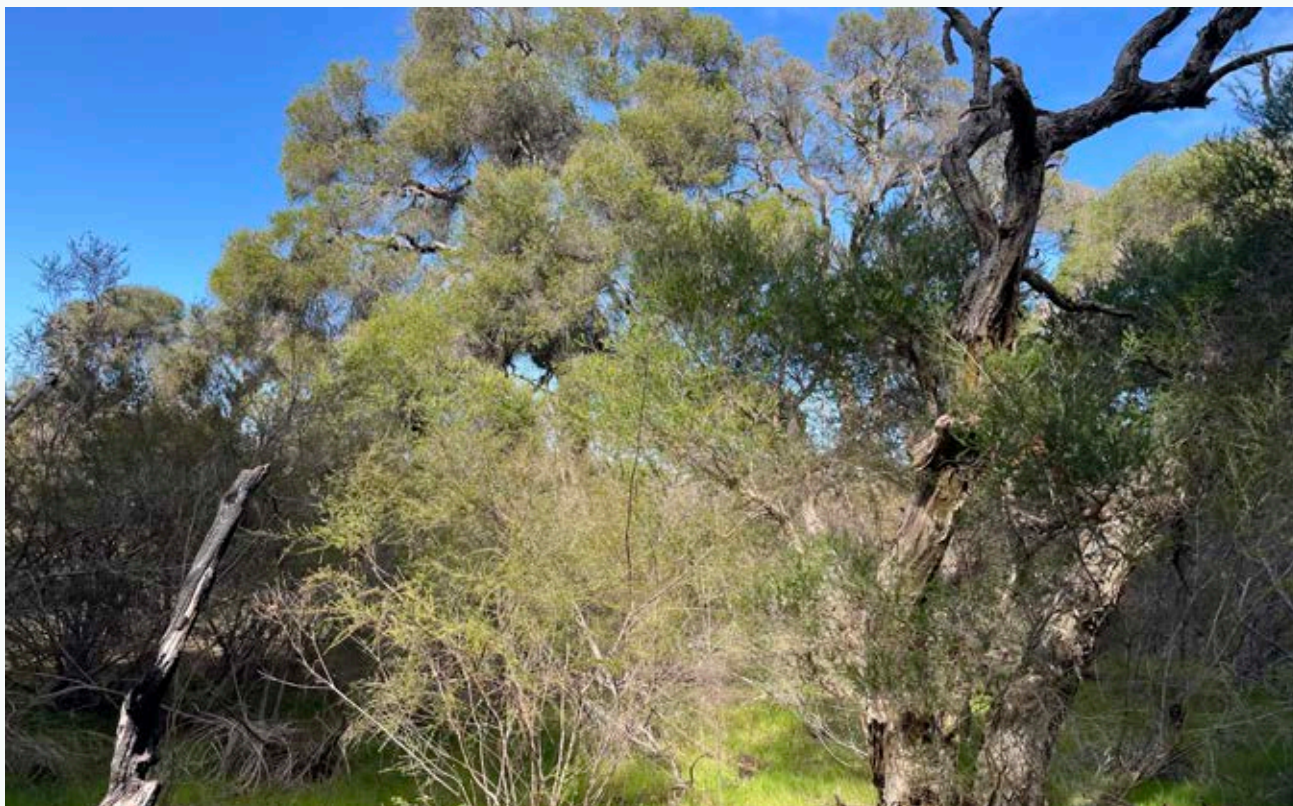
Opportunity to use NCA for Forecasting

Opportunity to use NCA for Forecasting

USE OF NATURAL CAPITAL ACCOUNTING AS A FORECASTING & PLANNING TOOL (HANSON GASKELL NORTH CASE STUDY)

INTRODUCTION

Hanson Construction Materials Pty Ltd (Hanson) Gaskell Avenue Sand Operations is one of the four initial sites selected as case studies for CRC TiME Project 2.7. The aim of Project 2.7 was to test the applicability of the SEEA-EA framework in mining, provide example natural capital accounts, and highlight challenges to the adoption of NCA in the mining sector.

During the case study undertaken on the Gaskell Avenue Sand Operations, an opportunity arose for NCA to potentially play another beneficial and possibly even more significant role in the mining sector – that is, to inform rehabilitation/restoration forecasting and mine activities planning.

Exploring this new potential role of NCA, this pilot study focused on the Gaskell North site only, with the area considered by Hanson to be a long-term resource option for the supply of silica, concrete and building sands.

As a result, this pilot study was undertaken to test the use of the NCA analytical approach and its underpinning datasets to gain insight into the future, by forecasting anticipated changes in ecosystem stocks and flows using findings from previous periods in ecosystem assets areas that share similar characteristics.

KEY FINDINGS

The Hanson pilot study is the first attempt to test the NCA forecasting process and its applicability and value as a planning tool in mining.

The data used, assumptions made, and site-specific outcomes for this test case are not sufficient to be used for purposes beyond the experimental intent of this study. However, the outcomes do demonstrate how the forecasting process could provide a beneficial pathway for NCA adoption in the mining sector.

Specific key findings included the following:

- A positive future outcome can be achieved if progressive rehabilitation and wetland remedial works are implemented at the onset of future mining activities, with a scale of progressive rehabilitation that ensures that at all future timepoints, artificial (mined) sections are balanced out by native vegetation areas.

- The forecasting process requires an in-depth understanding of the ecological context within the project area.
- The forecasting exercise requires development of a detailed mine plan that includes set forecasting time periods and a clear definition of activities planned to be undertaken during these periods.
- Historical vegetation and other ecological data can be used to forecast future condition performance and develop forecasted condition accounts.
- Relevant dataset and ecological expertise in data collection, processing and application is key to the validity of the forecasting process and hence is the key to its wider adoption within the mining industry.

THE CHALLENGE

The primary role of NCA is to describe the change in the state of natural capital stocks and flows of ecosystem services within the defined assessment boundary from the account opening data to closing date.

The case studies that are part of investigating the applicability of NCA in the mining industry highlighted a myriad of existing barriers that may hinder a wider and more rapid uptake of this approach, particularly regarding NCA assessments that require a wider and more comprehensive range of data sets that are not commonly collected under the existing monitoring programs.

Furthermore, the project demonstrated that, irrespective of rehabilitation efforts and success, for mines that are still active, the overall NCA 'picture' is primarily influenced by reductions in ecosystem extent as a result of mining operations.

This means that, until the area of restoration becomes greater than the area of exploitation (e.g., at the closure stage), the NCA physical accounts (combined ecosystem condition/extent, and carbon stock) will almost always show a net loss of natural capital.

However, from these challenges emerged opportunity. NCA allows a forward-looking view to influence the way the accounts can look in the future, by enabling the data to be used to influence positive change. In this way NCA can be used as a proactive planning tool, rather than just an end-of-period audit process.

THE OPPORTUNITY

There is opportunity to use the same structured NCA analytical approach and the underpinning datasets to gain an insight into the future – to forecast future changes in stocks and flows using the findings from the previous periods.

Using this approach, it could be possible to create informed forecasts of how successfully various project areas and ecosystem units are likely to respond (in terms of their condition) to different rehabilitation/restoration efforts and/or other activities or events, e.g., changes in mining practices.

Combined with the assumptions regarding the future mining footprint and rate of exploration, this would enable development of hypothetical future NCA accounts under different scenarios, which could 'paint a picture' of the natural capital potential for a given site and project, and what could and should be done to maximise this potential. This forecasting would then allow the industry to assess the project, not only from an operational capital return perspective, but also from an NCA outlook when making operational and investment decisions.

Acting as an extension of the work undertaken in Project 2.7, the specific objectives of this case study were to:

- assess if the existing ecological data could be used to facilitate the use of NCA as a forecasting and planning tool, with an emphasis on ecosystem condition, and ascertain the limitations of such data application.

- identify other data or assumptions that can be used to facilitate the forecasting process.
- deliver recommendations on how the process can be used and improved.
- test the uptake of the process by the industry.

A highly modified SEEA-EA approach was adopted, the focus of which was identifying the anticipated change in certain ecosystem condition parameters and ecosystem extent at the following four time points:

- Time Point 1: 5 years from Year 0 (2028)
- Time Point 2: 10 years from Year 0 (2033)
- Time Point 3: 15 years from Year 0 (2038)
- Time Point 4: 20 years from Year 0 (2043).

Specifically, the emphasis was on determining likely future rehabilitation performance, with the condition assessment restricted to the assessment of the key available vegetation/floristic parameters.

OUTCOMES

It is anticipated that changes in the extent will be primarily driven by two parallel activities: clearing as part of mining operations, and restoration of post-mined areas. A high-level summary of specific outcomes from this study is as follows:

- **Forecasting extent accounts:** Planned mining activities are expected to result in clearing of 36.7 ha of remnant vegetation by the end of Time Point 4 (2042), and 242 ha of plantation. This will be balanced by progressive rehabilitation works that are expected to result in rehabilitation of ~279 ha by 2043. Accordingly, while areas of remnant vegetation will be reduced during the forecasting period, the total area of native vegetation will progressively increase and by 2043 is forecast to be 70% greater compared to the starting Time Point.

- **Forecasting condition accounts:** Historic rehabilitation data collected from the adjacent Hanson-operated mine tenement (M70/776) was used for forecasting the likely future performance of the Gaskell North pilot site. This was deemed appropriate given the proximity of these two tenements, similarity in local geology, their location within a pine plantation, and anticipated similarities in mining and rehabilitation approaches. Analysis of this data showed that there were no major differences between rehabilitation areas of different ages for either compositional or structural characteristics. While % cover for all life forms showed a progressive increase with rehabilitation age, hence contributing positively to the structural state index value, native plant density showed a somewhat reducing trend with age.

- **Extent and condition integrated accounts:** There is an expected progressive improvement in the overall condition of the pilot site area with time, as follows:

  » If rehabilitation works start immediately after cessation of excavation, then the overall mine-impacted areas would never be above ~50 ha or 15% of the total pilot study area.

  » By Time Point 4, mining is expected to be finished within the pilot study site and all post-mine areas fully rehabilitated with a minimum three years in rehabilitation age.

  » Implementation of early remedial works on the existing wetland areas (removal of pines, weed management) and protection from dewatering impacts is expected to result in the improvement in condition of ~65 ha of wetlands within the first 5 years (from MEDIUM to HIGH).

  » Restoration of the dominant pine plantation areas after mining will result in an improved overall condition.

  » Topsoil plays a significant role in achieving positive future impacts.

NEXT STEPS

- Using NCA to forecast introduces a more strategic opportunity for operational mines to identify natural capital impacts, values and opportunities ahead of mining, to influence better decisions and nature-positive outcomes moving forward.

- The SEEA-EA/NCA analytical process is a powerful tool for ensuring that planning and investments into future mining activities are founded on the understanding of dependencies and impacts those activities have on nature, thereby helping balance nature-positive outcomes with the overall commercial and corporate goals.

- However, the limitations and key challenges associated with the creation of hypothetical future NCA accounts and scenarios would need to be further addressed if this NCA-based forecasting process is to be adopted more broadly within the industry.

CASE STUDY PARTNERS

- Hanson Construction Materials Pty Ltd.
- Department of Climate Change, Energy, the Environmental and Water (DCCEEW)
- CSIRO
- Syrinx
- Curtin University

REPORTING

Pantelic, L., Maybee, B., Meney, K. 2023. *Use of Natural Capital Accounting as a Forecasting & Planning Tool: Gaskell Noth Pilot Study*. Working Document prepared for Hanson Construction Materials through CRC TiME, November 2023.
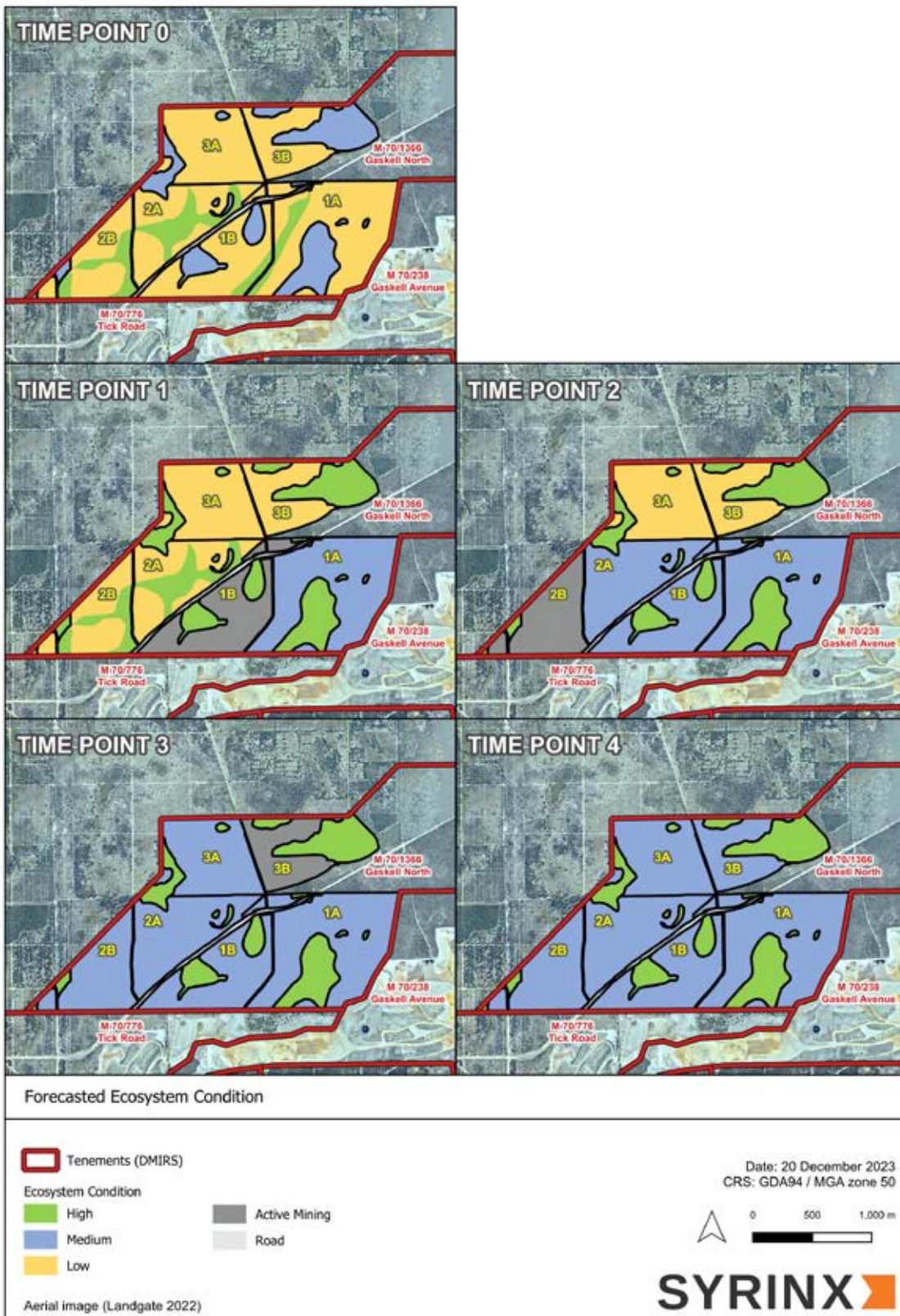
Forecasting pilot study boundary and changes to ecosystem units over time

Conclusion

Conclusion

The exploration of Natural Capital Accounting (NCA) in the mining sector, as detailed through various case studies, provides a comprehensive understanding of the challenges, opportunities and practical applications of integrating environmental considerations into corporate and national accounting frameworks.

The insights gained from four case studies (Alcoa, BHP Beenup, BHP Olympic Dam, and Hanson) highlight the dynamic and complex nature of implementing NCA within the context of mining operations.

These studies collectively underscore the importance of accurate and comprehensive data collection, the need for flexible and adaptable methodologies, and the critical role of strategic planning in the successful implementation of NCA. Challenges such as data availability and suitability, the valuation of natural assets and ecosystem services, and the capacity for preparing natural capital accounts, are significant yet surmountable obstacles.

The case studies also reveal the potential of NCA to support a more sustainable and environmentally responsible mining sector. By providing a framework for the measurement and valuation of natural capital, NCA enables mining companies to better understand their environmental impacts and dependencies, thereby facilitating more informed decision-making.

This can lead to improved management of natural assets, enhanced stakeholder engagement, and alignment with global sustainability goals.

Furthermore, the innovative use of NCA for forecasting in the Hanson Gaskell North case study demonstrates its potential as a strategic tool for future planning in the mining sector.

This approach can help predict the environmental impacts of mining activities, thereby allowing for proactive measures to mitigate negative outcomes and enhance positive ones.

In conclusion, the application of NCA in the mining sector, as evidenced by these case studies, presents a viable pathway towards reconciling economic activities with environmental stewardship.

It demands a concerted effort from all stakeholders – including corporations, governments, and regulatory bodies – to refine methodologies, improve data collection and analysis, and integrate NCA into standard business practices.

As the mining industry continues to evolve and adapt to global sustainability pressures, NCA stands as a crucial tool in ensuring that natural capital is appropriately valued and conserved for future generations.

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Appendix A:
Natural Capital Accounting reporting requirements

The following excerpt from The Natural Capital Handbook produced by CSIRO (2023) provides an overview of the evolving global best practice, standards and disclosure requirements on natural capital reporting:

"Natural capital reporting or disclosure involves the communication of natural-capital-related information to external stakeholders, such as shareholders, regulators, and civil society.

A number of different voluntary standards and guidance have covered the disclosure of various aspects of natural-capital-related information by organisations, published by organisations including the Global Reporting Initiative (GRI), Sustainability Accounting Standards Board (SASB), Climate Disclosure Standards Board (CDSB), International Integrated Reporting Council (IIRC), the Task Force on Climate-related Financial Disclosures (TCFD) and the Taskforce on Nature-related Financial Disclosures (TNFD) (TCFD, 2017, CDSB, 2019, CDP et al., 2020, GRI, 2011).

In November 2021, a new International Sustainability Standards Board (ISSB) was formed by the International Financial Reporting Standards (IFRS) Foundation, which also oversees the International Accounting Standards Board (IASB) thats sets corporate financial accounting standards.

The ISSB will set standards for disclosure of sustainability-related information that is material to company value, building on the existing SASB, CDSB, IIRC and TCFD standards and guidance and consistent with IASB standards, while the GRI will likely continue to provide a framework for voluntary reporting of sustainability-related information that is more broadly relevant to society.

IFRS standards are not, in themselves, mandatory, but they have been adopted into mandatory reporting requirements for listed companies in 144 jurisdictions (including Australia), and they are often followed voluntarily by companies not subject to these requirements.

Therefore, while natural capital reporting has been entirely voluntary in the past, reporting of natural capital information that is material to company value is likely to become increasingly expected, if not mandatory, for many organisations in the near future."