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Role of key actors for an effective license instrument in Argentine agriculture

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ABSTRACT

In Argentina, a significant discrepancy has been detected between the formal requirements for the submission of Environmental Impact Assessments (EIA) in operating feedlots and the actual purpose of the EIA as a predictive tool for environmental management. This lack of coherence between the requirements demanded by the authorities and the practical feasibility of obtaining an Environmental License has been a persistent challenge in our country. To address this problem effectively, we have chosen to involve key actors in the process: feedlot farmers and environmental authorities who have the responsibility of approving and supervising the environmental requirements. We carried out semi-structured interviews with these actors and field inspections to evaluate environmental management in feedlots of various scales, located in the provinces of Buenos Aires, Córdoba and Santa Fe. From the valuable data collected, we have developed a comprehensive guide specifically designed to facilitate obtaining environmental licenses for operating facilities. This guide has been discussed in a participatory workshop with the same actors involved to achieve a superior product. Its effective implementation promises a number of significant benefits, including the prevention of environmental conflicts, the granting of permanent locations for these activities, the simplification of the administrative process for farmers, the reduction of costs in both public and private sectors, and the provision of an updated registry of farmers for more effective monitoring and control by authorities.

INTRODUCTION

In Argentina, agricultural activities are fundamental pillars of the economy. However, together with mining activity, they produce the greatest negative impacts on the environment. The areas of deterioration and degradation of the country's environment comprise 75% of the national territory and have been affected, among others, by livestock farming, with the consequent impoverishment of living conditions (Subsecretaría de Planificación Territorial y de la Inversión Pública, 2015).

Regarding animal production, a total of 1,149 free-range fattening establishments (feedlots) are registered in the country, of which 71.6% are located in three provinces: Buenos Aires, Córdoba and Santa Fe (SENASA, 2021).

Argentina has experienced significant growth in feedlots in recent decades (SENASA). Although many feedlots manage their environmental aspects adequately and seek to comply with regulations, there is a lack of clarity in the farmers for obtaining an environmental license. This situation makes environmental compliance difficult for farmers who actively work on the sustainable management of their operations. This work was carried out to address this problem in three key provinces of Argentina: Buenos Aires, Córdoba and Santa Fe. The objective is to provide clear and effective guidance that facilitates environmental compliance and promotes more sustainable practices in feedlots industry.

Regarding environmental legislation, the agricultural production sector is covered by regulatory frameworks at different jurisdictional levels. In Argentina, Law N°25675 (General Environmental Law) establishes the minimum requirements for adequate environmental management (MAyDS, 2020). The environmental policy and management instrument provided by this law is the Environmental Impact Assessment (EIA). Being a federal country, the provinces can improve or expand the aspects stablished in national regulations, but never fail to comply with them.

However, Argentina does not have a national Environmental Impact Assessment Law. Therefore, it requires standardizing regulations between provinces and establishing minimum budgets.

The Environmental Impact Assessment is a tool that allows predicting impacts by preventing their occurrence. Considering what has been said, the requirements should be different for projects and operating activities.

In the case of feedlots, a high number are in operation, therefore, to obtain environmental licenses, different requirements than those requested for an EIA should be considered, given that the Environmental Impact Assessment is a predictive tool.

In addition to this, we must point out the existence of deficiencies in the application of Environmental Impact Assessment, having indicated by Yang (2018), five as a priority: 1) procedural aspects, 2) possible alteration in the objectives to be met by the EIA, 3) deficient incorporation of technical aspects to the EIA, 4) accessibility to information by interested parties, 5) dependence on effectiveness in the implementation of the standard, among others.

MATERIALS AND METHODS

The work was based on analyzing this type of situations for free-range fattening activities in the provinces of Buenos Aires, Santa Fe and Córdoba in order to recognize shortcomings from both a regulatory and administrative point of view and recommend solutions. Existing documentation was reviewed, establishments of different scales were visited in the field where measurements of environmental factors were carried out and interviews were held with key actors (municipalities, provincial authorities, and representatives of the private sector). This multidimensional approach was essential to identify the problems associated with obtaining environmental licenses for feedlots.

With the results obtained, a protocol was developed as a guide for obtaining environmental licenses, and through a participatory workshop with key actors, recommendations and improvements were incorporated into the proposed instrument. The results of this research aim to contribute to the improvement of the environmental performance of this activity and facilitate administrative procedures for provincial authorities and farmers.

RESULTS

Analysis of the regulatory framework

The analysis of the regulatory framework at national and provincial level for this activity is presented in the following table:

RULE	REGULATION LEVEL	CÓRDOBA	BUENOS AIRES	SANTA FE
SENASA RESOLUTIONN°329/17*	National	Applicable	Applicable	Applicable
INTENSIVE PRODUCTION LAWS AND DECREES	Provincial	Law 9306 y Resol 29/17	Law N°14867	LawN°11717 y Decree N°101/03
ENVIRONMENT QUALITY STANDARDS	Provincial	Yes, for intensive production systems	Not specified	Not specified
HAZARDOUS WASTE	Provincial	Law	Not	Decree

		N°8973/03 y Regulatory Decree 2149/03	specified	N°1844/02
ANIMAL CEMETERY MANAGEMENT	Provincial	Not specified	Not specified	RESOLUTION N°284/21
PATHOLOGICAL WASTE	Mixed (National/Prov.)	Specific intensive animal production	National. Not specific for Feedlots.	RESOLUTION N°69/98 y Decree N°388/00

*Resolution 329/17 (SENASA): It establishes the requirements for facilities, biosafety, hygiene, and sanitary management, for the registration and sanitary authorization of free-range fattening establishments that contain cattle, buffaloes, goats and sheep, without access to grazing.

Field visits and interviews with farmers

Field visits to 10 free-range fattening establishments of different scales surveyed yielded the following findings:

In the province of Buenos Aires, the state of the facilities surveyed shows non-compliance with Resolution No. 329/17, lacking shade, inadequate drainage, and uncompacted subsoil. Several non-compliance with regulations were observed, although some establishments show a willingness to adapt. Regarding environmental management, the treatment of corpses is generally inadequate, the effluents are mostly not treated, and there is inadequate management of pathological and dangerous waste except in one feedlot where environmental management is adequate.

In the province of Córdoba, the state of the facilities surveyed is variable, some are deficient and need significant repairs, and others are in good condition. Compliance with SENASA Resolution No. 329/17 is variable. In environmental management, everything from inadequate practices for the treatment of corpses to compost in a distant dairy farm were observed; inadequate effluent disposal; difficulties in waste management varying in effectiveness, and problems in the management of pathological and hazardous waste.

In the province of Santa Fe, the condition of the facilities surveyed is generally good with variability in the construction material. SENASA Resolution No. 329/17 is satisfactorily implemented. In environmental management, the use of composting piles for the treatment of corpses was observed in some cases; maintenance problems were identified in lagoons and canals with pumping in effluent management; variability in waste management, some with difficulties regarding waste treatment, and others with verified treatment of pathological and dangerous waste by an authorized operator.

These results show a variety of challenges and progress in key areas of environmental management and regulatory compliance in the establishments visited in the three provinces.

Interviews with Government Actors

Interviews were conducted with government officials at the provincial level to understand limitations in the application of regulations and seek solutions. Some of the highlights from the interviews are detailed below:

In Buenos Aires, the process to obtain environmental authorization for feedlots begins in the municipality. It is essential to carry out an Environmental Impact Assessment. The enforcement authority in this phase is the Ministry of Environment. In addition to the EIA, it is necessary for the establishment to have authorizations linked to water resources from the Water Authority (AdA). A notable challenge in Buenos Aires is the delay in the process by AdA. Currently, there is a collaborative effort to regulate the feedlot law, including various authorities associated with

livestock production. A no less important point is the need to differentiate the standard activities in operation from those that are in project state since the former would not comply with the requirement to carry out an Environmental Impact Assessment.

In Santa Fe province, the Ministry of Environment oversees the environmental licensing process. New projects require an EIA, while existing operations must submit Environmental Compliance Reports. Various regulations apply, and presentation requirements vary depending on the number of animals. Nevertheless, environmental requirements are not specific for feedlots as they are intended for factory activities. It involves the farmers in a difficult process trying to adequate the real situations in the feedlot to the factory fixed parameters as if they were a cookies, plastic, or car factory. Plus, in some parts or parameters in the Environmental Compliance Reports the farmers must complete with intentional mistakes to complete all the fields, i.e. the feedlot throwing its effluents to a river or land after treatment, is the only option in the Report. Due to the problems mentioned above, in many cases, farmers cannot get environmental licenses from environmental authorities while SENASA grants operating permits if they accomplish Resolution 329/17. Santa Fe authorities highlight the importance of collaboration with SENASA and the municipality to manage exceptions and adjustments in rural areas.

In Córdoba, obtaining an environmental license implies complying with the Resolutions and Provisions of the Ministry of Environment of the province. Farmers must obtain approval from the Provincial Water Resources Administration for water extraction and waste treatment. The entire process can be lengthy and especially challenging for small farmers.

Development of a model protocol

Based on the results of the interviews and the identification of the mentioned problems, a model protocol was developed with the aim of constituting a clear and concise tool so that provincial authorities can receive standardized information from farmers on environmental management of feedlots

This protocol includes general information about the establishment, description of pens, and information on water use, runoff management, manure management, management of dead animals, control of vectors of health interest, waste generation and environmental management plan.

Participatory workshop

The work team carried out a participatory workshop at the Center for Higher Studies of Rivadavia, province of Buenos Aires, on October 11, 2023. This event brought together municipal environmental authorities, environmental specialists, the coordinator of the Feedlot Environmental Management Group (GAF) organization, students, farmers, and staff of feedlot companies.

The objectives of the workshop were to establish a validation space for the field tasks developed, to provide training on environmental and regulatory matters, to know the problems in governance and to validate and receive contributions for the environmental license instrument prepared by the work team.

The workshop allowed collaborative exchange and improvement proposals were obtained for the proposed instrument. In addition, the foundations were established for future exchanges and collaborations that will contribute to addressing environmental challenges in feedlot production in Argentina.

CONCLUSIONS

There is a discrepancy between provincial regulations and the practical challenges farmers face. Interviews with authorities suggest that regulatory adaptations and clarifications are being worked on, which is an essential step to facilitate understanding and compliance by farmers.

Differences in the implementation of environmental regulations between provinces indicate the need for a more standardized approach. This would allow farmers to have consistent expectations regardless of their geographic location.

The costs associated with complying with environmental regulations appear to be particularly challenging for smaller farmers. This suggests that financial support mechanisms or incentive systems could be sought to promote sustainable practices.

Results from the participatory workshop emphasize the need to improve communication between municipal and provincial levels and farmers. There is a call to bring practical proposals to legislators, which implies that the legislative process should more closely consider the operational reality of feedlots.

The workshop also highlighted the importance of training in environmental and regulatory matters. The suggestion is that the development of educational programs could be a valuable tool to improve environmental management in feedlots.

The variability in waste management, effluent, and corpse management among the feedlots visited indicates that there is room for broader adoption of good practices. Standardization of these practices could help better compliance with the proposed model protocol.

The lack of a participatory instance in the previous phase of regulation is a point highlighted by authorities and farmers, suggesting that greater inclusion in the decision-making process could result in more realistic and applicable regulations.

The responses obtained during the workshop are essential for the adjustment and improvement of the model protocol and demonstrate the effectiveness of including multiple stakeholders in the policy development process.

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OVERCOMING CHALLENGES IN THE EIA: ENVIRONMENTAL SCIENCE STUDENTS IN ARGENTINA

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Research and teaching session on Impact Assessment in Higher Education

Summary:

ID 22 Author: Verónica Giberti | Co-author(s): Daniela Picardi Session Research and teaching of Impact Assessment in Higher Education Summary: The analysis of two decades of teaching in environmental sciences, incorporating environmental management and more specifically Environmental Impact Assessment (EIA) in the Environmental Sciences program at the FAUBA, reveals significant evolution gradually adapting to professional demands and environmental challenges. It is observed that environmental management and more specifically Environmental Impact Assessment (EIA) in the Environmental Sciences program at the Faculty of Agronomy, University of Buenos Aires (FAUBA), reveals significant evolution, gradually adapting to professional demands and environmental challenges. It is observed that environmental management has gained greater relevance, reflecting a decrease in the gap between science and environmental management. It is necessary to emphasize the need to strengthen interdisciplinary integration and collaboration between both fields to effectively address current and future environmental problems.

Introduction and Development

Environmental sciences are dedicated to the study of natural and human systems, analyzing the interactions between them and developing solutions to protect and preserve the environment to contribute to a sustainable future for future generations.

Furthermore, they have an interdisciplinary approach as they integrate knowledge and perspectives from various areas of study such as biology, chemistry, geology, ecology, sociology, economics, and politics, to name a few. (Simón Bolívar University, Mexico, 2023)

Environmental education is a process that enables individuals to gain a deeper understanding of environmental issues and acquire the tools to make informed and responsible decisions. (United States Environmental Protection Agency, 2023). Analyzing the training in Environmental Sciences and environmental management, including the Environmental Impact Assessment in the Bachelor's Degree in Environmental Sciences at the Faculty of Agronomy, University of Buenos Aires, over the past 20 years, along with the perceptions of its teachers and graduated professionals, helps us understand the role that this profession plays in our country and globally

As an introduction to the topic, we want to mention that the birth of the program in 2003 was preceded by the enactment in 2002 of the so-called General Environmental Law, an important milestone in Argentine environmental legislation that has provided a framework for environmental management and protection at the national level. This law establishes in its article 22 that any work or activity that may generate significant negative effects on the environment, the quality of life of the population, or the natural and cultural heritage is subject to an environmental impact assessment and has been, to date, the minimum budget for EIA at the national level. (Law 25.675, 2002)

The program emerges as a non-minor issue, given the characteristics of Argentina's economy, largely dependent on the country's agricultural production, in one of the most important Faculties of Agronomic Engineering. In the beginning, the structure of the environmental program shared common bases with Agricultural Engineering and differed with an environmental focus in its second stage with a clear agricultural bias, which has been changing over 20 years.

In these 2 decades, three adjustments to the program's curriculum have occurred (2003, 2008, and 2017), and more than 600 professionals have graduated. Each plan evolved in its contents and adapted with the aim of complying with solid bases of research and management in response to changing environmental, social, and economic needs.

Already in 2008, it began to strongly differentiate from the predominant program (Agronomy), proposing a basic trunk much more focused on the environment and subsequently specific elective subjects. The offer of these electives increased, with a clear increase in the number of subjects associated with environmental management, providing options for students in their search for orientations.

The book "Research in Environmental Sciences" published in 2017 by FAUBA synthesizes more than a decade of reflections on the complexity of environmental issues. It highlights the role of Environmental Impact Assessment (EIA) as a key tool to bring together different competencies in environmental management and research (Plencovich, M. C., Vugman, L., & Cordon, G., 2017). In this context, the 2019 article "Bridging the gap between science and environmental management" highlights the need to overcome the division between scientific research and practical environmental management, emphasizing the importance of an interdisciplinary approach that integrates scientific knowledge into environmental management practices.

From my experience relating these two worlds, closer collaboration would allow a faster and more efficient transfer of scientific knowledge to practice, improving the quality and relevance of environmental solutions. Additionally, feedback from consultants to academia would generate research lines towards areas of critical need, promoting applied studies that promote direct positive impacts on environmental management. This is where the importance of building bridges between both parties lies.

Already in 2020, as a result of this process, the Environmental Management Area of the Faculty was created, with the subject Environmental Impact Assessment being a core part of the development of the space

In 2023, the National Interuniversity Council issued Resolution 175/23, highlighting the relevance of professionals in Environmental Sciences and other related careers in public well-being. The resolution urges to include these careers in article 43 of the Higher Education Law, requiring that the study plans meet standards defined by the Argentinian Ministry of Education, Science and Technology . This guarantees that graduates are prepared to face responsibilities that directly affect the health, safety and well-being of the population. The resolution highlights the importance of environmental management in general and the Environmental Impact Assessment (EIA) in particular, as an essential competency in this context (National Interuniversity Council, 2023), indicating it specifically through the professional activities reserved

Professional Activity Reserved according to Art. 43	Link with EIA
Design, plan, direct and certify sustainable environmental management systems	Post-EIA planning and management for environmental management systems
Design, plan, direct, supervise and certify comprehensive management plans, programs and projects for the conservation and/or recovery of habitat and natural resources	Environmental management plans
Design, plan and direct environmental assessments	Central in EIA for conducting the environmental impact assessment process
Certify methods and instruments for diagnosis, monitoring and evaluation of environmental sustainability	Essential in EIA for the validation of the methods used in the analysis of environmental impact

The powers of art. 43 reflects the core skills and responsibilities of professionals carrying out EIA, ensuring that they have adequate training and practice to carry out effective and reliable assessments.

To evaluate the perception of graduates, a survey was conducted with 323 graduates from the 2003, 2008, and 2017 study plans, on the occasion of the 20th anniversary of the Environmental Sciences degree. One key question in this survey focused on identifying areas of expertise essential to their current activity that were not addressed during their studies.

The responses highlight a predominance in the approach towards environmental management. It is evident that graduates consider environmental management and EIA not only as fundamental areas in their current work, but also as areas that could be addressed with greater emphasis during their training. (Aguiar M., Bargiela M., Camerero G., Nasta L., Carboni L. & Dieguez H., 2023).

In addition to this study, the FAUBA Environmental Management Area conducted interviews with graduated professionals, many of whom have focused their final work on EIA or environmental management issues. Their responses highlight the importance of training with a systemic approach and a generalist vision, which allows them a comprehensive understanding of the interrelationships between environmental components and facilitates informed decision-making in complex projects. They have highlighted the capacity for interdisciplinary work and the effective development of their professional practice in EIA, both in the public and private consulting spheres. They coincide with the university's survey for the 20 years of the degree, highlighting the need for greater integration of environmental management and EIA in academic training, suggesting that its approach from the first years of the degree is essential (Area of Environmental Management, 2023).

Added to this consultation is the opinion of the teachers, some of whom have been and are the Directors of this career, many have clearly expressed that they consider the inclusion of

environmental management and the Environmental Impact Assessment (EIA) in the curriculum of Environmental Sciences students of high relevance, due to the integration of knowledge that occurs and the development of key competencies for professional life. They point out that this comprehensive training has a positive impact on the preparation of students. They consider that the skills acquired in environmental management are crucial for the country's progress, contributing to national development aligned with actions aimed at reducing and mitigating climate change and promoting environmental, economic and social sustainability, in line with the internationally agreed Millennium Goals. (Environmental Management Area, 2023)

Conclusions

In the last 20 years, the Environmental Sciences career has experienced positive evolution, and a decrease in the gap between science and environmental management has been observed. However, it is still necessary to build bridges to establish a virtuous bond between parties. Consulting benefits from the data provided by science, while science must identify and address real needs. The principles of good practice in Environmental Impact Assessment (EIA) highlight the need to apply the best practical science, using appropriate methodologies and techniques to investigate problems. Furthermore, they highlight the importance of an interdisciplinary and credible approach in the process. (International Association for Impact Assessment & Institute of Environmental Assessment, UK, n.d.), which is only feasible through collaboration and teamwork

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Health Impact Assessment (HIA) in Practice

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ABSTRACT

Health Impact Assessment (HIA) is a systematic process that examines the potential, and sometimes unintended, effects of a project, program, plan, policy, or strategy on the health of a population and the distribution of those effects within the population. This paper synthesises findings from RPS' IAIA 2024 conference poster and HIA briefing, highlighting the application of HIA in three case studies, across different stages: early, mid-point and late. Results suggest that HIAs that added most value were commenced early in the planning process, achieved high input into the design of the project, and effectively engaged with stake holders and/or the public.

Keywords: Health Impact Assessment, Equity, Equality, Sustainability, Population Health, Engagement.

INTRODUCTION

Health Impact Assessment (HIA) is a systematic process that evaluates the potential effects of a project, program, policy, or strategy on the health of a population and the distribution of those effects within the population[1]. The primary aim of HIA is to improve population health by providing evidence-based insights that inform decision-making processes[1]. This paper integrates findings from the RPS 2024 IAIA conference poster (see Appendix A) and linked HIA briefing[2], focusing on the application of HIA in three case studies. The aim is to illustrate the strengths and weaknesses of HIA in practice, highlighting its benefits, and outline best practices for its implementation.

Core Principles

The core principles guiding HIA include a comprehensive approach, sustainability, participation, equity and equality, and the ethical use of evidence[1]:

Box 1: Core Principles

- **Comprehensive approach to health**: HIA considers a broad range of influences on population health, including social, economic and environmental factors.
- **Sustainability**: HIA is part of delivering sustainable development.
- **Participation**: HIA centres around those affected by a decision, emphasising the importance of involving stakeholders and the public in the assessment process.
- **Equity and equality**: HIA identifies if some people would be more affected and assesses the fairness of these impacts.
- **Ethical use of evidence**: HIA is transparent and rigorous in the sources of evidence it uses, ensuring that decisions are based on the best available information.

Benefits of HIA

HIA is worthwhile to undertake for the following reasons:

Box 2: Benefits of HIA

- **Cost saving**: Good population health is cost-saving for society and governments, reducing the burden on healthcare systems[3,4].
- **Public good**: Improving population health has intrinsic value and is aligned with the implicit duty of governments to protect and enhance the wellbeing of their citizens.
- **Better policies**: HIAs aid policymakers in understanding the health impacts of their decisions, leading to more informed and effective policy-making.
- **Understanding**: HIA provides evidence-based insight into complex health pathways and trade-offs, allowing for a deeper understanding of how decisions affect health.
- **Clarity**: HIA provides clear conclusions and recommendations on the health implications of decisions, aiding decision-makers in identifying the best courses of action.
- **Benefits all stakeholders**: HIA benefits the goals of other sectors through improved population health, thereby supporting broader societal and economic goals.
- **Solves big problems**: HIA can tackle cross-sector challenges, e.g. climate change adaptation, by integrating health considerations into broader strategies.

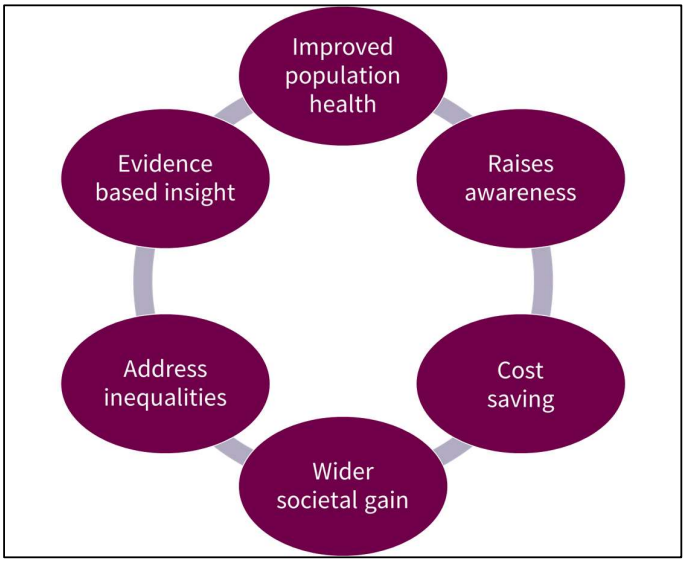

Figure 1: Benefits of HIA

APPLYING HIA

The methodology of HIA is flexible and can be adapted to various contexts. It involves the following key stages: Screening, determining whether an HIA is needed; Scoping, identifying which health impacts to consider; Assessment, evaluating the potential health impacts; Recommendations, proposing measures to mitigate negative impacts and enhance positive ones; Reporting, documenting the findings and recommendations; and Monitoring and Evaluation, tracking the implementation of recommendations and their effectiveness[1].

Figure 2: HIA Stages

HIA uses 'determinants of health' to describe the main ways that population health is influenced by a decision. The following are illustrative[5]:

Box 3: Illustrative determinants of health taken into consideration in HIAs

- Healthy lifestyles, such as opportunities to exercise and eat healthily.
- Safe and cohesive communities, such as access to good quality housing and transport.
- Socio-economic conditions, such as job opportunities and training availability.
- Environmental conditions, including air, water and soil quality, and noise exposures.
- Health and social care services, covering medical, occupational, and other care services.

HIA considers the ways health is affected, including if there are health inequalities i.e. the decision causes differences between the health of groups within a population. Different groups may include: young people; older people; people on low incomes; people with existing poor health; people who experience social disadvantage; or people more affected because of where they live or work.

Box 4: Practical activities in undertaking the HIA

Practical activities in undertaking the HIA include:

- Evidence reviews including population health indicators, scientific literature and health priorities.
- Understanding the behavioural patterns, lifestyle choices and cultural practices within a community.
- Assessment of how the change would affect peoples' health, directly and indirectly.
- Review the implications for healthcare services, including changes in demand on hospitals and clinics.
- Considering if there may be unintended consequences of a decision, including in other sectors.
- Recommend measures to mitigate any adverse health effects and enhance beneficial health effects.

Types of HIA and Their Applications

Strategic HIAs are applied to major decisions such as new policies, plans, or legislation. They provide early identification of potential adverse health effects and integrate beneficial health considerations into the decision-making process. Strategic HIAs are evidence-based and can significantly influence public health outcomes with relatively low resource input.

Checklist HIAs use a structured tool to ensure population health issues are considered in decisions. They are rapid and often rely on existing data, making them suitable for small- or medium-sized projects where rapid health assessments are needed.

Comprehensive HIAs provide detailed analyses of the likely health impacts of decisions. They draw on extensive evidence sources and may generate new data through stakeholder engagement. This type of HIA is often used for large projects or detailed plans and offers in-depth recommendations to avoid significant adverse effects.

RESULTS

Case Study 1: Strategic Residential HIA (Early HIA)

The first case study involved the development of a new community of around 5,000 homes. The focus was on assessing the likely positive and negative impacts on various groups, including vulnerable populations and considering both short- and long- term impacts. Recommendations included equitably distributing green space, promoting active travel, including healthcare premises, and avoiding homes near flood risks. The outcome was a greatly enhanced design promoting public health, effective engagement with health stakeholders, and responsiveness to local needs.

Case Study 2: Waste Transfer Station HIA (Mid-Point HIA)

The second case study focused on the redesign of a waste transfer station to improve efficiency and meet zero landfill goals by 2030. The HIA addressed community concerns and aimed to improve design efficiency. The outcome was a refined design, high engagement with stakeholders and the community, and responsiveness to community concerns.

Case Study 3: Industrial Park HIA (Late HIA)

The third case study concerned the development of a general industrial and distribution area. This HIA was undertaken very late in the design process with minimal engagement. The outcome was no change to design, no stakeholder engagement, and compliance with minimal added value.

DISCUSSION

The integration of HIA into decision-making processes is critical for promoting public health and achieving sustainable development goals. The case studies presented demonstrate the diverse applications of HIA and highlight the importance of timing and stakeholder engagement in maximising benefits.

Early Integration of HIA

The first case study on the strategic residential HIA illustrated the significant impact of integrating HIA early in the planning process. Early HIAs allow for comprehensive assessments and meaningful contributions to the design and implementation phases of projects. This proactive approach ensures that health considerations are embedded into the project from the outset, leading to more sustainable and health-promoting outcomes.

Stakeholder Engagement

Effective stakeholder engagement is another key factor in the success of HIAs. The second case study on the waste transfer station HIA highlighted how engaging with the community and health stakeholders can lead to refined project designs that address local concerns and improve public health outcomes. Active participation from stakeholders fosters a sense of ownership and ensures that the HIA process is responsive to the needs and priorities of the affected populations.

Challenges of Late HIA Integration

The third case study on the industrial park HIA demonstrated the limitations and challenges of conducting HIAs late in the design process. Late HIAs often have minimal impact on project design and lack meaningful stakeholder engagement. This reactive approach can result in compliance with minimal added value, highlighting the importance of integrating HIA early in the decision-making process.

Comparison of HIA Types

Table 1: Comparative results across case study 1, 2 and 3

Results	Case study 1	Case study 2	Case study 3
Stage	Early	Mid-point	Late
Design input	High	Medium	Low
Engagement	Effective	Effective	None
Value added	High	High	Low

Strategic, checklist, and comprehensive HIAs each offer unique advantages and are suited to different contexts. Strategic HIAs are valuable for major decisions and long-term planning, providing early identification of health impacts and integrating health considerations into overarching strategies. Checklist HIAs offer rapid assessments for small- or medium-sized projects, ensuring that key health issues are considered without extensive resource input. Comprehensive HIAs provide in-depth analyses for large projects, generating detailed recommendations and new evidence through stakeholder engagement.

IMPLICATIONS FOR POLICY AND PRACTICE

The findings from this analysis have important implications for policy and practice. Policymakers and practitioners should prioritise the early integration of HIA into decision-making processes and ensure effective stakeholder engagement to maximise the health benefits of their decisions. Additionally, selecting the appropriate type of HIA based on the context and scale of the project can enhance the relevance and impact of the assessment.

CONCLUSION

HIAs offer a structured approach to evaluate and enhance the health impacts of projects. The integration of HIA early in the planning process, coupled with effective stakeholder engagement, can lead to significant improvements in public health outcomes. As we face complex challenges and pursue sustainable development, the regular use of HIA will be instrumental in creating healthier, more inclusive, and equitable communities globally. The case studies illustrate the diverse applications and benefits of HIA, reinforcing its importance in achieving broader societal goals. By adhering to best practices and adapting HIA methodologies to specific contexts, decision-makers can leverage this tool to make informed, health-conscious choices that benefit all stakeholders.

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APPENDICES

Appendix A – IAIA 2024 Conference Poster

Health Impact Assessment (HIA) In Practice

A TETRA TECH COMPANY

Aim: This poster examines the strengths and weaknesses of each case study

Key Messages

Health Impact Assessment (HIA) is a systematic process that examines the potential, and sometimes unintended, effects of a project, program, plan, policy, or strategy on the health of a population and the distribution of those effects within the population.

HIAs that added the most value were:

- **Commenced early in the planning process**
- **It achieves a high input into the design of the project**
- **There is effective engagement with stakeholders and/or the public**

Results	Case study 1	Case study 2	Case study 3
Stage	Early	Mid-point	Late
Design input	High	Medium	Low
Engagement	Effective	Effective	None
Value added	High	High	Low

Stages: Screening → Scoping → Assessment → Recommendations → Reporting → Monitoring and Evaluation

Approach

Activities undertaken and evidence sourced

- Scoping health determinants and vulnerable groups
- Policy review
- Local health priorities
- Local development objectives
- Baseline health profile
- Literature review
- Stakeholder engagement

HIA benefits

Case Study 1: Strategic Residential HIA (Early HIA)

- HIA for **new Garden community**
- Assesses likely **positive** and **negative impacts** of a development proposal on the **health of different groups**
- Considers how the proposal will affect **vulnerable people** and considers both **short- and long-term impacts**

Example recommendations:

- ✓ Equitably distribute green space.
- ✓ Include routes to promote active travel to school and work.
- ✓ Dementia friendly design.
- ✓ Include healthcare premises.
- ✓ Avoiding homes close to flood risk/habitats (disease vectors).

What the HIA achieved:

- Greatly **enhanced design promoting public health.**
- **Engagement** with **health stakeholders.**
- **Responded to local need.**

Case Study 2: Waste Transfer Station HIA (Mid - point HIA)

- **Redesign** of **waste transfer station**
- **Improve efficiency** and **meet zero use of landfill ambition** by 2030

Engagement benefits

- ✓ Engaged with concerned community.
- ✓ Active participation.
- ✓ Develop community ownership of the process and outcomes.
- ✓ Lower tensions.
- ✓ Cooperation and m utual understanding.

What the HIA achieved:

- **A refined design.**
- **High engagement** with health stakeholders and community.
- **Responded to** community **concern.**

Case Study 3: Industrial Park HIA (Late HIA)

- General industrial and distribution (c.2,000m^2).
- Checklist approach.
- HIA commenced **very late** in design process.

What the HIA achieved:

- **No change** to design.
- **No engagement** with health stakeholders or the community.
- **Compliant**, but **limited added value**.

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Selfie & post here! #HIAatRPS

Ecological Awareness in Environmental Assessment; The Case of Thailand

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Abstract. Environmental Impact Assessment (EIA) is one of important mechanism to develop projects in line of sustainability. This study explored how content of Environmental Impact Statements (EISs) as the outcome of EIA could support project sustainability through the awareness of ecological content. Fifty-nine EISs were investigated. Major findings were that more than 80% of eco-content were in baseline study whereas those data were not used for impact assessment. The losses of ecosystem were mostly proposed for biodiversity level, with descriptive approaches without identification of quantitative losses. Consequently, the measures to control the impacts from projects were far from ecosystem services resulting from project development. To better incorporate biodiversity-based objectives in environmental impact assessments; connections between eco-content and different stages of an EIA are strongly recommended.

Keywords: Ecological assessment, Content analysis, Environmental impact assessment, Thailand.

1. Introduction

In Thailand, Environmental Impact Assessment have been used as project control mechanism since 1978 following National Environmental Quality Act (NEQA). In 1981, EIA has been effective. The transformation has been done from time to time. It was in 1992 that the NEQA was amended [1]. Recently, in 2018, the 2nd NEQA has been amended and announced in the Royal Gazette in which EIA section is focused. The role of Strategic Environmental Assessment (SEA) is firstly established in this Royal Gazette in terms of the EIA projects are required to consider the results of SEA in case they are located at the areas where SEA ever studied.

Ecological data have been long recognized as vital in the preparation of EISs [2]. Ecological studies as a primary component of EIA can and should support project development in accordance with sustainable approaches [2-6], although the traditional view of ecology is one of an empirical nature [7]. According to [3], nearly half of the criteria and indicators of sustainability pertain to ecological dimensions, whereas the remaining is tied to economic and social aspects. [4] insisted that the consideration of ecological impact for the maintenance of biodiversity to new infrastructure projects was crucial to achieve sustainable aims.

The importance of establishing the ecological effects to an area in the initial stages of project development is a viable avenue of research. Inaccurate ecological study at the project level, in particular, the questions how much ecological details should be fixed into the other environmental components, may create consequent problem at the macro level. Therefore, the integrated approaches for ecological aspects in EIA are essential. This study aimed to evaluate ecological content in Environmental Impact Statements (EISs) as the outcome of EIA whether they support adequate data for ecological losses and gains from proposed projects.

2. Material and Methods

Fifty-nine EISs were analysed. They included land development, transportation, industrial, dam/irrigation and power plant projects which were approved after the year 2007 (Figure 1). The number of EISs projects selected were agreed with the number of EISs approved in the same period. From 1992-2016, over 7,000 EIA projects in which around 70% were land development had been produced.

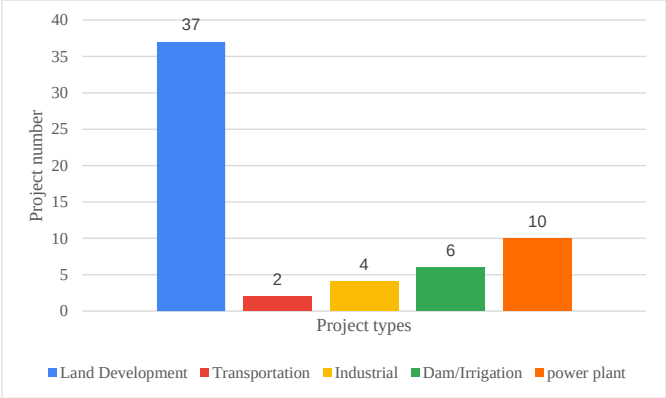

Fig.1. The EISs reviewed

Content analysis was used to investigate the content in the EISs against the correspondence with focus on ecological approach. This method was initiated by [8] and have been used and modified from time to time according to the purpose outcome. Therefore, in this study, the review criteria were adapted to examine ecological content in EISs in the stages of baseline study, impact assessment, and mitigation and monitoring measures. The criteria to review the EISs were based on the literature supported in Table 1 depicts an ecological model geared to indicate the appropriate ecological indicators for each stage of the EIA study

Table 1. Criteria established for content analysis.

Stages of EIA study	Criteria	References
ecological baseline data	to consider levels of ecosystem to identify indicator species to provide data of habitat loss, change and fragmentation	4,9,10,11,12
Ecological assessment	to consider changes at both temporal and spatial scales for species to assess Eco- losses and gains	5,4
Ecological mitigation and monitoring	to consider mitigation hierarchy to consider the coverage of programs	12,13

Ecological resources were separated into terrestrial and aquatic ecology, depending on project location. Based on fifty-nine reviewed EISs, 52 and 49 EISs appeared the contents of terrestrial and aquatic ecology, respectively. Among 59 EISs reviewed, there were four EISs that no data related to ecological aspects. These were land and development projects.

3. Ecological contents in Environmental Impact Assessment

3.1 Ecological contents in baseline and impact assessment

Ecological content in the stages of baseline and impact assessment was considered in quantitative approach by counting the number of pages. As to terrestrial ecology, average number of pages is 10.50 and 1.38 in baseline study and impact assessment, respectively (Figure 2). Eighteen and twenty-three EISs were not found the data of terrestrial baseline and impact assessment, respectively. More than 80% of content were in baseline study whereas those data were used for impact assessment less than 20%. Content of aquatic ecology were in the same direction as terrestrial ecology. Average number of pages in baseline study and impact assessment were 7.31 and 1.68 pages, respectively.

The outcome of ecological impacts assessment was found that those 41 EISs indicated no- impacts. Sixteen and three EISs were specified low negative impacts and only negative impacts without significant level specification.

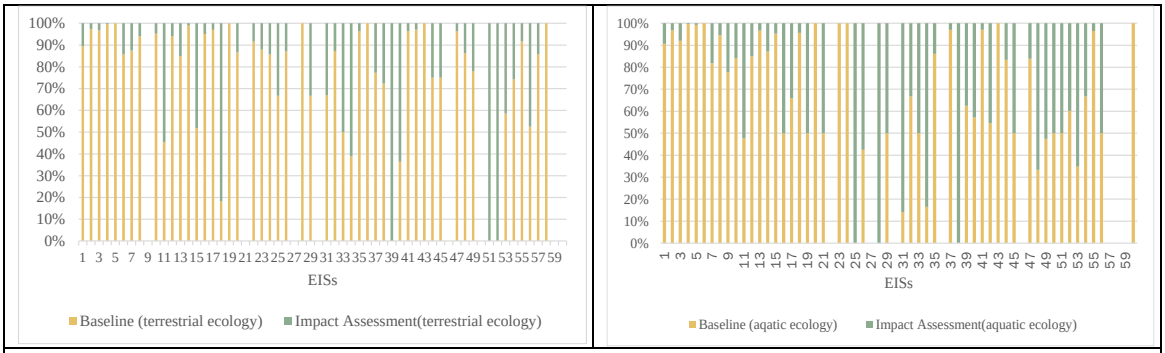

Fig. 2. Content of ecological baseline and impact assessment

3.2. The consideration on ecosystem losses

Ecological losses and gains from proposed projects are basic concept for ecosystem services. According to the EISs reviewed, the losses of ecosystem were mostly proposed for biodiversity level, however, the contents were widely indicated. These were the same as the losses of habitat and species (Figure 3). They indicated the losses of ecosystem in descriptive approaches without identification of quantitative losses or the types of ecosystem losses. These details could be not used as the initial consideration of the effects of projects on the losses of ecosystem in order to further identify or assess how gain of eco-compensation in mitigation measures.

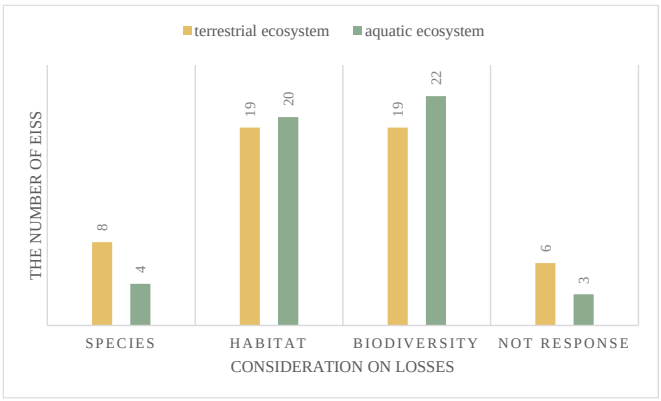

Fig. 3. The assessment of eco-losses in EISs

3.3 The measures to control the impacts

Mitigation and monitoring measures are the main tools to control the impacts from proposed projects. Mitigation hierarchy is the best practice for sustainable project development [13]. Mitigation hierarchy comprises avoidance, reduce, rehabilitation and compensation and, presently, compensation of ecosystem in the approach of ecosystem services is recognized as the highest level of mitigation [12].

Mitigation was mostly found for avoidance (Table 2). The examples were to strictly comply with mitigation of physical resources such as air or water quality, to prohibit any burning activities and catching any wild animals, to control activities within the projects' area, to maintain wastewater treatment, to avoid the discharge of treated water

Mitigation for reduction was to control any erosion causing by project activities, to clean up construction areas, to establish the areas for appropriate activities, to install wastewater treatment or instrument to screen the fabric from outside and grease and oil from the project areas, to establish good sanitation and accommodation for workers, recycling the unused raw materials onsite. Whereas rehabilitation focused on planting around project sites, to release local aquatic animals. Only one EIS

proposed mitigation for terrestrial compensation. It was reservoir project in which the appropriate ecosystem was proposed for its compensation.

Monitoring programs identified in the EISs with specific reference to ecology were negligible. Only fourteen EIS proposed monitoring for aquatic ecology, indicating the almost complete absence of effective ecological monitoring approaches. Those monitoring were activated at the same time of water monitoring. The examples were to monitor plankton and benthos. No EISs were indicated only terrestrial ecology.

Table 2. Mitigation and monitoring in EISs.

Measures	Terrestrial ecology	Aquatic ecology
Mitigation	26	26
Avoidance	22	23
Reduce	16	21
Rehabilitation	15	3
Compensation	1	0
Monitoring	8	14

4. Conclusion

The evidence presented here also provides insight into aspects of environmental research that have been overlooked, particularly ecological issues. In the case of tropical countries experiencing rapid development, such as Thailand, improvements in environmental assessment tools are crucial to assure sound environmental measures are put in place. In this way, potential environmental problems can be circumvented and ecosystems made sustainable. The results of this study clearly demonstrate the need to evaluate the EISs. These can not only apply to development projects that have the potential to cause environmental alterations, but also have relevance to country and regional environmental policy, natural resource acquisition and sustainability, and provide a holistic approach to environmental management and protection. To better incorporate biodiversity-based objectives in environmental impact assessments; connections between eco-content and different stages of an EIA are strongly recommended. Moreover, the eco-dimension in EIA study should be expanded. These points can help to achieve the goals of sustainable development.

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ENVIRONMENTAL IMPACT ASSESSMENT OF SALTWATER INTENSIVE SHRIMP FARM PROJECT

Abstract

The ESIA report describes Khine Zin Yaw Intensive Saltwater Shrimp Farming Project, located in Myeik District, Tanintharyi Region, Myanmar. The project, initiated by Khine Zin Yaw Trading Co., Ltd., is subject to compliance with national and international regulations and standards, including Myanmar Environmental Impact Assessment Procedures 2015. This ESIA report comprehensively evaluates the environmental and social impacts of the project's development and outlines the mitigation measures and management plans for each relevant component. The project falls under the category of EIA Aquaculture, as per Myanmar's EIA Notification of Environmental Impact Assessment Procedures (2015). The project area boasts favorable conditions, including access to unpolluted water sources, clay soil suitable for shrimp farming, and essential infrastructure. The project involves grow-out ponds, sludge ponds, drainage canals, treated water ponds and covering an area of 366.7 acres. The assessment considers the environmental and social consequences of the project, with a focus on localized and reversible impacts. Mitigation measures and regular environmental monitoring are proposed to address these impacts. The report includes an alternative analysis and baseline environmental surveys, encompassing air quality, water quality, noise, vibration and biodiversity assessments. Some parameters in marine water and wastewater quality exceeded guidelines, necessitating mitigation measures for wastewater treatment and responsible aquaculture practices.

Key words: Focus highlighted in the ESIA report includes water quality management, waste management, habitat conservation, disease prevention, biosecurity, stakeholder engagement and monitoring.

Introduction

The project is situated in Field No. (9-OSS), Pa-Htaw-Kyae-Taing-Pyin Kwin, Ma-Aing Village Track, Kyun Su Township, Myeik District, Tanintharyi Region. The project is precisely located at coordinates 12˚24'32.60"N latitude and 98˚29'53.32"E longitude. The location, surrounded by Ma San Pa Village to the East, Kyun Su River to the West, Kalar Island to the South, and Ka Phwer Village to the North, offers favorable conditions for shrimp farming. The decision to choose Field No. 9-OSS was based on the availability of water resources free from industrial and residential pollution throughout the year, the suitability of clay soil for pond preparation, and convenient transportation access, meeting the basic needs of owners and local people engaged in shrimp farming.

The construction and operational timeline spans from 2017 to 2023, with initial establishment on 167 acres in 2017-2018, extension to 199.7 acres in 2021, and construction activities in 2023. There are 65 shrimp grow-out ponds, 17 shrimp sludge ponds, and 10 drainage canals for wastewater discharge at the project site. The layout plan illustrates the arrangement of facilities and ponds, emphasizing the efficient use of resources.

Water resources management is a critical aspect, with raw water pumped from the nearest estuary stream, treated and stored in reservoirs. The treated water is then used for various operational purpose, including shrimp culture ponds. The juvenile shrimps (PL 10 and PL 12, *Penaeus Vannamei*) are imported from Charoen Pokphand Food Public Co., Ltd., Thailand. The cultivation process involves specific temperature and oxygen level adjustments during transfer and feeding regimes tailored to shrimp age and size. Continuous monitoring of water quality, aeration adjustments, and periodic checking of feed rates ensure successful shrimp cultivation.

The cultivation cycle, spanning 80-100 days, includes partial harvest at 75-80 days and 90-100 days, yielding marketable shrimp. Waste management involves collecting sludge and wastewater in waste ponds, utilizing conventional methods, and discharging the treated water to the nearest water bodies.

The environmental and social impacts are anticipated to be localized and reversible, with the implementation of suitable mitigation measures and regular compliance monitoring. The alternative analysis conducted encompasses technical, financial, environmental, and social feasibility, ensuring the safe and sustainable operation of the farm, as well as the creation of local job opportunities.

Figure 1 Layout Plan of KZY Shrimp Farm

Methodology

The environmental impact assessment for the shrimp farming project employs a systematic methodology based on the principles outlines by the International Association for Impact Assessment (IAIA). The assessment considers various factors such as magnitude, duration, extent, and probability to quantify the significance of potential impacts on air, water, land, biodiversity, and human beings. The methodology involves assigning scales to each parameter, and a significant point is calculated for each impact. The impact significance is then categorized based on the calculated significant points.

Significant Point (SP) for each impact is calculated using the formula:

SP = (Magnitude + Duration + Extent) * Probability

The calculated Significant Point is used to categorize impact significance into five levels:

< 15	Very Low
15-29	Low
30-44	Moderate
45-59	High
≥60	Very High

Impact categorization as very low and low are considered negligible, indicating no significant harm to the environment. Moderate impacts suggest the need for mitigation measures, while high and very high impacts demand precise and effective mitigation strategies.

Result and Discussion

Using the Air Quality Monitoring Station AQM-09, PM_{10}, $PM_{2.5}$ and gases CO, CO_2, SO_2, RH, VOC and O_3 were measured continuously for 24 hours. While the level of NO_2 at the one-point source (near the generator house) and Ma San Par Village is higher than the standard value, all other data measured at specific places fall within the standard. The project site's measured odor level is within the National Standard. It has been noted that some marine water parameters have baseline levels that are higher than the ASEAN marine water guidelines. For the quality of wastewater discharged from the farm, the total suspended solids (TSS) of wastewater points (1, 2, and 3) and total phosphorous (TP) of wastewater point (2) are higher than the guidelines value. High levels of TSS and TP in wastewater can be caused by factors such as feed and waste material from the shrimp, uneaten feed, and uneaten organic matter that decomposes in the water.

A biodiversity survey was carried out in the vicinity of the project site. Data on the avifauna, fish and fauna were also gathered by point counting, transecting and interviewing locals and fishmen. Through surveys and interviews, a total of 38 species of fauna and 103 flora species were recorded from the project area. Various sampling points were selected for marine biodiversity survey, covering ponds, tidal creeks, mangroves and mudflats. The presence of copepods, diverse benthic organisms, and unique phytoplankton compositions indicate the complexity and richness of the aquatic ecosystem. Monitoring and managing nutrient levels, especially in waste ponds, are crucial for maintain balanced and sustainable marine environment. The observed ecological interaction, such as the role of midge larvae as a food source for birds, emphasize the interconnectedness of different species within the ecosystem.

The social team at E Guard employed a comprehensive research approach, combining case study methodology and quantitative research techniques, to collect primary data on the socioeconomic conditions of local residents residing in close proximity to the project area. Few respondents paid attention to the alterations and effects on their surroundings. Some individuals were unsure whether the project development would have an impact. Some residents believed that the community might experience socioeconomic improvement due to the project. A small percentage of respondents mentioned that the project does not recruit as much, that the area's restrictions may affect the harvesting of mangrove products (like crab and tiny prawns used to make fish paste), that noise pollution is a result of the project's large motor boats and generators, that there are occasionally bad odors released, and that wastewater generation may have an impact on plants and animals in long term.

Table 1 Summary of Project Impact Significance

Potential Impact/ Issue	Impact Significance
Construction Phase	
Impact on air	Low
Impact on water	Moderate
Waste generation	Low
Threats to biodiversity	Low
Land use change and utilization of local resources	Moderate
Operation Phase	
Impact on air	Moderate
Impact on water	High
Waste generation	High
Soil contamination	Low
Noise Pollution	Moderate
Odor	Low
Threats to biodiversity	Moderate
Contamination of marine ecosystem	Moderate
Employment and livelihood	+

The overall assessment indicates that the project's potential impacts have to be mitigated with recommended mitigation measures during both construction and operation phases.

Planning and Logistics: Optimal schedules to reduce excessive transportation and equipment movement. Strictly prohibit open burning of solid waste within the farm.

Monitoring and Benchmarking: establish fuel consumption benchmarks and goals, regular monitor fuel usage and identify areas for improvement, used fuel-efficient equipment meeting environmental standards, regular maintenance for optimal performance and fuel efficiency, implement idle reduction policies to minimize unnecessary fuel consumption

Restoration: restore vegetation in clearance areas left after construction if feasible

Erosion Control Measures: implement sediment barriers, silt fences, or drainage connected to existing sediment ponds

Wastewater Discharge: prohibit direct discharge of wastewater into adjacent water bodies.

Nutrient Management: Develop a comprehensive nutrient management plan to minimize discharge into water bodies, optimize feeding practices and monitor water quality parameters regularly, implement aeration and circulation systems, minimize chemical use and ensure proper chemical handling.
Waste Generation: Implement the 3R system (reduce, reuse, recycle) in waste management. Encourage suppliers and contractors to minimize packaging waste and deliver materials in bulk when possible. Additionally, durable and long-lasting materials are specified to reduce the need of frequent replacements. Hazardous waste, such as fuel and lubricants, is identified and managed according to regulations, with workers trained in safe handling and disposal practices. Implement composting systems for organic waste and landfill non-biodegradable trash.
Soil Contamination: Cover culture ponds with HDPE to prevent soil contamination, implement proposed solid waste and wastewater treatment systems, ensure drainage is connected to wastewater canals.
Noise Pollution: Provide personal protective equipment and monitor noise levels, implement mitigation measures by covering generators with sound-absorbing materials, provide medical check-up for workers.
Threats to Biodiversity: implement a wastewater management scheme and solid waste management plan. It also prohibits hunting and fishing of animals during their breeding seasons to protect local wildlife populations.
Land Use Change and Utilization of Local Resources: replantation of mangrove in surrounding gaps and native tree planting in leveled areas vicinity of the site. Support for local community needs is integrated into the (CSR) plan.
Contamination of Marine Ecosystem: implement biosecurity control measures, review hazards causing disease outbreaks and update control measures, install disinfection spray systems for vehicles.
Occupational Hazards: properly store chemicals, implement safe handling procedures, and provide worker training, establish maintenance schedules and inspect equipment regularly, train workers on safe operation and emergency shutdown procedures, assess and address ergonomic risks, provide ergonomic training, implement safety measures for working around water bodies, provide adequate life-saving equipment and monitor workers' health, implement good housekeeping practices and train employees on fire prevention measures and electrical safety.
The outlined strategies aim to minimize the environmental footprint of the project, focusing on environmental and social aspects. The emphasis is on preventive measures, efficient operations, and continuous monitoring to ensure adherence to environmental standards and promote sustainable practices throughout the construction and operation phases.

Conclusion

The Environmental Management Plan (EMP) provides a comprehensive framework outlining necessary mitigation measures and reporting obligations. Khine Zin Yaw Trading Co., Ltd. further demonstrates its commitment by appointing an Environmental, Occupational, Health, and Safety Officer (EOHSO) to monitor the implementation and compliance of proposed mitigation measures and management plans.

Key focal areas within the Environmental Impact Assessment (EIA) include water quality management, waste management, habitat conservation, disease prevention and biosecurity, biodiversity conservation, stakeholder engagement, and monitoring. The baseline environmental quality measurement and impact assessment indicate potential significant impacts on water quality and waste generation. As a response, the project proponent emphasizes the implementation of specific mitigation measures, including wastewater treatment through constructed wetlands and the adoption of land filling and composting approaches.

Through the adoption of responsible aquaculture practices, the shrimp farming project aims to minimize adverse impacts on coastal ecosystems, contributing to the promotion of marine biodiversity and the sustainable use of marine resources. The project commits to maintaining or replanting mangroves along the project's boundary, preserving the watershed area, and engaging in gap replanting of terrestrial native species to serve as crucial habitats for various species. Ultimately, the Environmental Impact Assessment serves as a valuable guide to navigate and minimize negative environmental impacts, promoting sustainable practices that ensure the long-term viability and ecological integrity of the shrimp farming.

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Public Sector and Hydro-power in Nepal: Organization and Management Issues

Lars T. Soeftestad and Michael Holics [1/]

1 BACKGROUND

The paper follows from and expands upon an earlier paper that was prepared for the 2021 conference (Soeftestad and Gorzula, 2021). It aimed to analyse elements of the overall port-folio of hydropower projects. The emphases were on, *inter alia*, the history of the sector, the overall process of project implementation, and comparison of select projects as regards resettlement and compensation. The role of the public sector was not addressed, which is the focus of the present paper. The authors of both papers worked on the EIA for the proposed Nalgad Hydropower Project, and the present paper focus on this project.

2 NEPAL'S HYDROPOWER SECTOR

The major source of energy in Nepal is water. There are presently more than 120 operating hydro-power projects in Nepal, with a combined capacity of 2,600 MW, with more than 230 projects under construction. Together they will generate around 8,700 MW, which is a fraction of the total potential.

For the present purpose, key elements of the hydropower sector that are addressed include: (a) Legislation and (b) Public sector institutions.

2.1 Legal Basis

A number of laws govern the sector and more specifically the hydropower projects (Chiatrishuli, 2020; lawimperical.com, 2019; meroadalat.com, nd; NVE, 1998)[2/]:

- Electricity Act, 1992 (2049) and Electricity Rules, 1993 (2050). *Scope*: Deals mainly with licencing of projects.
- Electricity Regulatory Commission Act, 2017 (2074). *Scope*: For effective production, transmission, distribution, and trade of electricity.
- Nepal Electricity Authority Act, 1984 (2041). *Scope*: Governs Nepal Electricity Authority, established for management of power supply.
- Public Private Partnership and Investment Act, 2019 (2075). *Scope*: Governs projects with capacity above 200 MW and costs more than 6 billion Rupees.

2.2 Public Sector Stakeholders

As the sector gradually grew, new institutions were created, and existing ones were amended in order to address existing or emerging issues. The key institutions are (corporatelawyernepal.com, nd; lawimperical.com, 2019; Chiatrishuli, 2020)[3/]:

- Department of Electricity Development (DOED). *Responsibility*: (1) Main administrative authority responsible for implementation of projects, including appointing management staff and (2) Licensing of projects, including granting, renewing, amending, and revoking licenses.

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[2/] Cf. also Soeftestad and Gorzula (2021).

[3/] Cf. also Soeftestad and Gorzula (2021).

- Investment Board of Nepal (IBN). *Responsibility*: Approves investment for projects with capacity higher than 200 MW and with investment of more than 6 Billion Rupees.
- Electricity Regulatory Commission (ERC). *Responsibility*: Production, transmission distribution, and trading.

Further relevant decision makers and advisory bodies include: Ministry of Energy (MoE); Ministry of Forests and Environment (MoFE); Ministry of Land Management, Cooperatives and Poverty Alleviation (MoLMCA); Ministry of Science, Technology and Environment (MoSTE); National Planning Commission (NPC); Nepal Electricity Authority (NEA), and Water and Energy Commission Secretariat (WECS).

For other aspects of the overall management of the sector, over and above individual projects, and including statistics, the licensing process, EIA, resettlement, and compensation, cf. Soeftestad and Gorzula (2021).

3 NALGAD HYDROPOWER PROJECT

3.1 General [4/]

Work on Nalgad Hydropower Project was initiated in 2010. The future project area is located in Karnali Province in the western part of the country, specifically on the Nalgad River in Jajarkot District. Topographically this is in the mid reaches, but it is still relatively removed (it takes a whole day of driving to reach the damsite, and a further 1-2 days hiking to arrive at the northernmost part of valley). It is a storage project with a proposed 248 m high reinforced concrete (RCC) dam. The reservoir will have a total storage volume of 474 million cubic meters (MCM), and a live storage of 350 MCM. The project will have a capacity of 417 megawatts (MW). It is expected to generate approximately 1,406,06 gigawatt-hours (GWh) of electricity. Gross Head is 698 meters. Four turbines, each with a 102,5 MW nameplate capacity, will be installed. The project is being developed by the Nalgad Hydropower Company Limited (NHCL).

The mission of NHCL is to: (a) Implement global best practises for high dam construction, (b) Develop, build, own, and operate this storage project, (c) Operate the project in a cost-effective, socio-economically, and environmentally friendly manner, and (d) Improve the lives of local communities in the Karnali Province. The Government of Nepal aims for the project to play a crucial role in Nepal's overall energy landscape through harnessing electricity that will contribute to sustainable development.

3.2 The Project's Phases

The project has been under preparation a number of years, going through several phases, many of them mandated according to official regulations. A summary of project implementation, with a focus on activities, subsequent follow-up activities, and brief comments is available (Table 1).

3.3 Public Sector Staff: Role and Operation

The DOED seconded staff to the project on a permanent basis, though the staff oftentimes did not serve very long. In Kathmandu DOED staff were working in a building located apart from the offices of the administrative and operational project staff, local as well as expatriates. In general, their work was to some extent removed or separate from the work of the permanent and short-term consultants, that is, there was not a lot of contact. DOED staff would travel to the project area, but not very often, oftentimes to stay in a purpose-built office building-cum- guesthouse.[5/]

[4/] When nothing else is mentioned, all information in this section is from the project's EIA reports (Nalgad Hydropower Company Limited, 2023).

[5/] It is interesting that this office-cum-guesthouse was built before any work of the project had begun, and moreover that it appears to be mostly not used.

Table 1. Nalgad Hydropower Projet, Overview of phases				
No.	Date	Activity	Follow-up Action	Comment
1	Jul 2012	Feasibility Study for Nalsing Gad Storage Hydroelectric Project completed	Prepared by Project Development Department Engineering Services Nepal Electricity Authority	
2	May 2016	Contract signed for Updating of Feasibility Study, Detailed Engineering Survey & Design and Environmental Impact Assessment Study of Nalsing Gad Hydropower Project	Consultant mobilised	
3	Sep 2016	Commencement of EIA Study by Consultant		Delays by NHCL in starting consultation for EIA
4	Aug 2017	Submission of EIA Scoping and TOR Reports to NHCL	NHCL reviewed and provided comments for revision of the documents	
5	Dec 2017	Submission of revised EIA Scoping Report and EIA TOR Report to Ministry of Energy and Department of Electricity Development (DOED) for review/approval	DOED reviewed and provided comments for revision of the documents	Delay by NHCL in reviewing draft scoping and TOR reports
6	May 2018	Presentation of revised EIA Scoping and TOR Reports to Ministry of Environment and Population for review/approval	Approved by new Ministry of Forest and Environment in June 2018	Change in Government led to re-organisation of Ministries
7	Jun 2019	Submitted draft EIA documents to NHCL	NHCL organised Public meeting in Kathmandu	
8	Nov 2019	Public presentation in Kathmandu of draft EIA and supporting documents	All parties provided comments to be included in the Final EIA documents. Consultant revised all documents	COVID delays
9	May 2020	Submission of draft final EIA documents to MoFE	Review of draft final EIA documents by MoFE	Delay due to shortage of staff in MoFE
10	Dec 2021	Final EIA documents submitted to NHCL addressing all comments from public consultation, NHCL and DOED	NHCL submitted EIA documents to DOED and MoFE and arranged presentation of documents to MoFE	COVID delays
11	Aug 2023	Presentation of Final EIA documents to Ministry of Forest and Environment	EIA approved by MoFE	

4 DISCUSSION

4.1 Challenges

The management of a hydropower project (including construction and operation) covers a number of issues, among them: communication (internal and external), economics, engineering, finance, HR, logistics, and general management (Basnet, 2022). They will not be addressed here. [6/]

(A) Issues referred to characteristics of the DOED staff that were seconded to the project:

1. *Organization of the Sector*. In the overall management of the sector, it seems there is little horizontal focus on sharing information and knowledge from the DOED HQ in Kathmandu to staff at the many hydropower projects. As well, horizontal communication, aimed at sharing and knowledge management, seems to be lacking.

[6/] The views presented here refer to the author's work on the EIA only and the following period (see Table 1).

2. *Division of Labor*. Division of labour and responsibilities between participating stakeholders, in public sector, private sector, and civil society, is not clear, and leaves much to be desired.
3. *Level of Knowledge*. The level of knowledge at the staff level of the very complex and inter-disciplinary expertise necessary for successful management of projects is very low.
4. *Formal Qualification*. The level of personal formal qualification among staff appears to be low, and not optimally suitable for the position they serve in.
5. *Capacity Building*. There is little or no focus on capacity building of staff.[7/]

(B) Staff resources within the NHCL and MoFE:

6. NHCL had to outsource review of EIA documents because of the lack on internal expertise.
7. MoFE had lacking staff to deal with the volume of EIA documents submitted to the Ministry.

(C) Issues pertaining to work done by the DOED staff and/or organized by them:

8. *Cut-off Date*. No cut-off date for determining level of compensation was set and published. As a consequence, many people in Nalgad continued to build houses and other structures, in order to qualify for compensation.
9. *Land Acquisition*. The Government began the land acquisition process prior to the EIA and preparation of the Resettlement Action Plan (RAP). From this it can be inferred that the Government planned to go ahead with the Nalgad project irrespective of the outcome of the EIA process.
10. *Compensation: Levels*. The compensation for land acquisition offered by the Government does not meet international standards and recommendation as set by the World Bank and ADB, etc.
11. *Compensation: Cash Versus Replacement Land*. The DOED appeared to be concerned with this crucial issue only because it is mandatory. The fact that a good number of the people in Nalgad that qualified for resettlement prefer to stay behind, make the Governments job less complicated, and likely cheaper.

(D) Issues of a social/cultural character:

12. *Stakeholder Relations*. Relations with local people (the 'beneficiaries' in development cooperation parlance), of which many are indigenous, appears not to be given high priority.
13. *Cultural/Social Data, including Socio-Economic Data*. This is another example of how DOED and the Government do not place much, and certainly not enough, emphasis on the softer human aspects of hydropower projects.
14. *Resettlement and Compensation*. These processes and activities address social/cultural issues, largely because it is mandated. It follows that they are treated as externalities.

These challenges or issues are not wholly separate. Many of them are causally connected. This means that addressing one of them implicitly addresses also others

4.2 Operation and Management

Several of the challenges listed above fall under Operation & Management (O&M). O&M is ubiquitous in hydropower project (as well as in other infrastructure projects). O&M is concerned with designing and controlling the production of goods and services, in order to ensure efficiency in resource use. In the context of hydropower, it focuses on efficiency in economics, financing, and engineering.

Several private sector companies in Nepal provide training on O&M, among others to DOED staff. One such trainer is Homs Operation and Maintenance Services (Homs, nd). There is an international understanding of what O&M entails, and these firms provide training following this understanding. O&M addresses a limited set of economic, engineering, financial, and technical issues. Everything else, in particular the social human concerns centred around people that live in the project area, are

[7/] Cf. section on Operation and Maintenance (O&M) below.

understood as externalities and accordingly of no concern. A revised, broader, and more inclusive understanding of what O&M entails would be a good idea.

5 CONCLUSIONS

The arguments presented in sections 3 and 4 are based on the experience with working on the Nalgad Hydropower Project. Chances are high that the very issues apply to all hydropower projects in Nepal, those under construction and those operating. Also, the larger the project the higher the chances that these challenges will be present.

Further, chances are high that all or most of these challenges are available also in hydropower projects elsewhere in the Himalayas, that is, in Bhutan, India, China, and Pakistan.[8/]

Of the challenges listed above, this paper is above all concerned with what can be referred to as soft human issues. These include, but are not limited to, communication, governance, inclusion, knowledge management, networking, participation, and sharing.

Finally, we argue for increased communication between the public sector and civil society.

6 RECOMMENDATIONS

We present two recommendations that represent, summarize, and expand upon several of the challenges listed above, and that are themselves related.

6.1 Networking

Increased emphasis on networking, which would support and further inclusion between all relevant stakeholders, is necessary to address several of the challenges mentioned above, support sharing of information and knowledge, and support learning. This will further support the following recommendation on training.

Networking should also take place internationally, with the neighbouring countries in the Himalayas. The Himalayan region contains hundreds of hydropower project, partly under construction and partly operating. The public sector institutions responsible for these projects will have deep experiences to share what works and what does not work.

6.2 Training

Training, first and foremost for the DOED staff seconded to hydropower projects is necessary. This is crucial in order to increase their formal competence and knowledge as well as to understand the lives and cultures of peoples who live in the project areas, including indigenous peoples.

Such training should also be offered to members of NGOs and private sector companies involved in building and managing project.

Training modules should build upon, and expand upon, existing training on O&M organized by private companies. It should be considered if it is better that DOED organizes such training.

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[8/] At present only data from India are available. For a possible future revised edition of the paper data from all Himalayan countries will hopefully be available.

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The Role of Social Impact Assessment in Shaping Community Development Funds for Energy Projects: Lessons from Australia and Asia

Andrea J Kanaris & Biqing Li

"The future depends on what we do in the present." Mahatma Gandhi

Understanding the social impacts of an energy or resource project is crucial in shaping where and how community development funds invest. Social impact assessment (SIA) is understood as a process of identifying, analyzing, monitoring and managing the intended and unintended social consequences (positive and negative), of planned interventions (policies, programs, plans, projects) and any social change invoked by those interventions (Vanclay, 2003). SIAs serve as a vital tool for the identification and evaluation of the social, environmental, and economic impacts of these projects. Historically SIA and community development funds (CDF) have operated as separate activities. SIAs are primarily mandatory forming part of environmental approvals and CDF are a mechanism established to contribute to a company's corporate social responsibility (CSR) often with little or no evidence of their success in delivering on their intended outcomes (Barnett et al., 2020). This paper explores how SIAs may influence the design and execution of CDF and lays down the foundation for their success. We explore both CDFs and community benefit schemes (CBS) as identified by the CSR and community development literature.

This paper builds on the existing discussions of merging approaches of SIA and CDF to shed some light on the practical side of such an approach, especially in energy projects.

First, we outline the existing problem with CDFs drawing on case studies from Australia and Asia. Secondly, we outline why SIA provides the critical underpinnings for building a business case for investment in community benefit interventions. Thirdly, we articulate the rationale for reimagining community development funds as investment funds. Finally, we introduce a way forward for companies to invest in community programs and interventions that maximize and measure benefits to the community.

The problem with CDFs

CBS and CSR share the same vision to positively contribute to society. The CSR literature began about 50 years ago. CSR entails the "policies and practices of corporations that reflect business responsibility for some of the wider societal good" (Matten & Moon, 2008). The CSR stream of corporate social performance literature is criticized for disproportionately focusing on the benefits to specific stakeholders or the firm itself (whether it is financial or non-financial) instead of impacts on the wider society. There is not a single study that adequately demonstrates that CSR initiatives resolved the social problems they intended to address. The above deficiency of CSR literature highlights a need for an appropriate approach to evaluate and validate the effectiveness of CSR initiatives and expanding the matrix of social performance to social impacts.

CBS are also rooted in development studies. They are viewed as voluntary, therefore additional measures a project proponent can take to restore and improve affected livelihoods (IFC, 2012). Development practice has enormous concern with evidence of their impact and evaluations are the norm (Duflo et al., 20007; Khandker et al., 2010; Ravallion,

2009; Banerjee & Duflo, 2009). Scholars and practitioners have pointed out the advantages of SIA in addressing the effectiveness of CBS and its potential to improve corporate social performance evaluation, including:

- Identification of who is eligible (Devine-Wright & Sherry-Brennan, 2019)
- Identify opportunities based on the characteristics of the community (Estevez & Vanclay, 2009).
- Establish the effectiveness of initiatives with robust evaluation methods.
- Facilitate selecting and designing CBS that can realize their good intentions.
- Provides evidence through rigorous research methods and processes to help selecting more effective and efficient interventions/programs.
- Help justify the design of CBS (Barnett et al., 2020).

Even though several researchers have highlighted the potential that SIA could facilitate the design, implementation and evaluation of CDF, there is limited discussion as to how it should be done in practice. Estevez & Vanclay (2009) concluded that CBS or social investment should be encompassed by SIA discourse and practice given that SIA is already a mandatory requirement in many jurisdictions and an essential part of project financing whilst social investment remain a voluntary and less regulated field. Combining the process helps avoid duplication of actions in data collection and improves efficiency of money spent.

SIA Practitioners often hear impacted communities talk about their low levels of trust in corporations and government, and frustration at the known impacts not being adequately addressed. In many cases these companies will have CDFs established that spend millions of dollars in the community in the belief that they are "doing good". The result is often that impacts are not adequately addressed, community consume the grants and yet maintain a high-level of distrust and sometimes resentment. Many express feeling that the company is only interested in "looking good" and seeking photos for the public relations and reporting. On the other hand, the companies are often perplexed at how all their good work has not translated to high levels of trust and a great relationship with their community.

So, what is going on? The dilemma is the disconnect between the intention and outcome realizing its effects i.e. mistrust. By this stage the problems are layered on top of each other. The community are receiving funds and grants for programs or initiatives that are often unrelated to the impacts. Leaving impacted people to fall through the cracks. Large amounts of funds allocated to lots of small projects that often make the staff and the recipients happy but at its worst there is no measurable benefit to the community as whole. This is compounded by diverting money away from projects and strategies that would address the companies impacts and community needs in a manner that allows for measurable ROI.

We looked at two case studies:

- Australia: Clean Energy Enhancing Positive Social Outcomes from Wind Farm Development, which included findings from their survey results.
- Asis: Asian Development Bank's (ADB) Strategic and Integrated Approach to Transforming Power Development in Planning in the Greater Mekong Subregion.

The Australian study showed there is no linking of SIA to CDFs and ASIA linked the SIA to the CDF but the process for integration is flawed.

Case study 1 – Australia

The Clean Energy Council surveyed corporate and community wind energy developers on their community engagement and benefit-sharing. They received 26 responses from company representatives working in community engagement (43%), leadership roles (e.g. CEO) (25%). The survey was not circulated to recipients of CDFs to ascertain their views, satisfaction levels and experiences.

Among those working in benefit sharing only 35% had some relevant training or qualification. There were no mentions of linking the community benefits to the environment or SIA.

There was remarkably little benefit-sharing in the 19 project examples provided by respondents. This question had lowest response rate with only 15 respondents, possibly reflecting a level of unfamiliarity and inexperience among respondents. For those that do benefit-sharing, the most common forms are sponsorship (25%) and community grant funds (34%). There were plans to use/implement community co-investment or co-ownership by 17% of respondents. Benefit-sharing overall was less common, less diverse and less understood.

A range of approaches to community engagement were being used across the Australian wind industry. However, they are wary of public meetings (e.g. 'town hall' meetings) and use of surveys, feeling that these can easily misrepresent local sentiments (i.e. be hijacked) and can tend to result in creating 'for and against' divides. The primary purpose of community engagement's is to build relationships (26%) and a need to inform and educate (17%)(Hicks et al., 2017).

Case study 2 – Asia

The benefits and impacts of energy projects, especially large-scale renewable energy projects, are often imbalanced with the benefits typically accruing at national or global levels and adverse impacts felt by local residents (ADB, 2020). Due to this characteristic of energy projects, we argue that CBS accompanying these projects should be designed proportionately to the project impacts to be able to address the unfair distribution of burdens in energy transition (ADB, 2020). Asia Development Bank (2020) proposed to integrate Strategic Environmental Assessment (SEA) into Power Development Planning to enhance environmentally, socially and economically sustainable outcomes efficiently. CBS are incorporated into SEA processes, mitigation measures or action plans, which are subject to monitoring and evaluation. These schemes were informed by the results of impact assessment by:

- being consistent with the objective and criteria identified through baseline study.
- being consistent with the concerns as indicated by impact assessment.
- developing mitigation measures proportionately to the possible impacts.

This case was addressed in the context of coordinated efforts and has the following shortcomings:

- Neglected the inherent disconnect from the work done by an independent SIA expert and company employees designing and implementing CDFs who are incentivized to represent their employer.
- Did not address how much benefit should a corporate entity create for their community and when is it the responsibility of governments.
- Did not address whether experts with the appropriate skill sets and capacity will be involved in delivery.

Rationale for reimagining CDF

The current framework for CDF is not effective and may not be efficient. Most CDFs adopt a grant funding model and are unable to demonstrate their return on investment (ROI) as they measure outputs without evaluating their intended outcomes. Often the amounts are distributed in small amounts as donations e.g., jerseys for the local football team or one-off grant payment to a local charity, school etc. This approach is popular for many reasons such as making staff feel good, provides good public relations announcements, helps support small local initiatives. Grants are beneficial to those funded and is not necessarily meeting a community need or benefit the broader community.

Vanclay (2003) stipulates that a feature of SIA is to assist communities and stakeholders to identify development goals and ensure positive impacts (benefits) are maximized or enhanced, indicating that this role can be more important than minimizing harm from negative impacts. On this premise we make the argument that SIA is critical in the formation of CDF, and we propose they are reimagined as community investment funds (CIF).

Proposed CIF model

Language is important. By shifting the name to community 'investment' fund we are noting the need for a return on that investment. This would then require a justification for the investment and the need for measurement.

SIA can be seen as the business case for the investment in social programs/initiatives, mitigation strategies, and benefit enhancement strategies that create a shared value as they address impacts and benefits and are endorsed by the community. In this model, there would be a strategic investment that better leverages funding to meet the needs of the community, partners and the corporate entity.

When consulting with community during a SIA a range of impacts, benefits, mitigation and enhancements are raised but not all are included in subsequent management plans and conditions. These are the starting point for what investment can be made in a CIF.

The table below provides a guide for deciding what is mandated and not included in a CIF and those that would be suitable for inclusion in a CIF. This list is not exhaustive but indicative.

	Mandated activities	Community Investment Fund	
		Non-Mandated 80%*	Optional Charity 20%*
Driver	Reporting obligations	ROI for community and funder	No expected ROI
Activities / Strategies	• Legislated Requirements e.g. Community Development Agreements under Australia's Native Title Act 1996, • Conditions of Consent • ESIMP	• Mitigation and enhancement strategies identified by community during ESIA but not included or mandated. • Programs / initiatives that address community needs	• Sporting uniforms • Community gardens • One off community events
Linkages	• ESIA • Legislation and or regulatory requirements	• ESIA and Community Needs • Shared Value	Community needs OR Corporate values

*Percentages are proposed and may vary. The proposed percentages encourage strategic investment while allowing for charitable giving.

The diagram below illustrates the proposed CIF model. It shows the components of SIA that inform a business case for a CIF, considers the need to demonstrate a ROI and social performance, process to support successful delivery and outcomes, with community and stakeholder engagement as a critical underpinning.

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Teaching SEA in a country without regulation: challenging this scenario?

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Abstract: Brazil has a long-standing systematic practice (more than 40 years) and mandatory Impact Assessment of projects that is taught in several undergraduate and postgraduate courses. Strategic Environmental Assessment remains locally discretionary and unregulated, despite mentioned in legal provisions of Brazilian states and almost forgotten in local education. Teaching impact assessment is not trivial and poses challenges to teach and train professionals who will work in interdisciplinary teams, being pivotal to contributing to the quality of practice. In a country with experience limited to around 70 SEA reports and with sparse regulatory proposals beginning in 1994, designing an SEA course for undergraduate students represents a major responsibility to break this inertia and build a learning atmosphere to boost its appropriate use in the country. The objective of this work is to discuss the pioneering proposal and offering of the first undergraduate SEA course at the Universidade de São Paulo, supported by the IAIA framework on Teaching Impact Assessment. The comparison of these principles, of international good practices, expected (proposal) and achieved (offering), revealed results for improvement in future cycles that still come up against limited practice. The principle of pedagogy is the most consistent, based on the lecturer's theoretical and professional experience. However, the principles of content and skill need to be strengthened and the lack of a mandatory and regular SEA scenario negatively impacts them. Despite the limitations, teaching SEA is essential to disseminate the instrument and build the desired practice in Brazil.

Introduction

Teaching impact assessment (IA) is fundamental to its good practice (Enríquez-de-Salamanca, 2019). The importance of the topic resulted in a good practice guide for Teaching Impact Assessment (Pope and Morrison-Saunders, 2018; Morrison-Saunders et al., 2020).

Brazil has more than 40 years of formal and mandatory application of EIA for engineering projects but it is still in an early development stage considering the research field (Duarte et al., 2017).

SEA remains discretionary in Brazil, with only 68 recognized cases in Brazilian planning (or identified since there is no repository) (Tshibangu and Montaño, 2019), predominantly carried out under the support of multilateral funding agencies.

According to Gallardo et al. (2021), research with SEA is also positioned at an early stage of development.
Discussing IA in Brazilian education, Ramos et al. (2025) observed that SEA is often a topic inside EIA courses. It is an independent discipline in only 2 undergraduate courses, differently from EIA, which is present in most environmental engineering courses evaluated by Veronez and Malvestio (2022) as mandatory and formal teaching. However, Raimundo and Almeida et al. (2022) reinforced that SEA is an often overlooked topic in IA teaching in Brazilian undergraduate engineering programs.

Since the first attempt to formalize SEA in Brazil, in 1994, some local and specific laws have been presented, gradually and spaced out, but without comprising the broad planning and the entire country (Crespo and Raimundo, 2018; Gallardo et al .2022). The recurring attempts to modify the environmental licensing framework linked to IA in the country, with the latest proposal from 2021, aim to accelerate and be flexible licensing, weakening the role of IA (Athayde et al. 2022), without fostering a proper inclusion of SEA at the federal level.

In this context, a professor of environmental engineering at the best international-rated Brazilian university, and a specialist in IA, proposed a dedicated SEA discipline at the undergraduate level. The objective is to discuss the pioneering proposal and to offer the first SEA course for undergraduate students at the Universidade de São Paulo (USP), using the IAIA framework for Teaching IA.

Method

The SEA subject to be evaluated is one of two offered in two Engineering schools at the Universidade de São Paulo
(https://uspdigital.usp.br/jupiterweb/obterDisciplina?nomdis=avaliacao%20ambiental%20estrategic&sgldis=
), started in 2018 and 2019, under the responsibility of two professors specializing in IA, who are among the three who publish the most on SEA in Brazil (Gallardo et al. 2022).

The first class was from 2020, with 61 students, and the second one from 2021, with 98 students, both taught during the pandemic in an exclusively remote format. The next offering is for the 2nd semester of 2024. The subject was not offered in 2022 or 2023, the professor's postdoctoral period abroad, as there was no other professor in the department with the technical knowledge to offer it.
According to the syllabus, the SEA discipline does not have exams, but the students must carry out activities in the classroom and outside, seminars with papers and SEA reports, and they are encouraged to follow and engage in forums and chats on Moodle.

In an exploratory approach, to analyze this case study, in its two cycles of offering, the IAIA framework on Teaching IA (Pope and Morrison-Saunders, 2018; Morrison-Saunders et al., 2020) was used, comparing the expected principles (in the course

syllabus) and perceived if achieved (in both offerings, according to the teacher's perception of the student's performance). The assessment was binary (yes or no), when "no" represents no evidence that validates the principle could be perceived by the teacher. However, "yes" does not necessarily represent that the principle is being adequately explored, which means room for potential improvement.

The main limitation of this research refers to the perspective of the teacher's exclusive analysis, with no interviews being carried out with the students, monitors, or invited lecturers.

Results

The discipline, offered within the scope of a civil and environmental engineering department with a workload of 60 class hours, is not mandatory but can be chosen as a free elective discipline or within the specialization modules. In both offers, the main audience (because they have priority for enrolment) were engineering students, not limited to civil and environmental engineering, but other types too, also serving other courses, such as environmental management and international relations. During the pandemic, synchronous and monitored classes allowed attracting students from other campuses located outside the host city. The initial number of enrolment places had to be increased to meet the number of enrolled students.

Professor Rosário Partidário (IST) gave a lecture in the first offering and Professor Marcelo Montaño (who teaches another SEA discipline at USP) was responsible for the lecture in the second offering. Professional Fernanda Correa from the Arcadis consultancy, which coordinates SEA studies in Brazil, was a speaker at both offerings.

Tables 1 to 3 analyze the principles of best practices applied to the SEA discipline.

Table 1 – Principles: contexts

Principles: Contents	Extremely or very important for teaching		Comments
	expected	perceived	
Integrates the theory and practice of IA	Yes	Yes	The program uses lectures and practical activities
Incorporates research contributions	Yes	Yes	Students work with scientific articles in activities
Presents international best practice principles	Yes	Yes	There is a specific class on SEA frameworks and good practices
Presents the requirements of specific standards, regulations, or procedures relevant to the participants	Yes	Yes	The first two classes focus on the EIA of projects and the assessment of cumulative impacts is also part of a class in the course
Explores professional ethics	No	No	Ethical issues are only considered implicitly in the course program and lightly permeate some classroom discussions
Positions EIA as an interdisciplinary process	Yes	Yes	Interdisciplinarity permeates several classes of the discipline and the diverse composition of students' backgrounds corroborates this principle
Presents IA as a pluralistic process	Yes	Yes	There is a class on public participation in SEA, speakers also brought some data on this principle
Presents IA as being both socio-political and technical in nature	Yes	Yes	Both the class on decision-making in SEA and other classes on baseline, for example, address this principle
Fosters sustainability-oriented norms and values	Yes	Yes	There is a class that discusses the integration of sustainability in SEA

Provides practical methods and tools	Yes	Yes	There is more than one class in the program that covers methods and tools, with Brazilian and international case studies. The final seminar also requests an analysis of the method used in the analyzed SEA.

Table 2 – Principles: pedagogy

Principles: Pedagogy	Extremely or very important for teaching		Comments
	expected	perceived	
Is tailored to the context, needs, and capacities of learners	Yes	Yes	As it was known that some students do not know IA, the first two lectures tried to alleviate this deficiency,
Ils flexible	No	No	The course has a program to be followed, small adjustments can be made, but there is no wide flexibility
Facilitates co-learning	No	No	Not applicable
Simulates Key features of IA practice	Yes	Yes	Teamwork is strongly encouraged, including seeking a multidisciplinary group composition
Provides opportunities for discussion and debate	Yes	Yes	Students are encouraged to participate, and this principle makes up the final grade
Utilizes case studies	Yes	Yes	There are specific classes dedicated to analyzing Brazilian cases and international cases (regulated and non-regulated SEA systems)
Provides opportunities to gain practice experience	Yes	Yes	Students develop the final seminar using a real SEA study.
Facilitates self-learning	Yes	No	As the practice of SEA is very limited, unlike other training subjects, there were no students who worked specifically with SEA
Is memorable and fun	Yes	Yes	In both offerings, students were satisfied with the learning environment created in the course.

Table 3 – Principles: Essential skills

Principles: Essential skills	Extremely or very important for teaching		Comments
	expected	perceived	
Integrative and systems thinking	Yes	Yes	The activities developed were focused on promoting critical evaluation
Critical thinking	Yes	Yes	The activities developed were focused on promoting critical evaluation
Judgment	Yes	No	The activities developed did not allow reaching this level of judgment
Written communication skills	No	No	The focus of activities was aimed at a specialist audience
Oral communication skills	No	No	Oral communication was encouraged, but the SEA instrument is for discussion, not to prepare for dialogue with different stakeholders
Collaboration and teamwork skills	Yes	Yes	Carrying out group activities allowed them to develop this skill
Project management and coordination skills	No	No	This management skill was neither acquired nor expected in the course
Research skills	No	No	The course has a more analytical focus, not on the construction of the SEA study
Job readiness	No	No	The course focuses more on the skills of understanding SEA, not on coordinating a SEA

Considering the three categories of principles, regarding the content and pedagogy of the discipline, the teacher tried to contemplate them in their entirety and had a perception of reach for almost everyone during the course. Regarding "skills", less than

half of these principles were not even considered when preparing the discipline and only two of them were perceived as achieved during the course.

Discussion and Conclusions

The first two offerings of the SEA discipline for engineering undergraduates revealed a high demand by students (61 and 90 students, respectively), considering that it is an elective subject of a non-mandatory instrument in the country. Thus, even without the mirror of mandatory and practical experience, the SEA theme was deemed important in the training path of these students.

The comparison of principles on how teaching environmental assessment with this experience in teaching this subject in Brazil revealed results for future improvement. The content principles, except for professional ethics, were considered in building the syllabus and could be confirmed in the development of the course. This confirms what Enríquez-de-Salamanca (2019) highlighted about the importance of having IA specialists teaching courses of this nature in an attempt to overcome some weaknesses in IA teaching in Brazil as detected by Almeida and Raimundo et al. (2022).

The principles related to pedagogy denoted that several strategies were used by the teacher to ensure effective learning with SEA. It tries to avoid generating a negative vicious cycle between teaching and practice as observed by Veronez and Malvestio (2022).

The principles related to skills were very little sought after in the discipline proposal and less achieved in its implementation. As there is no systematic practice and the potential for professional performance with the instrument is extremely limited, the discipline was less ambitious with the intended skills to guarantee space in the course in more technical aspects that reinforce the importance of the instrument. This is clearly in line with a situation of non-systematic and unregulated SEA practice in the country (Gallardo et al., 2022).

Difficulties were identified in aligning all the principles of best practice in the proposal of the discipline and, consequently, these are accentuated when offering it.

One of the most relevant points of this SEA experience in undergraduate engineering is overcoming the stigma observed in Brazilian IA teaching practice, of SEA being just a topic within EIA teaching as observed in Ramos et al. (2015).

However, the results revealed a need for improvement in future cycles that still come up against limited practice. One of the great challenges of teaching SEA in the engineering course observed in this experience is to train students and show the importance of the subject, in a context in which the instrument is voluntary and the regulation advances locally and at a snail's pace.

Teaching SEA is essential in Brazil so that future professionals can apply the instrument with quality and safety and disseminate its need in the country's planning. This

pioneer experience in teaching SEA in a country without regulation has brought an analysis of the best practices on Teaching IA and reinforced the role of education in prompting Brazilian SEA practice.

Acknowledgements

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Lithium supply development in Argentina

IAIA Session 144: Impacts and Risks of Lithium and Rare Earths supply chain

Summary statement: Extraction of lithium from brines in NW Argentina affects high altitude salt flats in volcanic terrain supporting valued wildlife and traditional livelihoods of indigenous communities.

Paper Abstract:

Much of the world's lithium supply comes from Australia and China. In the past 15 years, in what's been called the "lithium triangle" on the high plains of Chile, Argentina, and Bolivia, lithium brines have been discovered and put into operation beneath the salt flats of the Andes. These are also sites of endemic wildlife, migratory birds, and traditional livestock farming carried out by ancestral communities. The benefits of lithium brine mining include stimulating local economies in these remote locations, supporting new infrastructures (roads, power lines, gas pipelines, solar and wind power generators), increasing government revenues at all levels, and enhancing the study of socio-environmental and cultural resources. Negative aspects include pressure on limited sources of fresh water, pressure on wetlands and vegetation that sustain livestock and wildlife (including many protected species), long hauls of heavy vehicle traffic on poorly designed roads, and associated dangers. It also includes conflicts over land tenure with local communities, most of whom live at subsistence levels. There are prejudices against this type of mining, and a better consensus among stakeholders should be developed. Regulation is lagging behind. There is a clear need for a specific sector study in a strategic impact assessment for the highlands of northwest Argentina, with links to competing companies in Bolivia and Chile. Regional governments, international funding agencies, academics, and socio-environmental specialists play a key role in improving the quality of socio-environmental assessment in the "Lithium Triangle."

Authors:

Simon Catchpole: economic geologist and environmental consultant with over 40 years professional experience, the last 30 years in Andean terrain, including the last three years with developers and financiers of diverse lithium projects in NW Argentina.

Bernardo Parizek: wildlife biologist, consultant and environmental manager with 30 years of experience in Andean-Patagonian terrain, including the last ten years with developers of lithium projects in NW Argentina.

Context: Lithium is an essential ingredient in the most versatile electric batteries, widely available in today's world, from mobile phones to electric cars. These uses make lithium a key mineral resource in the modern world, and its application has accelerated the displacement of traditional energy sources by renewable energy sources. It also makes lithium a highly valuable commodity at this time. Three years ago, lithium carbonate was priced at USD 5,000 per ton; by the end of 2023, it had reached USD 80,000 per ton, but currently, the price of lithium has dropped significantly. This enormous variation in prices currently that generates a lot of expectation and uncertainty.

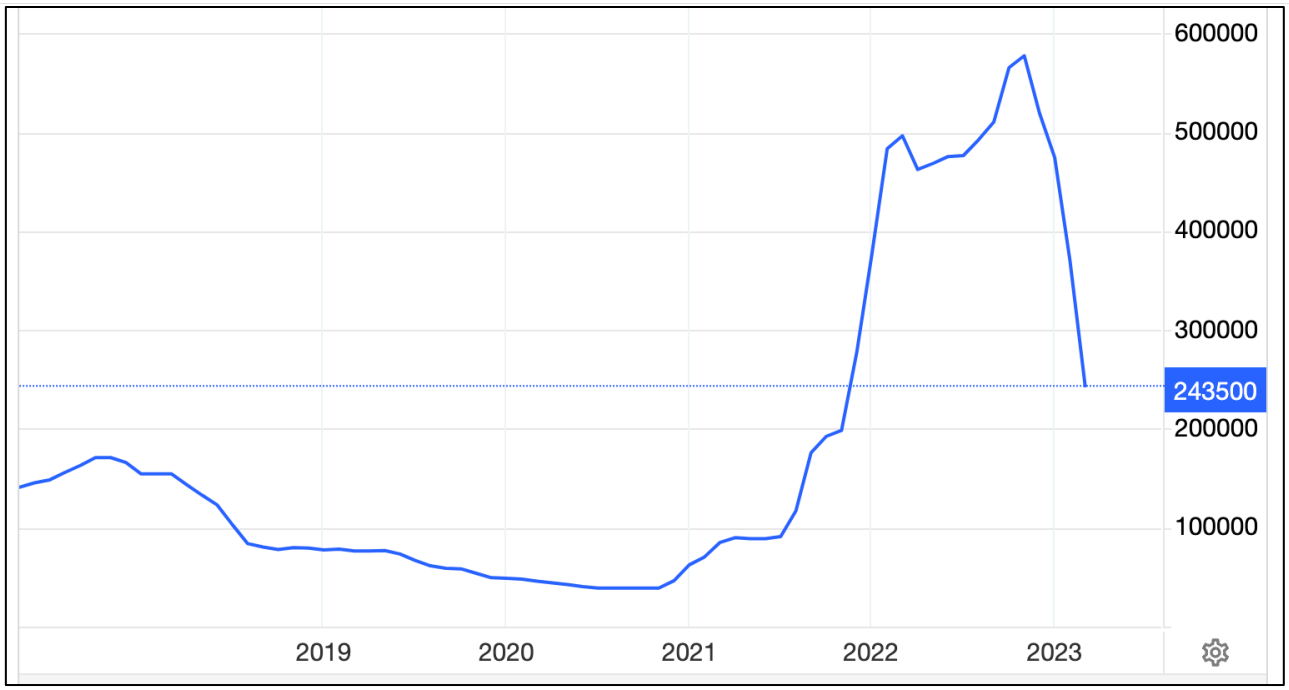

Figure 1. Lithium price variation in CNY (USD ~ 7 CNY) Source: Trading Economics-Forex.com

The growth in lithium demand is changing the geopolitical landscape. While lithium is fairly abundant in the Earth's crust, economically viable mineral deposits are concentrated in a few regions of the world: notably Australia, China, and the plateau shared by Argentina, Bolivia, and Chile known as the Lithium Triangle.

Mineral deposits

The larger lithium mineral deposits are of two types:

- Hard-rock, lithium bearing pegmatites associated with granitic intrusions. Spodumene is the sought-after mineral.
- Lithium bearing brines hosted by unconsolidated sedimentary sequences, typically found associated with salt flats in volcanic terrains. The source of the lithium ions is in the hydrothermal fluids originating from the volcanic activity.

Our experience is in the lithium brines of NW Argentina, which shares common features with the brine deposits of Bolivia and Chile. Bolivia’s deposits are the largest by volume, but are low grade. Chile’s deposits are the richest, but are not so widespread as those of Argentina. Argentina has numerous, endoreic basins with salars, surrounded and in some places intruded by Quaternary volcanoes.

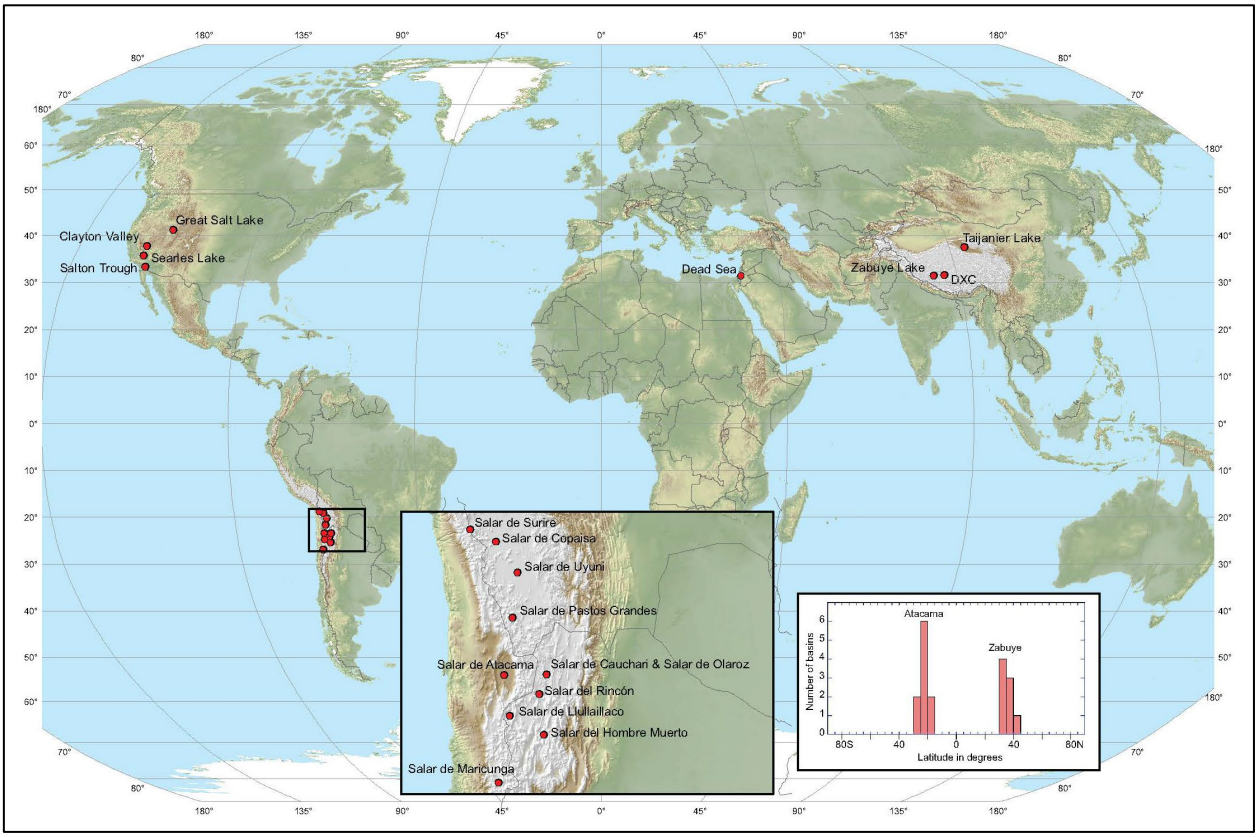

Figure 2: Major lithium brine deposits of the world, from Munk 2016, Lithium brines global perspective.

Natural concentration of lithium in brine

The climate is arid, a mountain desert with low precipitation and high rates of evaporation (radiation and wind). The climate of the Arid Andes and the Puna has shown a clear trend towards aridification, higher temperatures, and lower precipitation.

The melting of snow in endorheic basins with locally sourced sediments progressively fills these basins, creating unconsolidated sedimentary packages hundreds of meters thick. Surface evaporation concentrates the saline and lithium content in these waters, which simultaneously mix with runoff from volcanoes, and likely mingle with deeper circulating hydrothermal fluids. The saline fluids become buried with the host sediments and form the brine reservoir. Some horizons of the sedimentary package are composed of high proportions of evaporitic minerals such as halite. Freshwater entering surface ponds over the denser brine develops a transitional brackish zone between the two. This is critical because the freshwater body sustains vegetation and much of the wildlife, as well as subsistence farmers and their communities. Brackish and saline lakes support the unique wildlife of this habitat, especially migratory and gregarious birds like the Andean flamingo. This has led to many of these locations being designated protected areas or Ramsar sites.

Table 1. Summary comparison of lithium mining in countries of the Lithium Triangle

Topic	Chile	Bolivia	Argentina
Exploration and operation	Earlier	Recent	Very intense the last 10 years
Quantity and characteristics	Few salars / high concentration / deep	Few salars / low concentration / shallow (Uyuni)	Many salars, variable concentration / deep
State participation	New contracts 51 % participation	All contracts with 51% participation	Some contracts with regional participation (<15%)
Development and technology	High development and technology, increasing production	Low development and only pilot plant	High development and technology, rapidly increasing production

Our question is: What are the socio-environmental effects of this new dependency on lithium?

Mineral extraction:

To some extent, the effects depend on the extraction method that is employed.

Through sequential evaporation systems: Typically, brine is extracted via wells and pumped to open-air evaporation ponds to concentrate the salts. Concentrated brines are chemically processed to separate out salt, potassium, magnesium, and boron components and combine the remaining lithium with carbonate. Unwanted components precipitate as sulfate salts and form semi-solid waste deposits. The precipitated salts in the ponds are periodically harvested and disposed of in stacks of dry waste/subproducts. The concentration and chemical purification process require the use of freshwater.

Direct extraction method - DLE: Alternative methods being developed on an industrial scale do not require evaporation ponds. Instead, they involve the electrochemical concentration of lithium directly from the brine, so that spent brine can be returned to the deposit (on the surface or underground). The recovered lithium solution is purified and also produces semi-solid salt residues. Environmental protection mainly involves avoiding disturbance to freshwater bodies and wetlands, and saline lakes with their fauna. At the social level, it is essential to simultaneously maintain subsistence agriculture/livestock farming, supporting local communities, often of indigenous ethnicity, community relations work, expectation management, territory governance, and promoting local suppliers from the early stages of the project to its closure.

General impacts and benefits:

Potentially Negative:

- Freshwater disturbance
- Disturbance of wetland habitat - vegas and salt flats
- Cultural conflict - subsistence economies and market frenzy

- Upsets in governance of basins where multiple projects converge

Potentially Positive:

- Increased knowledge of natural resources
- Access of local communities to markets/connectivity
- Improvement of roads and energy supply
- Improvement of health services, housing, and government services
- Enhancement of awareness of health and safety practices
- Improvement of educational and training opportunities

Currently, the socio-environmental governance of lithium mining has been overwhelmed by the economic urgencies of Argentina and its regional governments. In this process, very sensitive systems of freshwater, biodiversity, and indigenous communities have been compromised.

What effect has lithium mining had on water management?

The main sources of fresh water in the Puna are some streams, springs and the majority are groundwater near salt flats. The contact area between the lower zone (salar-lake) is an area of very high sensitivity. The extraction of water for lithium projects represents a possible impact on this area and the recharge levels. The edge area is the most sensitive system, at the freshwater/saltwater interface zone, wetland/salt, foraging area/lake and saturated/unsaturated zones. This edge zone can condition the suitability of the wetland area for use by livestock and wildlife.

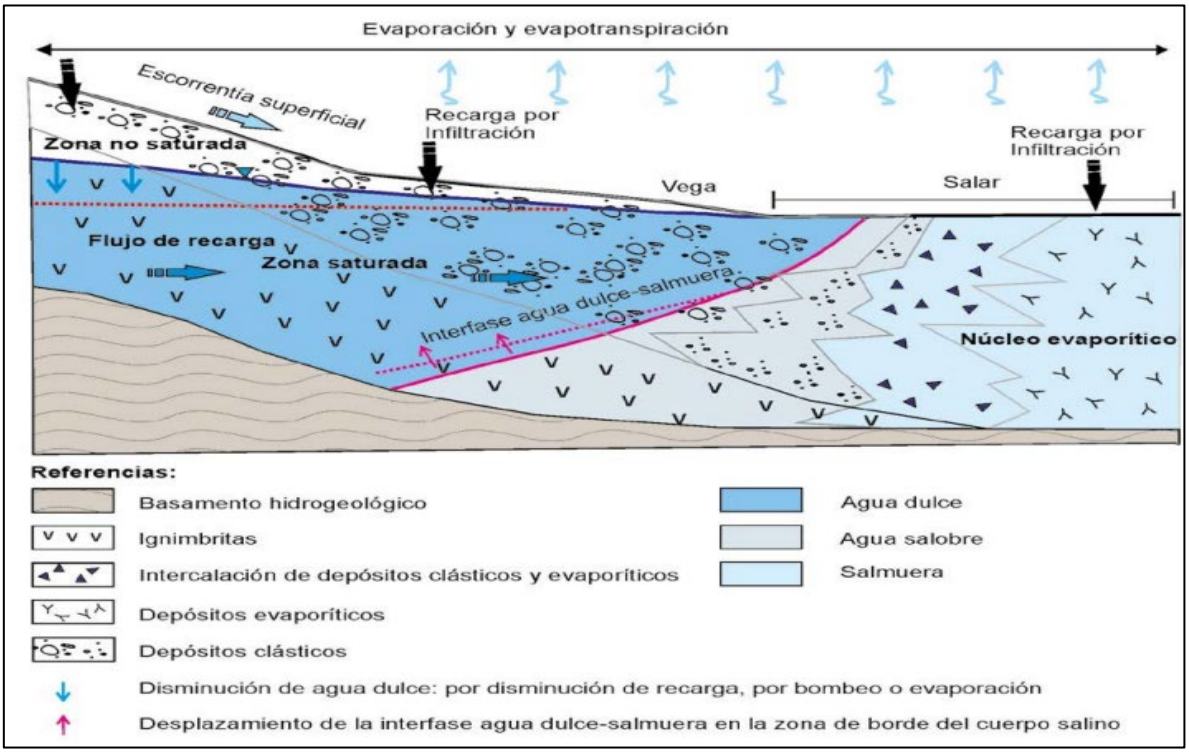

Figure 3. Idealized section through a lithium brine deposit. (Source: Rodolfo Garcia)

There are discrepancies in the understanding of the interactions of fresh water and brines. The lithium deposits are located at the hydrographic base level where fresh and brackish water systems mix with brine. They are desert systems with low aquifer recharge capacity for long-life projects There are wetlands (vegas) associated with these systems where livestock and wildlife come together.

What effect has lithium mining had on biodiversity?

The salt flats and some areas with the presence of lakes and wetlands are small areas of high biodiversity - mostly seasonal. Migratory birds, especially flamingos and waders, are indicators of the state of these wetlands.

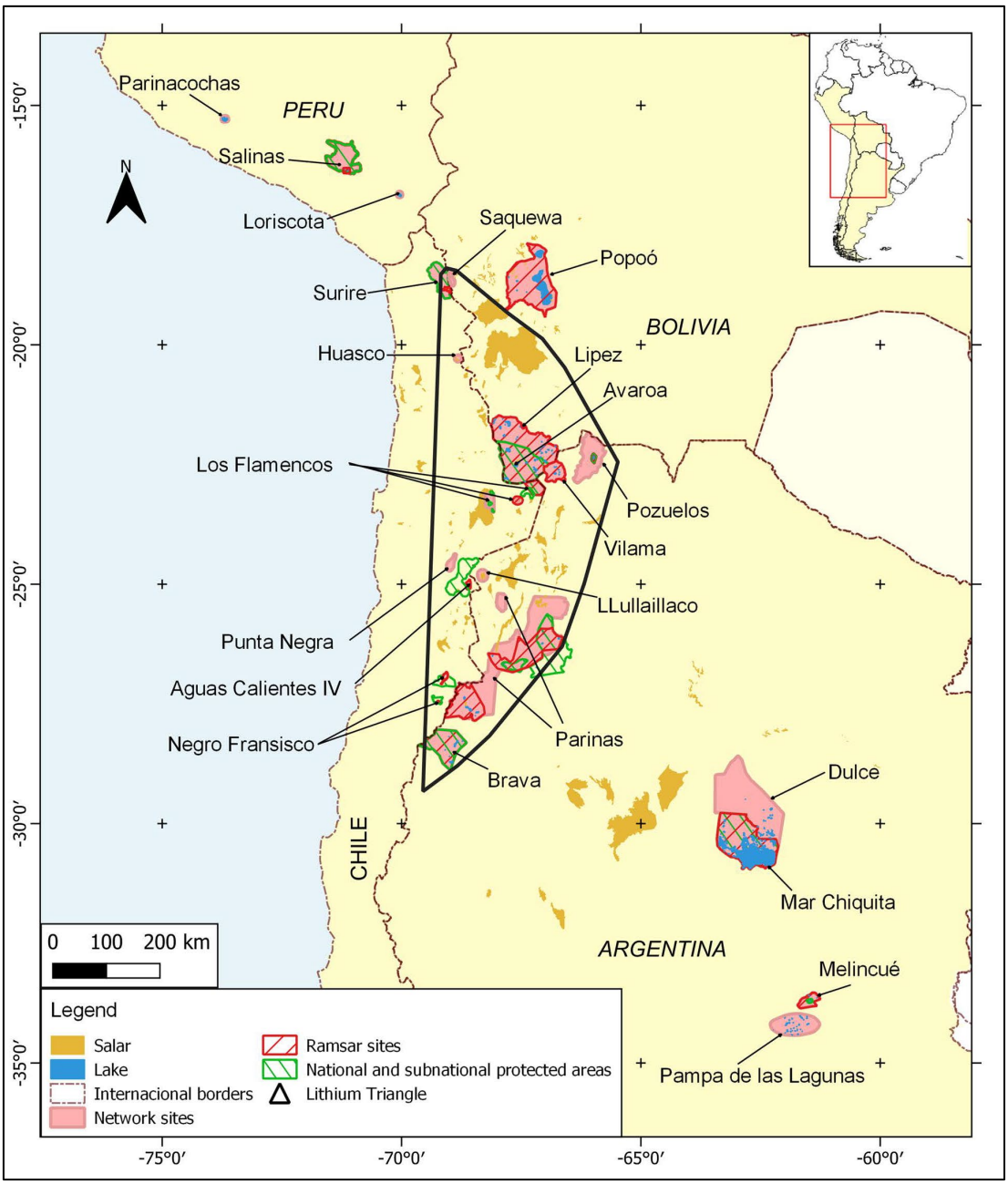

Figure 4: The "Lithium Triangle" and its relationship with Ramsar sites and Flamingo monitoring sites of the joint andean monitoring program, from Marconi 2022 – The Arid Andean Plateau Waterscape.

Possible impacts

- Impacts to wetlands and lake water levels
- Impacts to wildlife - areas of refuge, foraging/feeding and reproduction
- Possible changes in migration systems?
- Reduction of the irrigated area due to consumption of fresh water
- Affectation of vegetation cover and diversity, potential soil salinization due to aquifer depression or brine intrusion.
- Affectation of the Andean Microbial Ecosystems

However, it must be recognized that unrestricted livestock farming as well as industrial lithium extraction are the main stressors.

What effect has lithium mining had on the communities?

Local communities in the vicinity of many of the lithium deposits subsist on herds that feed on vegetation that develops at the fresh-water discharge zones. Their economy is based on subsistence farming, services to local tourism and employment in local government. Effects that they experience with the arrival of industrial scale mining include:

- Cultural shock, market system and subsistence
- Demand for work from companies and for training from the communities
- Intensive use of public services; routes/security/health/education
- Shared territory and fresh-water resources
- Possibility of employment and local development and youth permanence
- High sensitivity of heritage and ancestors, vindication of indigenous peoples

Cumulative Impacts: However, what is at stake is not just a single location, but the impact of an industry on an entire region of the continent. This goes beyond the capacity of a single company or regional administration to govern. For this reason, the authors are convinced that concerted efforts must be made by entities across the industry, multilateral bodies, and national/regional governments to promote responsible development of lithium mining in the South American Puna. This requires broader studies and analysis strategies covering:

- A regional knowledge base of habitats, food chains, migratory species, and protected species.
- A regional knowledge base of socio-economic conditions and ethnicity.
- An understanding of groundwater processes in the salt flat and wetland environment.
- An understanding of the regional supply of equipment, suppliers-entrepreneurs, consumables, and workforce.
- The cumulative effects of a number of lithium mining enterprizes.

This should be addressed with a strategic impact assessment for lithium in the Puna.

For how long? What comes afterwards?

As with most extractive industries of non-renewable resources, the longer term concern is how the transition is made once the resource is economically exhausted. A single deposit may last 20, 50 or 100 years, and then it will leave some legacy. On that timescale, the demand for lithium may reduce as alternatives are found or recycling become the dominant mode of supply. We also have to build in the flexibility to downsize at relatively short notice. The lifetime of the group of deposits in the South American Puna may last 100's of years, and in that time we must ensure that we do not deteriorate the environment, and that we leave the communities better off than before.

How the SEA Shaped the Firth of Clyde Regional Marine Plan

Arthur Keller, NatureScot
IAIA April 2024

Abstract: *The Firth of Clyde regional Marine Plan (RMP) was one of the first statutory marine plans in Scotland. It was developed by a group representing the diverse interests in the Firth, the Clyde Marine Planning Partnership, including statutory bodies, representative organisations, and third sector representatives. The marine system over which it has oversight is complex, and subject to a range of pressures and competing uses. The SEA itself was produced in stages, as the RMP was being developed. The RMP process involved a programme of community engagement, and extensive discussions between the different parties to tease out the issues, and agree management principles for the Firth. The presentation will consider the challenges of scoping the SEA, and of using the information gathered at different stages of the Assessment to inform the deliberations within the partnership. It will describe the extent to which the SEA helped to shape the plan itself. The SEA was conducted over the period of the Plan production, but the Plan itself remains in limbo, awaiting formal adoption by the Scottish Government. But the presentation will discuss how the process of engaging such a large partnership has itself influenced the management of the Firth, and the environmental, social and economic changes taking place within it.*

Regional Marine Planning in Scotland:

Scotland does not have an established planning system for its marine areas. Regulation of use of marine areas has been *ad hoc*, with land use planning ending for the most part at the coastline, and different regulatory regimes for dredging, dumping, marine traffic, infrastructure installation, fisheries and so on. Some, like the use of the foreshore, date back to ancient rights, others – like marine renewables – are more recent.

Prompted by the requirements of the EU Marine Strategy Framework Directive in 2008, the Marine (Scotland) Act 2010 was passed into legislation. The Act makes provision for a statutory National Marine Plan to achieve sustainable management of Scotland's marine resources. But it also allows for a suite of regional marine plans to be developed in 11 marine regions to enable local decision making about issues within the respective areas.

Two regions were selected as pilots for this process: Shetland and the Firth of Clyde. Shetland is a single authority island group, with cohesive stakeholder groups who understood their common interest in Shetland's waters. By contrast the Firth of Clyde is much more complex. It's a partially enclosed sea/estuary for the river Clyde, which of course flows through Scotland's biggest city. Indeed the tidal area is upstream of the city centre (so the Regional Marine Plan area includes the whole waterfront). It includes a number of local authorities and diversity of uses – industrial (the Clyde was the heart of Scotland's ship-building industry – and it still is to a degree), transport and shipping, defence, fisheries (mainly shellfish now) – and recreation and tourism. The river banks are channelised, and when Glasgow was at its industrial peak the river suffered from high pollution levels. However, with improved pollution control, the water quality of the estuary has greatly improved (such that some estuarine species that had been dependent on artificially high nutrient levels have declined - but salmon and otter have returned). Around 40,000 people are employed in the marine sectors and ancillary industries[i], and it remains a much loved – if much exploited – resource for the 2m or so people who live in the catchment.

The Firth also has a diverse ecosystem - although its fauna has been heavily modified by historic over-fishing. In previous centuries it had been a herring fishery centre, but that declined, as did other stocks of cod, saithe and whiting. Now it has the same fish biomass as

in the first half of the 20th Century, but mainly comprised of immature whiting – so not suitable for a fishery in itself, and potentially unstable. Nevertheless, it has healthy – indeed increasing grey and harbour seal populations[ii] (bucking the trend elsewhere in Scotland for harbour seals) and other large mobile species, and a rich coastline with extensive sea grass and kelp resources, which are an important carbon store. Nonetheless, the coastline itself will be affected by climate change – not least due to sea level rise, which will affect habitats and infrastructure.

The Clyde Marine Planning Partnership:

So a lot going on. But the Clyde also already had an active voluntary coastal planning partnership, the Firth of Clyde Forum, and had produced a non-statutory marine plan. So the proposal was to convert that existing partnership into a constituted body, and use that as the body that would oversee the plan. That was quite an ambitious proposal – to bring together a disparate range of private, public, NGO and industry representative groups, who had been quite happy to discuss and agree a voluntary plan, but who might find it more difficult to act together as a decision-making body for a statutory plan. But if successful that could be extremely effective, since all the main stakeholders had acted together. A small team employed by NatureScot and funded by the Marine Directorate took this forward on behalf of the Partnership.

There were some compromises to be made for the Association to be constituted. It was intended that a balance should be struck between different interests, but that inevitably meant that it could not be an entirely open inclusive structure – the membership was held at about 20 organisations, and some local groups felt that they had been excluded from the partnership, although they were involved in the development of the plan itself. The Ministry of Defence (MoD) had been an active member of the Forum due to the naval base on Loch Long, but it was not able to participate in the Partnership as defence is a reserved matter (and therefore not under the auspices of the Act), but the MoD did participate in the consultation.

The Clyde Regional Marine Plan:

The process of constructing the plan starts with a comprehensive information base – which of course contributes to the SEA environmental baseline as well. Along with that, the Plan team embarked on consultation exercise which sought to bring in voices that were outside the stakeholder groups already involved. An animation was produced and circulated on social media to promote the process. A series of workshops were held around the communities of the Firth. The team used a regional marine spatial planning board game to communicate the concept and help to prompt participants. That produced some interesting results – for example holding a workshop in a high school in one of the main fishing areas brought about completely different perspectives from young people (more environmentally

aware) than from the community groups represented by a much older cohort (more concerned with immediate economic interests).

The team also held a series of workshops, which brought together the different stakeholders involved in the Partnership, and other interests. Those workshops were constructed in accordance with the different Sustainability Appraisal-Strategic Environmental Assessment (SA-SEA) issues used the environmental baseline, and explored the interactions between those elements. An ecosystem services approach was taken to frame objectives for each section, which helped participants think through the difference interactions. The workshops were based on key sectors or policy areas, and each considered the objectives and options for that policy area, its interactions with the others, and impacts on the environmental receptors identified in the Assessment. So the Assessment set the context for the discussions, helped to draw out the tensions, and thereby helped to identify the policies needed to address them.

The Strategic Environmental Assessment-Sustainability Appraisal

Under the Environmental Assessment (Scotland) Act 2005 there is a mandatory requirement to produce an SEA for Plans and Strategies in Scotland, but it was felt that that should be complemented by a broader Sustainability Appraisal which would include the implications of the plan for social and economic sustainability.

This was carried out by the team of marine planners. None of the team members had carried out an SEA before, and given the workload there was an argument to use external contractors. But in the event it was decided to do this in-house, by the marine planners themselves, in conjunction with the development of the Plan, because that would help to ensure that the findings of the Assessment would influence the contents of the Plan. And their conclusion was that, despite their initial reluctance, they were glad that they did so as that greatly enhanced the process.

The review of alternatives was challenging: it was difficult to identify a reasonable ‘reasonable’ alternative before embarking on the detail of the policies. So the Assessment tests the Plan against a ‘no-Plan’ - alternative.

Actually, the SA-SEA was not the only assessment carried out on the Plan. It was one of several conducted, which investigated specific impacts on European protected sites, business regulation, island communities and equalities. All of these contributed to the Plan and helped to ensure that the Plan would help to meet, or at least not hinder, the respective policy objectives in these areas. But the SA-SEA was the most influential in shaping the Plan.

When we reviewed the draft Plan policies against the Assessment, some policies with potential contradictions were revised - for example the policy to accommodate the laying of new energy pipelines was changed to recognise the future phasing down of oil and gas exploitation. The Assessment also strengthened the argument to include some policies – especially in relation to the natural environment. But that actually underplays the influence of the Assessment. In fact it moulded the Plan – drawing the picture of the marine region together, and framing the workshops which identified the key issues and their resolution, so that the policies reflect the issues identified in the Assessment – for example, identifying coastal areas that are vulnerable to rising sea levels, and policies to manage this.

Relationship between the draft Clyde Regional Marine Plan and the Sustainability Appraisal, including Strategic Environmental Assessment

Stages in SA-SEA Process	Stages in RMP Development	Key Input Points
Establishing the baseline	Development of Clyde Marine Region Assessment	CMPP Members, SEPA, NatureScot, Marine Scotland, MASTS[1]
Screening and scoping Review policy options in terms of impact on Society-Economy-Environment Develop Interim SA-SEA Report	Development of pre - consultation draft	Screening and scoping report considered by consultation authorities Sectoral working groups, issue-based workshops, CMPP Members' meetings, public engagement. 10 week open consultation on pre-consultation draft and interim SA-SEA Report
Further review of policy revisions for SA-SEA requirements	Revision and preparation of draft RMP	12 week public consultation on draft RMP and SA-SEA including active stakeholder engagement
Post adoption statement	Ministerial approval and adoption Publication	Post consultation procedures by Scottish Ministers
Monitoring effects of implementing the RMP	Keeping matters under review	CMPP Members' meetings

[1] Marine Alliance for Science and Technology Scotland

The Plan Now

The Plan[iii] itself does not have a great deal more teeth beyond that of existing regulators, but it is significant that it brings all of the different issues and interests together, under the auspices of a partnership of stakeholders. So there is ownership of the Plan by the different groups albeit that that makes for an unwieldy process.

Under its approval process the Plan has been passed by the CMPP to the Scottish Minister. He will issue the Plan for consultation, with the SA-SEA (slightly revised to reflect any revisions from his Marine Directorate). In the meantime, a second National Marine Plan is being developed, and the coherence of the Partnership has been tested a little by the timescale of the Plan process and the various iterations that it has gone through. So the success of the Plan – and of the Partnership that produced it – depends yet on the next stages.

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[i] Clyde regional Marine Plan Interim SA-SEA Report – March 2019
[ii] https://marine.gov.scot/sma/assessment/seals
[iii] Pre-consultation draft Clyde Regional Marine Plan – March 2019; https://www.clydemarineplan.scot/marine-planning/clyde-regional-marine-plan/#draft

SEA at a Crossroad
Trends in Austria's Transport Infrastructure Planning

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Abstract

Since the first implementation of the SEA Directive, Austria has always been a fascinating laboratory of SEA practice in strategic transport infrastructure planning. Austria's federal system encompasses transport planning competences on different levels and in different regions. Every entity has an own legal framework and they all have their planning culture and tradition of SEA for plans and programmes for transport infrastructure.
SEA for Austria's federal high-level transport network has shown to be one of the most effective in Europe. The SEA Directive was implemented in a law that focusses on general aims and processes of high-level transport infrastructure planning. According to this law, SEAs have always been fully integrated in the planning processes themselves. Therefore, the integrated assessment of economic, social and environmental aspects has always been at the heart of SEAs according to this law. The paper shows the best examples of this practice and highlights the advantages and shortcomings of this approach.
On the other hand, SEA legislation for transport infrastructure planning on Austria's regional level shows both very diverse specifications and outcomes. Mostly, SEAs show EIA-like approaches and the effect on the plan or programme is barely recognizable. The paper shows some of the very best and worst examples and discusses whether this supposed shortcoming does really matter.
The paper contains critical learnings from 15 years of SEA practice in Austria's transport infrastructure planning and provides ideas for the future of SEA practice in Europe.

Introduction and general background

Austria has one of the densest networks of high-level transport infrastructure in Europe. This is due, on the one hand, to Austria's status as an important transit country in the European economic area and, on the other, to the historically evolved structure of the economic and settlement areas.

The introduction of the Strategic Environmental Assessment (SEA) in the transport sector based on the implementation of Directive 2001/42/EC (henceforth SEA Directive) in the 2000s hit Austria in a very dynamic phase of the development of its transport system:

- The planning and establishment of efficient connections to its eastern neighbours as a result of the fall of the so-called Iron Curtain was just getting underway. In line with the priorities of the eastern neighbouring states, this primarily meant the construction and expansion of freeways and expressways.
- For the railroad network - after decades of relative neglect in favour of road construction - a new era of expansion was being prepared in connection with the establishment of the Trans-European Transport Networks.

Although the instrument of the environmental impact assessment (EIA) had already been successfully applied in this phase in Austria for a good ten years, the SEA as a new instrument was met with little enthusiasm and predominantly a lack of understanding when it was introduced. Particularly in the field of transport infrastructure planning, it was unusual and unimaginable for many stakeholders that environmental concerns had to be explicitly

and extensively taken into account in early planning phases through to the fundamental decision-making process itself.

Although there is now a largely established practice of SEA in the field of transport infrastructure planning in Austria, SEA remains a little-loved, sometimes unambitiously practiced and often ineffective instrument.

Implementation of the SEA Directive in Austria's transport infrastructure planning system

Austria is a federally organized state with nine federal provinces, the *Länder*. The division of competences between the federal government and the *Länder* is precisely regulated by law, whereby the federal government only has those competences that are expressly assigned to it under Art. 10 of the Federal Constitution Act (Bundes-Verfassungsgesetz). In the area of transport infrastructure, the federal government is responsible for the high-level road network (freeways and expressways), the majority of the railroad network and navigable waterways.

The SEA Directive was implemented in the Austrian transport infrastructure planning system in accordance with this principle at two levels:

- A separate law was created for high-level transport infrastructure nationwide. The Federal Act on Strategic Assessment in the Transport Sector (SP-V-Gesetz) always provides for an SEA when a federal high-level transport infrastructure is adopted by law or ordinance or such a law or ordinance is substantially amended.
- For other transport infrastructure - i.e. primarily the subordinate road network - the Länder have chosen different ways of anchoring the SEA in existing state laws: Implementation directly in the road laws, implementation in the spatial planning laws (for keeping preferred corridors free) or no implementation at all.

All selected forms of implementation primarily concern connections between locations or nodes. None of the systems covers the entire network or relevant parts of it. The scope of SEA is therefore relatively similar to that of EIA from the outset. As will be shown later, this results in some fundamental shortcomings in SEA practice in Austria.

SEA for nationally high-level transport routes

Since the SEA Act came into force, a total of ten so-called Strategic Transport Assessments (Strategische Pürfungen im Verkehrsbereich, SP-V), or SEAs for short, have been carried out in Austria. This relatively low number is due to the fact that the national high-level transport route network was essentially already defined in Austrian law before the implementation of the SEA Directive: The Federal Roads Act (Bundesstraßengesetz), the ordinances on high-performance railway lines (Verordnungen für Eisenbahn-Hochleistungsstrecken) and the Navigation Act (Schifffahrtsgesetz) already contained some very far-reaching plans in the 2000s and have only been extended or amended in isolated cases since then - and thus since the SEA Act came into force.

An initial group of additional freeways and expressways was included in the Federal Roads Act in the second half of the 2000s. These were road projects for which concrete planning had already been carried out before the SEA Act came into force. The SEAs were therefore carried out at comparatively short notice and in some cases shortly before the projects were implemented. These SEAs only complied with the basic idea of the SEA Directive to a rudimentary extent, as environmental assessments with a character similar to an EIA were carried out due to the advanced stage of planning and, in some cases, high implementation pressure. Another reason for the high degree of similarity to EIAs was the professional background of the planners and practitioners involved from the EIA sector. Based on this experience, the first guidelines for SEA were then published, which established this practice as the standard.

In the 2010s, a total of three SEAs were then carried out for the declaration of railways as so-called high-performance railway lines. The SEAs were carried out very early on in planning processes that were partly open-ended, which brought them much closer to the basic idea of the SEA Directive. The key feature of these SEAs was the complete integration of the environmental assessment into the legally standardized planning process itself. Environmental considerations were integrated as a decision-relevant component in multi-criteria analyses of equivalent alternatives. In retrospect, an influence of the consideration of environmental concerns in the narrow sense (nature) can be observed in isolated cases, even if the equivalent consideration offers no guarantee for the selection of a highly "nature-friendly" alternative. As experience with this completely different SEA practice progressed, the aforementioned SEA guidelines were fundamentally changed and republished.

Two SEAs are currently being carried out in the area of the high-level road network. It is not yet possible to draw any reliable conclusions from this experience.

SEA for provincial roads

Road projects under the responsibility of the *Länder* account for the majority of road construction projects in Austria. Although the networks in all *Länder* can be regarded as complete in their basic features, there are still some extensive and complex network connections, network extensions or network adaptations, in particular bypasses of individual or several villages. Whether an SEA is carried out depends on whether there is a legal basis for carrying out an SEA in the area of road planning in the respective *Land*. The two *Länder* of Vorarlberg and Upper Austria (Oberösterreich) are used to illustrate two typical SEA systems:

The implementation that comes closest to the basic understanding of the SEA Directive can be found in the *Land* of Vorarlberg. There, SEA is enshrined in the Roads Act itself, not only for provincial roads, but even in some cases for municipal roads. However, as this *Land* is comparatively small, only a few SEAs have been carried out for provincial roads to date. The SEAs for municipal roads are handled together with the SEAs in the area of land use planning on the basis of special provisions. For provincial roads, SEAs were carried out at early planning stages and fully integrated into the planning process. Here, the environmental report is part of the general explanatory report and thus serves fully as part of the basis for decision-making. However, as individual projects are always considered here too, a certain proximity to the EIA cannot be avoided.

In the *Land* of Upper Austria (Oberösterreich), corridors for provincial roads can be defined and kept free by land use planning programmes. The provisions required for this - including for SEA - are enshrined in the Land Use Planning Act. In principle, this system allows for SEA as defined in the SEA Directive, as the law stipulates that SEA in the area of land use planning must be carried out at an early stage and taken into account in the decision-making process. In this case, the restriction of the effectiveness of SEA is rather due to the actual SEA practice in the area of land use planning: Open-ended assessments of alternatives are the exception. Particularly when creating the basis under land use planning law for major projects or developments, a largely developed project is already available, which is then used as the subject of the assessments in the SEA. As a result, this again means SEAs that are largely similar in character to EIAs.

Learnings from 15 years of SEA practice in Austria

The most important prerequisite for the effective implementation of SEA in the field of transport infrastructure planning is the establishment of the instrument at the highest possible strategic level. Overall network planning, mobility strategies, transport concepts etc. are exempt from the obligation to carry out an SEA in Austria - both at federal and *Länder* level.

Instead, SEAs are generally only to be carried out for specific routes. As a result, no meaningful consideration of system alternatives and thus no fundamental system decision can be made within the framework of an SEA. There is often a lack of political will to change this and many practitioners also lack the imagination as to how an environmental assessment can be carried out satisfactorily at such an abstract level.

The SEA is most effective when it is fully integrated into the planning process. There is a broad consensus on this, but not on what this means in practice: Should the environmental assessment and the environmental report be understood and carried out as recognizably separate realities, or should they be fully integrated into the general planning process? Does the SEA have to force a maximum “nature-friendly” solution or does the full integration of environmental aspects automatically and "invisibly" achieve a sufficiently good level of environmental protection? There are clear indications that, in line with the broad concept of sustainability, the assessment of environmental aspects in the narrower sense as one of several impact dimensions ensures a greater influence on the final decision. Often, the transparent addressing of environmental impacts and thus the need for justification for decision-makers already has a greater effect than a rather decoupled environmental assessment outside the planning process.

The particular added value of SEA can be to introduce an element of open-ended consideration of alternatives into planning processes. Such a consideration of alternatives in turn facilitates the integration of environmental considerations into the decision-making process, because this increases the need for differentiating aspects. The central concern of the SEA Directive to give sufficient space to environmental concerns in planning processes is therefore automatically promoted by the promotion of the assessment of alternatives. However, this requires a deliberate focus in the SEA process: away from the unconditional quantitative measurability of the assessment results towards a coherent formation and similar assessment of several alternatives. In order to be relevant for decision-making, the impact assessment must above all depict the impact relationships in their essential characteristics.

The SEA Directive requires the presentation of "likely significant effects", which means that a one-to-one processing of the aspects according to Annex 1 lit. f is not necessarily expedient. When identifying, describing and assessing the likely significant effects, it is often sufficient to use qualitative methods in the sense of plausibility assumptions. The use of quantitative methods generally leads to fictitious accuracy or encourages the detailed elaboration of projects, which should have no place at the level of plans and programmes.

The SEA is most strongly accepted and reflected as an instrument when it can be clearly distinguished from other instruments, above all the EIA, in terms of function, process and type and depth of environmental assessment. While the character of an "end of pipe" assessment is rightly at the forefront of the EIA, the SEA shows its particular strength as a planning instrument. In such a system, so-called “tiering” also works well, whereby multiple assessments and redundancies can be avoided.

Recommendations for the future development of the SEA Guideline

Overall, the SEA Directive in its existing form has been successful in establishing SEA as an instrument. While the wording of the existing SEA Directive remains rather vague in some areas ("likely significant effects", "reasonable alternatives",...), other areas - also in terms of content - are strongly determined (in particular Annex 1). This is not problematic per se, but it is the cause of some of the misunderstandings, incorrect practices, etc. that have been outlined above. In the following, therefore, some recommendations are formulated as to how priorities can be changed, gaps in interpretation closed and (supposedly) too rigid specifications defused in a final-oriented manner.

The central starting point for a redesign should be a revised formulation of the objectives of the SEA Directive. The focus should be clearly on the process character, specifically the requirement for adequate and comprehensible consideration of environmental considerations within planning processes and in decision-making. By contrast, the more substantive objective of a high level of environmental protection should be less important. Such a clarification of priorities should be made throughout, starting with the objectives in Article 1.

Linked to this - and particularly crucial for the SEA Directive's German version - is a move away from the term "assessment" ("Prüfung"). The instrument now called SEA should be semantically sufficiently far removed from the EIA. A changed term would make it clear that the SEA is or should be primarily an environmental or sustainability-centered decision-making aid and not a methodologically isolated impact assessment.

The restriction of the scope of application to plans and programmes should be extended to policies. This closes a loophole that is all too often used to deny the need for an SEA for significant and far-reaching determinations, particularly at strategic level. In connection with this, there must also be a better and more far-reaching definition of what is meant by plans and programmes and that this also includes documents etc. that are not explicitly designated as plans or programmes.

The substantive focus should be shifted away from an environmental perspective in the narrow sense towards a broader sustainability perspective. This may well require far-reaching changes to the SEA Directive, starting with central key terms. In order to minimize the associated increased risk of so-called trade-offs between impact dimensions of sustainability, suitable transparency regulations must be created to ensure that specific impact information remains identifiable until the decision-making process.

The most important lever for distinguishing the SEA more clearly from explicit environmental assessment instruments such as the EIA lies particularly in Annexes 1 and 2, and especially in Annex 1 lit. f. The congruence in terms of content and semantics with important elements of the EIA tempts us to see the SEA as "EIA light" and to design it accordingly. By strengthening the scoping process, in which an assessment program must be developed, discussed and coordinated on an ad hoc basis, greater accuracy and relevance of the analyses can be achieved.

The further development of the SEA Directive alone is an important first step towards positively changing the SEA systems in the Member States - including Austria. Ultimately, however, success depends on how the Member States deal with a change in the objectives and focus of the SEA Directive. The decisive factor here is to encourage the Member States to interpret the SEA Directive in accordance with their national planning systems and planning traditions and to implement it with a view to creating added value for the respective national planning system. This begins with not adopting the SEA Directive in its essential parts word-for-word in national laws, but rather standardizing a tailor-made and autonomous SEA system as far as possible, taking into account the most important objectives and characteristics of the SEA Directive.

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Countering Consultation Fatigue in Regional Approaches to Just Transition

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Abstract

Mine closure has a significant impact on people. Leading engagement with affected communities is complex and nuanced. Meaningful community engagement becomes especially important in a social environment where end-of-life mining issues are overlapping and the community is already over-consulted and cynical about engagement. The Latrobe Valley mining industry finds itself rehabilitating three of Australia's largest open cut lignite mines, within a 30-kilometre radius which also encompasses three major regional towns and a population of around 70,000 people. In current conversations about mine rehabilitation, ESG (Environment, Social and Governance) is a topical acronym. The social portion of the ESG program includes First Nations partnerships, labour practices, human rights, diversity and inclusion, worker/community health & safety and security. Through community engagement programs significant feedback in the Latrobe Valley relates to consultation fatigue about mine rehabilitation and just transition. This feedback needs to be heard when considering the social impacts of mine closure in the Latrobe Valley. This paper looks at ways used to counter consultation fatigue in the Latrobe Valley, Victoria, Australia where mine closure is having an impact on communities.

Introduction

The Latrobe Valley in Gippsland Victoria is often identified as one of the most over consulted communities in Australia. Situated around 150 kms east of the state's capital of Melbourne, it is home to three of the southern hemisphere's largest open cut brown coal mines which have powered the state's electricity industry for the last 100 years. The region has seen enormous change over time, including privatisation of industry and significant recent changes as we move away from a carbon economy, including the move away from timber and coal industries. As a result significant consultation has taken place with the community on a number of social, economic and environmental issues. So how do you engage with an over consulted community?

The Mine Land Rehabilitation Authority is based in the Latrobe Valley and works work with community, industry and government to facilitate the rehabilitation of the Latrobe Valley mine sites for the beneficial use of future generations. What we knew quite early on when the authority was established was that, over the years, the community has been consulted significantly about their vision and views for the rehabilitation of these mines. But we knew from verbatim conversations with industry and community that there was a lot of cynicism and mistrust about the consultation that had taken place. Our community includes the spectrum from highly-engaged activists to people who are very difficult to engage.

People told us that consultation initiatives often didn't factor in what the community had said before. That there were perceptions of corporate knowledge being lost with the turnover of people in government and industry. And that levels of consultation fatigue were high.
So we decided to conduct a literature review, to pull together the key consultations about mine rehabilitation that had taken place in the last decade, see if we could identify any key themes and share what we had learnt with key stakeholders.

There are three terms which are useful to be familiar with in order to understand the study well. The three terms are declared mines, the Hazelwood Mine Fire and consultation fatigue.

Declared mines in the Victorian context

In Victoria Australia, legislation identifies the concept of a declared mine. A declared mine is defined in Victorian legislation as a mine that has geotechnical, hydrogeological, water quality or hydrological factors that may be deemed to pose significant risk of harm to the community, environment and infrastructure. The Minister for Resources may at any time choose to declare a mine according to these criteria.

There have only been three declared mines in Victoria. They are Hazelwood, Yallourn and Loy Yang in the Latrobe Valley. Three large open-cut brown coal mines. They are large, close together, and close to communities and infrastructure. All three mines are closing in a short space of time.

These mines are very large. The total area of the three open cut mines is over 50 square kilometres. Combined the voids would hold about 4 times the volume of Sydney harbour, and they have a surrounding land area of 130 square kilometres.

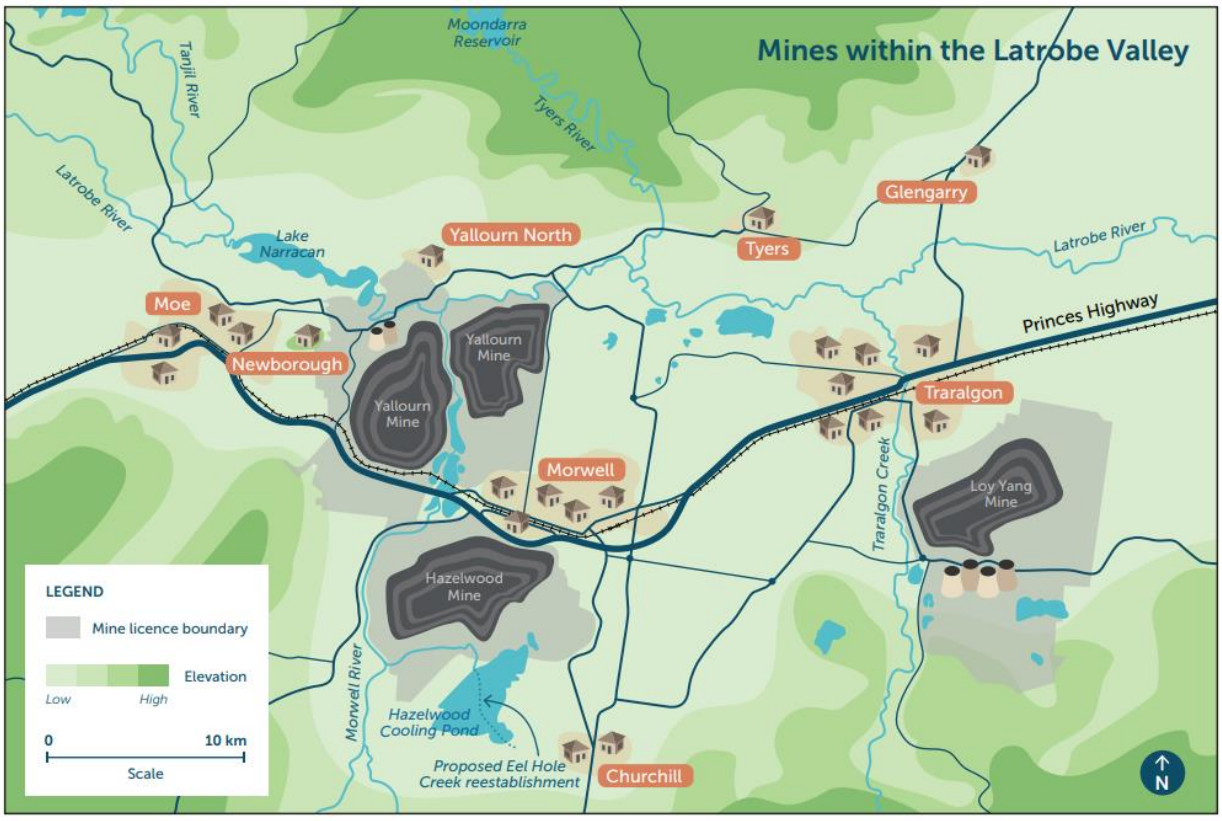

Figure 1: Mines within the Latrobe Valley, Victoria

The declared mines are very close to the Latrobe Valley townships. The population of Latrobe City (which includes the major towns of Moe, Morwell and Traralgon and nearby townships) is around 77,000. Between 2016 and 2021, the population in Latrobe City Council has grown by 5.5%.

While legislation says the mine operators must deliver a rehabilitated mine that is “safe, stable, and sustainable”, the community has told us that they want something beyond the legislative requirement, something attractive for the region that is usable and enjoyable (MLRA, 2021).

The Hazelwood mine fire

On 9 February 2014, embers from a nearby bushfire ignited a fire in the Hazelwood mine. The Hazelwood Mine Fire burned in the Hazelwood coal mine for 45 days in February and March 2014. The fire sent smoke and ash over the town of Morwell and surrounding areas for much of that time and had significant impacts on the Latrobe Valley communities (Gao, 2022). It also was the catalyst that led to the creation of a number of community advocacy groups. Among other things, these groups advocated for an independent inquiry into the Hazelwood mine fire, which did come to pass. The Hazelwood Mine Fire Inquiry Report was published in 2016 and stated that the community had experienced adverse health effects and may be affected for an indeterminate period into the future. The inquiry found that 11 premature deaths were most likely caused by the mine fire. The Board estimated the total cost borne by the Victorian Government, the local community and the operator of the Hazelwood mine, GDF Suez, to exceed $100 million.

Consultation fatigue

Consultation fatigue arises as people are approached more and more often to participate but perceive little response, or action, from this participation. Consultation fatigue has been defined as a combination of an excess of consultation activities and a failure to deliver on projects that have been consulted on previously (Richards, C.,Blackstock, K.L. & Carter, C.E, 2004).
In short, Consultation fatigue doesn't just mean people are tired of being consulted. It means that people have perceptions of being over consulted, without it bringing about meaningful change. People also want to understand how decisions are being made, even if the outcomes don't align with their desires.

When addressing consultation fatigue, there is an argument for recognising that not all processes are amenable to participation and that the wider public do not expect to take part in all decisions (Richards, C.,Blackstock, K.L. & Carter, C.E, 2004). When undertaking consultation work, there is an argument for first asking what the community has already said on the topic and acting on that data.

Academic studies indicate that consultation fatigue can be minimised by meaningful sharing of information between community, industry and government stakeholders so that there is an understood field of knowledge on community views on key topics.

A review of literature

Based on this information, a need was identified to conduct a literature review so as to:

- identify and examine the existing body of knowledge
- provide a baseline for future consultation
- identify common themes
- counter consultation fatigue

In total, twelve papers were reviewed. The scope of the review encompassed reports, submissions and relevant publications specifically addressing community consultation in the context of the rehabilitation of Victoria's declared mines. The review focuses on understanding the nature and content of these consultation processes and the outcomes of these interactions. So we explored questions asked and responses given. The timeframe covered was 2014 – 2023. This timeframe encompassed the Hazelwood Mine Fire inquiry as this inquiry was open for public submissions.

Recurring themes

Five recurring themes were identified in the review, and they were:

- water is precious,
- First Nations views are vital,
- a need for a just transition,
- community conversations should continue, and
- the region's future should prosper.

Water is precious

Mine rehabilitation usually involves filling the mine voids with a stabilising material. All three Latrobe Valley mines include water as the stabilising material in their rehabilitation plans. Concerns have been raised about where the water for these pit lakes would come from. Australia is the driest inhabited continent in the world. Against a backdrop of a changing climate, water in mine rehabilitation is an issue of focus in the community. Also, as with everywhere in the world, multiple users compete for water.

First Nations views are vital

Communities continue to express that the views and values of the Gunaikurnai people have a pivotal role to play in guiding the rehabilitation of mined areas. In this review, people were found to express a desire to see First Nations people as part of the conversation.

A just transition

A just transition is defined as ensuring no one is left behind in the transition to low-carbon and environmentally sustainable economies and societies*. (United Nations, 2023). Community consultations raise issues of justice. Latrobe Valley community members feel that the Latrobe Valley brown coal mines have “kept the lights on” for Victoria (including nearby Melbourne, a city of 5 million people) for many decades. Now that it’s time for rehabilitation, they do not want to see communities left behind.

Community conversations should continue

Community members want to be actively involved in the decisions and actions that shape the future of the region’s natural assets. Consultation fatigue doesn’t mean people are tired of being part of the conversation. It more often refers to a community’s desire to be engaged in conversations that are meaningful and to see outcomes from those conversations which are meaningful.

The region’s future should prosper

The community continues to express a desire for economic opportunities arising from mine rehabilitation and transition.

Recommendations

In addition to sharing the literature review and its themes, we also made a number of recommendations for consideration by community, industry and government stakeholders largely around using the information in the review to inform future engagement work and ensure future engagement work is meaningful.

Conclusion

When engaging with an over consulted community, there is a strong argument for first asking what the community has already said on the topic, identifying and collating that data and sharing that information between stakeholders so that it can be used well and acted on. An established and understood field of knowledge on community views on key topics can help us to engage with an over consulted community, and with all communities.

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Follow-up and the new Environmental and Planning Act in the Netherlands

A practice-oriented research paper to follow-up in the Netherlands

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Introduction

Environmental assessment (EA) consists of several successive steps. This paper focuses on the final step: the follow-up. EA follow-up is used to determine whether predicted effects actually occur, mitigating measures are effective and goals are achieved. If not, adjusted measures and policy decisions can be taken. Although valuable, this step is currently not fully used in the Netherlands. This paper aims to explain how follow-up is currently embedded in the Dutch EIA and SEA system, and how it is being applied in practice. Through analyzing recent case studies useful insights about follow-up are identified. The Antea Group research[1] was carried out on behalf of Rijkswaterstaat, Dutch Ministry of Infrastructure and Water Management.

EA and follow-up

Follow-up is an umbrella term that consists of various activities. Follow-up usually consists of monitoring, evaluation, management, and communication.[2] Monitoring is the collection of data and comparison with standards, expectations or predictions[3], that aims to provide information on the characteristics and/or functioning of (environmental) variables.[4] Evaluation is the assessment of compliance with standards, expectations or predictions.[5] Management refers to decision making and taking appropriate action in response to issues raised by the previous steps.[6] Finally, communication concerns informing of stakeholders and the general public of the results of the follow-up activities.[7] This paper and the Antea Group research[8] mainly focuses on the first two steps of follow-up, monitoring and evaluation.

Legal framework

Follow-up relating to EIA and SEA forms part of the EU directives. The SEA Directive contains an obligation for EU Member States to monitor the implementation of plans and programs, including to identify unforeseen adverse effects on the environment at an early stage and subsequently assessing whether appropriate remedial measures are necessary.[9] Pursuant to the EIA Directive, the competent authority must assess whether effects of the project need to be monitored.[10] At the UN level, the Espoo Convention[11] and article twelve in the Kiev protocol[12] underline the importance of monitoring in a transboundary context, and the usefulness of carrying out monitoring jointly if it extends over more than one Party's territory.[13]

In The Netherlands, legislation on environmental impact assessment was recently (January 1st 2024) transferred into a new law called the Environmental and Planning Act[14]. Follow-up play an important role in this act, as it is explicitly part of the policy process. So follow-up in EA fits in perfectly.[15] The legal obligations regarding follow-up do not change much under the new act, but a few changes have been introduced regarding the applicable procedures.[16] For example, monitoring results now need to be digitally published.[17]

The research

Antea Group has conducted research consisting of a desk study and interviews with project managers and specialist in the field of EA. Interviewed parties are for example the Netherlands Commission for Environmental Assessment (NCEA), the University of Groningen (UG) and the Rhine estuary Central Environmental Management Service (DCMR).

In total twelve projects were examined. Three projects were selected for the interviews: Haven-Stad (Amsterdam), Maasvlakte 2 (part of Project Mainport development Rotterdam, PMR) and sand extraction in the North Sea (Coastline care).

Maasvlakte 2 (PMR)
The industrial development project Maasvlakte 2 concerns the construction, design and use of deep-sea related port industries, sea walls and rail- and road infrastructure. Before Maasvlakte 2 was built, local sea depth was approximately 17 meters. To create land up to 5 meters above sea level, 365 million m3 sand was needed. The majority of sand is extracted from selected locations in the North Sea. To compensate for the negative effects of Maasvlakte 2, a new nature and recreation area of 750 ha was also constructed as part of the Maasvlakte project. To assess if compensation is successful, follow-up measures were implemented. An extensive system of follow-up has been set up since 2006. This project can perhaps be seen as the "mother" of follow-up in the Netherlands. However, this project is so unique and extensive that it cannot be seen as the Dutch representative for follow-up. Nevertheless, lessons learned from this project can be very useful for other initiatives.

Haven-Stad (Port-City Amsterdam)
Haven-Stad is a large-scale long-term urban development project which will take a few decades to be completed. The Development Strategy Haven-Stad[18] consists of four phases with the last phase starting in 2040. When completed Haven-Stad will equal Amsterdam city center with over 150.000 inhabitants and employees. During the long transformation period the project has to adapt to new insights, ambitions and objectives.

The reasoning behind applying follow-up in this project is to see whether ambitions and objectives remain feasible or need adjusting during this longterm development. Follow-up is also used to check if the underlying environmental information in the EA remains valid. Follow-up for Haven-Stad Amsterdam is carried out by a small project team which operates separately from the main project group.

Sand extraction North Sea (Coastline care)
Coastline care provides sand supplementation to reinforce the ever eroding Dutch coast, which is vital to prevent the country from flooding. Sand is also extracted from the North Sea for commercial use in (infrastructure) construction. Follow-up is applied specifically for the ecological effects of these activities in the North Sea. Because Coastline care is an ongoing project, the follow-up is organized differently, research continues for longer than the timeframe the monitoring and evaluation plans (MEP's) describe. During the monitoring, the focus may also shift to other indicators, due to new insights or at the request of the competent authority.

Experiences
Using the project case studies described above, the Antea research provides an overview of the experiences that were encountered with follow-up.

The competent authority has a determining role
The main reasons for the projects to implement follow-up are the legal obligation or specific requirements by the competent authority. Legal obligations can also arise from permit requirements. In the case of Maasvlakte 2 legal obligations prescribed monitoring of effectiveness of requested nature compensation measures. Another reason for projects to carry out follow-up is to increase the trust of stakeholders through relevant communication, this also applies to Maasvlakte 2.

Added value is seen
The projects that applied follow-up, all saw added value in doing so. Added value was seen in the use of follow-up as a forward-looking tool. In Haven-Stad Amsterdam follow-up was used to continually monitor environmental impact as the project progressed. Follow-up also has added

value in providing useful knowledge, especially about unclear cause-and-effect relationships. In case of Maasvlakte 2 and Coastline care new insights in ecological effects were gained.

Used sparingly and implementation not properly arranged
The general conclusion to be drawn from this Antea study, is that so far relatively little follow-up has been used in the Netherlands. Mainly government-run projects have used it. EA follow-up seems to have remained relatively unknown, compared to other steps of the EA instrument. It suffers from a negative image. Another possible cause for neglecting follow-up is the focus turning to a new project after completion of an EIA report (and the project itself). Project managers and EA specialists that wrote the EIA move on and there seems to be no department or person responsible for initiating follow-up.

More attention to follow-up though a different approach
Under certain conditions, parts of the research obligations can be executed at a later stage of the project or plan. This is the case for long-term urban development projects in former industrial areas like Haven-Stad Amsterdam, Binckhorst in The Hague and more recently Merwe-Vierhavens in Rotterdam. These projects benefitted from this approach, as the final image of these projects is often unknown. Follow-up can therefore contribute to adjust goals and ambitions and help to timely identify measures for prevention of considerable environmental effects.

A MEP and a pragmatic data approach
The projects examined in this study also show a monitoring and evaluation plan (MEP) is paramount for implementation of effective follow-up. The MEP is preferably already drawn up in the project phase. A pragmatic approach to data collection increases the likelihood of success, as does examining usability of existing databases and monitoring systems. For example, the highway project A1 Apeldoorn-Azelo only used pre-existing monitoring programs for follow-up.

The duration of the project influences the approach to follow-up
For short-term projects, follow-up can focus on the policy framework, the reference framework and models examined in the EIA. For long-term projects in a complex environment, it is not feasible to completely determine follow-up in advance. A rigid approach to follow-up does not fit the changeable nature of the environment and policymaking.

Conclusions and reflection
This research shows that follow-up is a valuable tool when used right. It enhances decision-making by addressing uncertainties arising in assessment processes, and in guiding choices in a progressive decision making process.

The more changeable the environment, the more value follow-up can have
The case studies show that follow-up is received positively when it also fulfills a steering function, instead of just a controlling and testing one.

Follow-up appears to be particularly relevant for plans and projects in which long-term ambitions and objectives are pursued, especially when projects take place in complex environments, such as inner-city urban developments (Haven-Stad), projects on the North Sea (Coastline care) and industrial projects with significant environmental effects.

In less changeable environments follow-up has a more limited impact on subsequent decisions. A more pragmatic approach may therefore prove more successful for these types of plans and projects. Making effective use of pre-existing monitoring programs and data may be a key factor for successful implementation of follow-up in these types of projects.

The study also suggests that follow-up has more added value if it serves multiple purposes. Follow-up yields information about more than validity of the predicted EA effects and can eliminate or reduce knowledge gaps. Insight in actually occurring environmental effects can re-assure concerned stakeholders, which can create stakeholder support. This has been the case in projects

like Maasvlakte 2 and Kraaijenbergse Plassen. It can also contribute to better insights in the functioning of ecological systems. Multi-usability of follow-up can contribute to its acceptance.

An early MEP
Projects with successful follow-up have one thing in common: a careful start phase with a plan of action, recorded in a monitoring and evaluation plan (MEP). Making a MEP part of the contractor's contract or assigning it to the internal project group helps to ensure that follow-up is conducted.

Check the usability of existing data at an early stage
It is worthwhile to investigate if existing data can be used. Experiences from all three case studies show that existing data is not always (immediately) usable for the plan or project. Therefore, it is necessary to check in the preparation phase to avoid setbacks during monitoring. Besides quantitative data, citizen science can be used in follow-up. For example surveys on the perception of noise disturbance can become part of follow-up.

Ensure that EA follow-up is embedded in the organization
It is recommended to assign follow-up to a specific dedicated project team to prevent a loss of focus when the construction phase is over. It should be noted that probably only larger (combined) competent authorities of big cities and industrial agglomerations can afford to form and sustain separate follow-up teams. Smaller authorities probably lack (human) resources . Structural embedding of follow-up in the organization for smaller competent authorities is therefore very difficult and calls for different ambitions with regard to follow-up.

Present follow-up more separately from EA
The desk study and interviews mainly examined EA follow-up. One of the identified barriers to application of the instrument is its image, which is also related to the negative image of EA. However, follow-up is slowly expanding from an EA obligation to a vital tool for achieving ambitions in an ever changing environment. Presenting follow-up more separately from EA can help to break down barriers that relate to the image of the instrument.

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[1] Antea Group (2024), *Onderzoek monitoring en evaluatie mer*
[2] Morrison-Saunders, A. & J. Arts (eds.) (2004), *Assessing Impact, Handbook of EIA and SEA Follow-up*, Earthscan, London, 338pp.
[3] Ibid.
[4] Arts, J. & Caldwell, P. & Morrison-Saunders, A. (2001) Environmental impact assessment follow-up: good practice and future directions — findings from a workshop at the IAIA 2000 conference, *Impact Assessment and Project Appraisal*, 19(3), pp. 175-185.
[5] Morrison-Saunders, A. & J. Arts (eds.) (2004), *Assessing Impact, Handbook of EIA and SEA Follow-up*, Earthscan, London, 338pp.
[6] van der Zee E. (2023) Strengthening Environmental Decision Making through Legislation: Insights from Cognitive Science and Behavioural Economics. *Transnational Environmental Law*. 12(2), pp. 295-317.
[7] Morrison-Saunders, A. & J. Arts (eds.) (2004), *Assessing Impact, Handbook of EIA and SEA Follow-up*, Earthscan, London, 338pp.
[8] Antea Group (2024), *Onderzoek monitoring en evaluatie mer*
[9] Art. 10 SEA Directive.
[10] Art. 8a(4) EIA Directive.
[11] The Convention on Environmental Impact Assessment in a Transboundary context (The Espoo Convention), 1991.
[12] Protocol inzake strategische milieubeoordeling bij het Verdrag inzake milieu-effectrapportage in grensoverschrijdend verband, Kiev, 21-05-2003
[13] Guidance on the Practical Application of The Espoo Convention, p. 29.

[14] Environmental and Planning Act (2024).
[15] Explanatory Memorandum of the Environmental and Planning Act.
[16] 'Dit verandert er in de milieueffectrapportage (mer)', available at: Dit verandert er in de milieueffectrapportage (mer) | Informatiepunt Leefomgeving (iplo.nl) (accessed on 15-2-2024).
[17] Omgevingsbesluit art. 11.5 (3) for plans and programs and art. 11.20 (2) for projects.
[18] Gemeente Amsterdam (2017) *Haven-Stad Transformatie van 12 deelgebieden Ontwikkelstrategie*

EFFECTIVENESS CRITERIA FOR EIA FOLLOW-UP GOVERNANCE AT THE MACRO LEVEL[1]

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Abstract

This paper explores how EIA follow-up governance (i.e., the processes and structures required for ensuring commitment to implement the principles of EIA follow-up), influences EIA effectiveness through the identification of best practice principles and criteria. Stakeholders' perceptions, gathered through qualitative research methods, most notably a policy Delphi, were evaluated against these best practice principles and criteria in order to assess EIA follow-up governance effectiveness at the jurisdiction (macro) level.

Background

EIA follow-up governance incorporates all the processes, mechanisms and arrangements required to enable the implementation of EIA follow-up (Arts & Morrison-Saunders, 2022). Governance, together with monitoring, evaluation, management and participation (i.e., engagement and communication), are the follow-up elements essential to understanding the outcomes of development projects which are subject to EIA (Arts & Morrison-Saunders, 2022; Morrison-Saunders et al., 2021).

Noting how regrettably, EIA follow-up is overlooked in terms of implementation, this paper aims to (i) identify best practice principles and criteria for effective EIA follow-up governance, and (ii) understand what would constitute effective EIA follow-up governance at the jurisdiction (macro) level, while utilising Malta[2] as a case study.

Formulating the best practice principles

The formulation of the EIA follow-up governance best practice principles is mainly influenced by the following works: (i) Hanna and Noble (2015) who utilise a Delphi study to identify effectiveness criteria for environmental assessment, (ii) Pope et al. (2018) who propose an EIA effectiveness framework with four dimensions – procedural, substantive, transactive and legitimacy, (iii) Pinto et al. (2019) who distil the EIA follow-up best practice principles into 24 criteria aimed to aid qualitative assessment of EIA follow-up performance of a project, (iv) Arts and Morrison-Saunders (2022) who define the five key elements of impact assessment (IA) follow-up and subsequently the 15 IA best practice principles, and (v) Morrison-Saunders et al. (2023) who reflect on the 12 best practice principles for public participation in IA follow-up

[1] Research is part financed by the Tertiary Education Scholarship Scheme (TESS) Malta.
[2] Malta (i.e., the islands of Malta, Gozo and Comino) has a total geographical area of 316km^2, and a total population of 519,562 in 2021 (NSO, 2022), with the highest population density in the European Union (1320 persons per square kilometre).

proposed by Morrison-Saunders and Arts (2023). These served as the foundations for the EIA follow-up governance best practice principles and criteria, as follows:

Best practice principles for EIA follow-up governance

To ensure effective EIA follow-up governance, a jurisdiction should:

1. Have a *legislative* framework which specifies EIA follow-up requirements.
2. Establish clear identification of *responsibilities* in EIA follow-up.
3. Specify *compliance and enforcement* provisions.
4. Ensure *reporting* of EIA follow-up outcomes, to facilitate *adaptive management* and promote continuous *learning from experience* to improve future practice.
5. Establish clear, pre-defined and well-justified *performance criteria* for EIA follow-up.
6. Have a clear *understanding* of the purpose and importance of EIA follow-up.
7. Allocate adequate *resources* to ensure EIA follow-up.
8. Ensure that EIA follow-up *governance arrangements* are appropriately efficient and effective.
9. Ensure *transparency* and *accessibility* of EIA follow-up to all stakeholders/parties involved.
10. Ensure *legitimacy* of EIA follow-up governance arrangements.

Box 1: Best practice EIA follow-up governance principles

Applying the best practice principles and criteria

The policy Delphi

The best practice principles and criteria for effective EIA follow-up governance were tested against the results of a policy Delphi, which highlighted stakeholders' perceptions of EIA follow-up, EIA follow-up governance and EIA effectiveness. The policy Delphi was carried out with a group of stakeholders actively involved in EIA, as a sample of policy-specific experts (Beiderback et al., 2021; Franklin & Hart, 2007; Turoff, 1970), including project proponents, architects, EIA consultants, local council associations, government entities and eNGOs. Whilst a total of approximately 50 invites were distributed, 18 participants agreed to participate. A total of 12 and 10 complete responses were received for the first and second rounds of the policy Delphi, respectively. The questions, sent via electronic mail, consisted of two rounds of open-ended questions, with the responses analysed and utilised to test the best practice EIA follow-up principles and criteria.

The evaluation tables

The following tables provide an evaluation of the effectiveness of EIA follow-up governance in Malta:

EIA follow-up governance principles ***Procedural***	***Detailed criteria for effective EIA follow-up governance***	***Stakeholder Responses***	***Comments on Reponses***
1. Have a *legislative* framework which specifies EIA follow-up requirements.	A. Is follow-up a requirement for all EIAs?	Partial	As acknowledged by most of the research participants, the current EIA regulations do include provisions specific to monitoring, surveillance and other post-permit analysis (Regulation 32b in the relevant legal notice – S.L. 549.46) and that references to EIA follow-up is vague. Whether EIA follow-up should be a requirement for all EIAs was considered debatable.
	B. Are processes in place for each component of EIA follow-up?	Partial	Research participants associate EIA follow-up to mostly monitoring arrangements; very limited number acknowledged the evaluation and auditing aspects. All acknowledged that there are no processes in place for management, communication and engagement.
	(i) Are processes in place for monitoring?	Yes	Research participants acknowledged that monitoring is an essential component of EIA follow-up and is being carried out.
	(ii) Are processes in place for evaluation?	Unable to judge	Limited number of research participants acknowledged that processes for evaluation and auditing are in place for EIA follow-up.
	(iii) Are processes in place for management?	No	None of the research participants acknowledged such processes being in place.
	(iv) Are processes in place for stakeholder communication and engagement?	No	None of the research participants acknowledged such processes being in place.
	C. Are the above processes implemented in practice?	Partial	Only for monitoring requirements.
	D. Have any guidance documents to aid the appropriate implementation of EIA follow-up processes been published?	No	None of the research participants were aware of any guidance documents related to EIA follow-up.
2. Establish clear identification of *responsibilities* in EIA follow-up.	A. Is there staff within the regulatory authority with specific responsibilities for EIA follow-up?	Partial	Research participants acknowledged that there are no staff members within the regulatory authority with specific responsibilities for EIA follow-up except those related to monitoring and compliance.
	B. Are the responsibilities of all stakeholders for follow-up, i.e., regulator/s, project proponent/s, eNGOs and the public clearly identified?	Unable to judge	Clear identification of responsibilities for follow-up is required.
3. Specify *compliance and enforcement* provisions.	A. Do the regulations include provisions for compliance and enforcement, in relation to EIA follow-up?	Unable to judge	Limited information regarding compliance and enforcement provided by research participants; proposed inclusions for specific provisions in regulations.
	B. If yes, is a penalty system related to enforcement and compliance in place?	Unable to judge	Limited information regarding compliance and enforcement provided by research participants; proposed inclusions for specific provisions in regulations.

Table 1: Stakeholders' perceptions of procedural effectiveness of EIA follow-up governance

EIA follow-up governance principles *Substantive*	*Detailed criteria for effective EIA follow-up governance*	*Stakeholder Responses*	*Comments*
4. Ensure *reporting* of EIA follow-up outcomes, to facilitate *adaptive management* and promote continuous *learning from experience* to improve future practice.	A. Are EIA follow-up outcomes reported to all stakeholders, including the public?	Unable to judge	Very limited information available; organisation of an annual EIA forum to share EIA outcomes, including EIA follow-up outcomes with stakeholders has been suggested by the participants.
	B. Have all (significant) impacts of a project been addressed?	Unable to judge	Only the regulators would be aware of whether all significant impacts of a project would have been addressed.
	C. Have all mitigation measures been implemented?	Unable to judge	Only the regulators would be aware of whether all significant impacts of a project would have been addressed.
	D. Is there opportunity/evidence of learning within project/s?	Unable to judge	No such evidence/opportunity was traced.
	E. Is there opportunity/evidence for adaptive management?	Unable to judge	No such evidence/opportunity was traced.
	F. Is there opportunity/evidence for learning/sharing with other proponents and/or stakeholders?	Unable to judge	No such evidence/opportunity was traced.
5. Establish clear, pre-defined and well-justified *performance criteria* for EIA follow-up.	A. Are clear EIA follow-up performance criteria pre-identified in order to appraise information, results and outcomes emerging from follow-up actions?	No	No such criteria are pre-identified in order to assess EIA follow-up performance. None of the stakeholders were aware of such.
6. Have a *clear understanding* of the purpose and importance of EIA follow-up.	A. Are all stakeholders informed of the purpose of EIA follow-up?	Unable to judge	No; information regarding EIA follow-up is limited.
	B. Are there provisions for communicating the importance of follow-up?	No	No; no evidence of such outreach or communication was identified.
	C. Is there clear and ongoing collaboration between regulatory authorities who are responsible for EIA follow-up?	Unable to judge	More collaboration between the regulatory authorities, i.e., the PA and the ERA and other authorities was deemed necessary.

Table 2: Stakeholders' perceptions of substantive effectiveness of EIA follow-up governance

EIA follow-up governance principles *Transactive*	*Detailed criteria for effective EIA follow-up governance*	*Stakeholder Responses*	*Comments*
7. Allocate adequate *resources* to ensure EIA follow-up.	A. Do both the regulators and the project proponent/s have adequate human resources to ensure the carrying out of EIA follow-up?	Unable to judge	Information related to the allocation of human resources in relation to EIA follow-up is limited to not available.
	B. Is appropriate time being allocated by both the regulators and the project proponent/s towards EIA follow-up?	Unable to judge	Information related to the allocation of time to EIA follow-up is limited to not available.
	C. Are enough financial resources being allocated by both the regulators and the project proponent/s towards EIA follow-up?	Unable to judge	Information related to the allocation of financial resources and budgetary requirements to EIA follow-up is limited to not available.
8. Ensure that governance arrangements are *appropriately*	A. How did the environmental outcomes come about? (i.e., to what extent can the outcomes be attributed to EIA follow-up governance specifically?)	Unable to judge	Limited or unknown in view of the limited information available on EIA follow-up.

efficient and effective.	B. Was there evidence of redundancy or inefficiency in EIA follow-up processes by the regulator? (e.g., did the stakeholders identify ways these processes could have been done more efficiently and effectively by regulators?)	Unable to judge	Limited or unknown in view of the limited information available on EIA follow-up.

Table 3: Stakeholders' perceptions of transactive effectiveness of EIA follow-up governance

EIA follow-up governance principles	***Detailed criteria for effective EIA follow-up governance***	***Stakeholder Responses***	***Comments***
Legitimacy			
9. Ensure *transparency* and *accessibility* of EIA follow-up to all stakeholders/parties involved	A. Have regulators and/or project proponents taken reasonable steps to make EIA follow-up accessible to all stakeholders, including the public? (e.g., provisions of non-technical summaries, printed material, dedicated websites, social media accounts?)	No	No such steps have been taken in terms of EIA follow-up; however, research participants made detailed proposals for addressing this issue.
	B. Are there appropriate feedback mechanisms in place where all stakeholders and the public can provide feedback in relation to EIA follow-up, ensuring transparency and legitimacy?	No	No such feedback mechanisms are in place; however, research participants made detailed proposals for addressing this issue.
10. Ensure *legitimacy* of EIA follow-up governance arrangements.	A. Were the existing governance arrangements upheld or delivered appropriately by regulators in the views of stakeholders?	Unable to judge	Not known as no mechanisms are in place to seek views of stakeholders.

Table 4: Stakeholders' perceptions of legitimacy of EIA follow-up governance

Reflections and Conclusions

This paper has presented how EIA follow-up governance best practice principles can be applied to evaluate its effectiveness at the jurisdiction (macro) level. The evaluation framework provided a focused assessment of EIA follow-up governance in Malta. Application of the principles proved to be relatively easy. This offered clear feedback in relation to the performance of EIA follow-up governance. It is evident, however, that the lack of information available on both EIA follow-up governance may hinder a robust judgement of its performance.

The best practice principles and criteria highlighted the current state of play in relation to EIA follow-up governance, but also identified deficiencies that would warrant improvements in their effectiveness. They are designed to enable any interested party to evaluate any jurisdiction worldwide implementing EIA follow-up, to provide guidance and enable best practice, rather than acting as a compliance check-box tool. In conclusion, understanding governance processes, arrangements and mechanisms is vital in making EIA follow-up happen.

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Achieving a just transformation in Australia's renewable energy zones

Dr Sharon Harwood

Abstract

To meet the emissions reduction targets by 2050 the Australian Energy Market Operator (AEMO) has identified 35 land-based and 6 offshore wind renewable energy zones (REZs). Each of the REZs have been identified based on their potential to generate energy relative to demand, and efficiency to augment the transmission grid. This will create a decentralised energy system that will have significant benefits for Australia, but may also bring potential impacts to communities, environmental values, economies, and land uses within rural Australia, and typically agricultural areas that are not planned to accommodate industrial-type infrastructure. The REZs do not necessarily align with bioregions or with statutory boundaries and do not have a centralised regulatory body. Consequently, there are a myriad of disconnected regulatory approval processes that fail to identify or mitigate key environmental, cultural, and social impacts across and between each REZ. The challenge is to find mechanisms to harness the opportunities associated with the energy transition to positively transform communities and to mitigate negative landscape level impacts. Healthy transformation is measured in terms of how communities within the REZ adapt to the comprehensive social, environmental, cultural, and economic changes associated with energy transition. This paper describes how the implementation of strategic environmental and social assessment as a key planning tool can provide all stakeholders with data to make informed decisions to achieve a just transformation and optimised outcomes through the planning and development of REZs.

Introduction

Australia's existing electricity transmission network evolved from the location of coal deposits and power stations to industrial demand centres (McDonald, 2023). Transitioning from a centralised coal generation system to decentralised solar and wind resources requires an entirely new approach to the planning and utilisation of the existing state and national transmission network. The new approach will need to connect the distantly located solar and wind resources to an existing transmission network that possesses limited capacity (McDonald, 2023). This will require consideration of how to develop new transmission lines, new solar and wind farms, and new storage systems, while also protecting the environmental, cultural, social, and economic values that host communities value highly.

The new planning approach that the Australian Energy Market Operator (AEMO) has adopted in its Integrated Supply Plan (ISP) is the development of dedicated Renewable Energy Zones (REZ's). REZ's are defined as *high-quality resource areas where clusters of large-scale renewable energy projects can be developed using economies of scale* (AEMO 2022).

Each of the state and territories within Australia are responsible for developing planning regimes for REZ's within their jurisdiction. These are at varying stages of maturity; however, none have created a development assessment process that integrates with the local and state planning policies or considered the important social, cultural, economic, and environmental values held by host communities within each REZ. Simply put, the REZ's are an overlay that identifies how the transmission, generation and storage system can be most effectively located to maximise efficiencies for energy generation, distribution, and storage. The scale of the new development associated with the new REZ's in Australia, includes:

- 10,000km of new transmission lines (Aziz and Ahmed 2022)

- 119 million hectares of land to replace coal, gas and oil with 50% sourced from solar and 50% from wind power. This is equivalent to 15 per cent of Australia's landmass, or approximately one -third of all Australia's agricultural land (You and Begg 2023).
- 450 GWh of storage will be required or the equivalent of 4,000ha of land to develop new pumped hydro energy storage systems (Blakers, Lu and Stocks 2017) to stabilise the national energy system when 100% of energy sources are renewable.

Limited consideration has been given to how the host community values are impacted by the development of the new energy infrastructure or the integration of the REZ's within statutory planning frameworks. Moreover, within each REZ:

- All developers of renewable energy generation, transmission and storage must apply to the AEMO to participate in the national electricity markets.
- All new developers of renewable energy generation, transmission and storage must apply either to the state (where a major project) or local government for approval prior to developing.
- All major project proponents must complete an EIS pursuant to the relevant state planning requirements.

Consequently, there are a myriad of disconnected regulatory approval processes that fail to identify or mitigate key environmental, cultural, and social impacts across and between each REZ. The challenge is to find mechanisms to harness the opportunities associated with the energy transition to transform communities justly and positively to mitigate negative landscape level impacts.

What is a just energy transformation?

Energy transition refers to the shift from a set of dominant resources such as oil, coal and gas to another such as wind, hydrogen and solar. Accordingly, the energy transition literature is expanding in its scope to consider the positive and negative impacts of the transition on households and host communities. Carley and Konisky (2020) maintain that transitions inevitably produce winners and losers which highlights the notion of energy justice in decision making such as social inclusion and benefit distribution and mechanisms to address these by governments in decision making processes and energy developers in the delivery of their projects.

However, consideration of what constitutes a just energy transformation remains disconnected from the source of the transition (one energy source to another), the communities most affected by the transition and the process that facilitates the transition (planning and development assessment). The notion of a transformation as opposed to transition suggests that moving from one set of resources to renewables will create profound and hopefully positive change to the social, cultural, economic, and environmental values held by those most affected by the transition such as communities in rural locales. The speed and scale of change that is required to transition to renewable resources to achieve net zero by 2050 requires a fundamentally different approach to the planning and development of REZ's. Delineating areas of renewable energy potential on a map applies a purely technocratic approach to transition and fails to acknowledge the deep connection and knowledge that local communities have to these same areas. Many rural spaces and places are already being contested and reimagined irrespective of the energy transition (Calvert et al 2022). Ongoing changes associated with climatic conditions that affect cropping and grazing communities, are further exacerbated by the broader impacts of global and regional economic reforms and more recent disruptions to global supply chains which must be considered within the process of energy transition. Healthy transformation should be measured in terms of how communities within a REZ adapt to the comprehensive social, environmental, cultural, and economic changes associated with energy transition.

For the purposes of this paper, energy transformation describes the capacity of the affected community to adapt to the type, scale and intensity of change caused by the energy transition. Accordingly, the hazard resilience literature (see for instance Harwood et al 2014) describes adaptive capacity as the ability of a community to adapt to change in a positive and effective way. Rather than viewing the change as a stressor from which they need to recover from, transformative change is about adapting to new knowledge as the trigger of change. The collective capacity to adapt is influenced by the way that proponents introduce their developments to affected communities and the planning and development assessment frameworks that guide public decision making.

There are four key justice considerations underpinning the notion of a just energy transformation, namely (after Carley and Konisky 2020 and Bennett et al 2019):

1. Distributional justice – the decision-making system acknowledges ways to equitably distribute benefits and burdens over time, space, between groups and across populations.
2. Procedural justice – creating and managing fair, equitable, inclusive, transparent, and accountable decision-making processes. This form of justice also describes the governance procedures that the proponents apply internally in their decision making such as grievance mechanisms, building local capacity to participate in decision making and co-ownership/management.
3. Recognitional justice – the decision-making system recognises and seeks to reconcile the historic and ongoing inequalities such as acknowledging pre-existing rights and tenure (including customary tenure), the integration and inclusion of diverse worldviews, perspectives and values and identifying and differentiating the rights holders and stakeholders in the decision-making processes.
4. Restorative justice – which requires the intervention of the government or other intervention to avoid distributional, procedural and recognitional injustices and to apply the appropriate governance processes in decision making procedures to correct these.

To achieve a just energy transformation in Australia's REZ's requires a decision-making system that not only addresses the four abovementioned justices, but also supports community adaptation to the profound changes associated with the energy transition. Fundamentally, Australia's REZ's requires a more strategic approach that enhances social, cultural, economic, and environmental opportunities, mitigates adverse risks and impacts, delivers certainty to both the host community and energy developers, supports policy making, guides long term regional planning, includes affected communities in knowledge production (ie sensitivity mapping) and delivers time and cost efficiencies in assessment processes.

The role of strategic environmental and social assessment in facilitating a just transformation

The International Association for Impact Assessment (IAIA) maintains that traditional environmental impact assessments applied at the project level have proven to be insufficient to deal with the bigger picture beyond project level impacts (IAIA 2023). This is particularly relevant in REZ's where multiple generation, transmission and storage projects are developed within the one region simultaneously.

There is currently no development certainty provided to either the community or the developers of renewable energy in Australia's REZ's. Developers wear all the risk in identifying the most viable and acceptable location to the community and are required to develop community engagement, benefit sharing and First Nation strategies commensurate with project level impacts prior to gaining a licence with the AEMO or the completion of an environmental impact assessment (EIA). The financial costs are significant to the developer, and the lack of uncertainty experienced by the affected residents and community impacts their well-being and reduces the levels of social acceptance of renewable energy development. Developers and regulators do not have access to a central database

with which to make development decisions relative to the community expectations and limits of acceptable change to important social, cultural, economic, and environmental assets and values.

Achieving net zero by 2050 is a global and national goal, yet developers hold the risk, and local communities experience the consequences of a lack of regional co-ordination in Australia's REZ's to achieve net zero. The application of a government led strategic environmental and social assessment (SESA) in each REZ could proactively identify the social, cultural, economic, and environmental effects of the proposed renewable energy system, guard against consultation fatigue associated with simultaneous and multiple developments, provide communities with an opportunity to collectively develop strategies to mitigate impacts and identify catalytic development opportunities to sustain their economies into the future. However, the most valuable feature of the SESA to Australia's REZ development is proactively addressing the cumulative impacts that are currently exacerbated by the lack of regional intervention and co-ordination of mitigation strategies. These include impacts on transport networks and critical municipal infrastructure (water supply, sewage treatment), housing and accommodation shortages, capacity to create catalytic social investment strategies, capability of local supply chains to engage in regional scale development, investment in workforce skill development and training, increased demand on limited health service provision, under resourced volunteer emergency services, heightened stress and anxiety for residents and communities from development uncertainty, lowered levels of community cohesion created by community opposition to renewable energy development, reduced viability of regional agricultural industries from lowered production volumes at local and regional markets, and potential biosecurity risks on valued natural resources and environmental values. Furthermore, not all jurisdictions in Australia require the completion of a social impact assessment as part of the EIA. This oversight invariably means that historic and ongoing inequalities experienced by First Nation peoples and vulnerable populations (youth, unemployed, gender identity) are neither recognised nor restored as part of the EIA and the energy transition.

Conclusion

This paper has described how the implementation of a strategic environmental and social assessment can be used as a key planning tool to provide all stakeholders with data to make informed decisions about renewable energy development in Australia's REZ's. Achieving a just transformation in Australia's REZ's is dependent on a government lead intervention to create a more efficient and collaborative approach to siting decisions that in turn provides heightened certainty for the host communities and developers alike.

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Impacts on biodiversity and expected inputs to management from monitoring

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ABSTRACT

Monitoring the impacts of projects and evaluating the efficacy of mitigation are key components of follow-up. Monitoring impacts on biodiversity is particularly challenging due to ecosystem complexity, while compliance with conditions of permits often require the collection of large amounts of data that not always are properly analyzed to extract relevant information for environmental management. The commitment of some companies with performance targets such as no net loss is an opportunity to push the boundaries of regulatory monitoring from data collection and storage to evidence-based demonstration of outcomes. We reviewed a set of documents related to biodiversity management and to the permit process, started in 2004, of a bauxite mine in the Brazilian Amazon. Firstly, we revised the list of impacts and respective mitigation, then we related monitored parameters to the impacts. The monitoring plans were reviewed for frequency, grid, indicators and the interpretation provided by the reports. We observed that those reports do not show evidence of occurrence of all impacts. They are prepared to demonstrate compliance with regulatory requirements, but do not provide analysis about the actual magnitude of impacts by comparing with the baseline or reference values. However, a contrasting approach was used to deal with an impact not predicted in the EIA, fauna run-over in internal roads, and in external railway and highway. Informed by specific monitoring, additional mitigation is being implemented, reinforcing the importance of follow-up and adaptive management in mining projects.

Key-words: EIA follow-up, mining, reports, magnitude, fauna run-over

Introduction

Monitoring, as part of EIA follow-up, alongside impacts' evaluation, management and communication (MORRISON-SAUNDERS *et al.*, 2021), is an important source of information and knowledge to the environmental management of operating undertakings (SÁNCHEZ, 2012). Monitoring is meant to be responsible for producing data and information, to be consolidated into the necessary knowledge to promote effective impacts management, including the path to avoid and minimize impacts (DURNING, 2012; MORETTO *et al.*, 2021).

Biodiversity targets such as 'No Net Loss' (NNL) or 'Net Gain' (NG) at project level, meaning that all lost biodiversity will be restored and offset (BBOP, 2012), are adopted by sectorial groups, environmental certifications and as conditions to finance projects. As examples of institutions that promote those targets are the International Finance Corporation (IFC) with its Performance Standards (PS), the Aluminium Stewardship Initiative (ASI), a certification tailored to the aluminium supply chain from mining to end use, and the International Council on Mining and Metals (ICMM), a business organization.

Hence, it became important to demonstrate more than compliance with regulatory requirements, also being necessary to create strategies to achieve those targets and show their accomplishment. For that reason, biodiversity monitoring running to answer compliance requirements on EIA follow-up phase is of interest, as it could generate data capable of demonstrating actual achievements. However, it may not always contain the

necessary information to demonstrate achievement of voluntary corporate commitments, and having those targets adopted by companies are an opportunity to improve data collection, storage and analysis.

In this context, the research's objective is to understand if monitoring is properly demonstrating the actual impacts of a mining operation, necessary to promote effective management of impacts on biodiversity, and to demonstrate results related to biodiversity targets as well.

Materials and methods

The research described on this paper has the Juruti bauxite mine as study object. Situated in the Brazilian Amazon and belonging to Alcoa, it started operation in 2009. We reviewed a set of documents related to the EIA process, including the Environmental Impact Statement (EIS) presented in 2004, the operation's environmental management plan and the annual compliance reports (that contain monitoring data), available for the period 2016-23.

We firstly revised the list of impacts on biodiversity, by building causal chains of the kind 'activities-aspects-impacts', adjusting the original description of impacts (from the EIS) when imprecise, and adding impacts missed in the EIS, as needed. Then, mitigation measures implemented in the mine were associated to the revised impacts. By detailing its monitoring indicators, a first analysis of monitoring adequacy to the revised impacts was developed. Finally, the monitoring plans were reviewed for frequency, grid, parameters and indicators, and the interpretation about the impact provided by the annual reports.

Results and Discussion

The initial analysis resulted, from the *ex-post* revision, in 21 impacts related to biodiversity. We reviewed 11 plans that in 2022 were fully or partially monitoring 19 impacts, as detailed in Margarido *et al.* (2023). Those steps highlighted the importance of having clear and precise impacts as a starting point to adequate monitoring, since not all monitoring plans had indicators capable of detecting the related impacts.

The review of monitoring plans started by organizing the characteristics of interest, such as methodology and how they describe collected data. As a partial result, it was possible to trace a timeline about the monitoring plans, tracking, for example, changes in the monitoring grid or sampling effort, as seen in the fauna monitoring, impossibility of accessing certain monitoring areas due to extreme events, such as floods or fires, as seen in the flora monitoring, and changes in indicators, seen in the extinction risk flora monitoring in the railway. The understanding of each monitoring plan's history is important to determine whether or not monitoring has been improving over time, and possibly to explain some decisions on monitoring managing. Those are studies still on course.

Nevertheless, organizing information contained on the annual reports also showed that those compliance reports present poor evidence of impacts. The reports' main content were the results of monitoring campaigns carried out on the year. We observed that the related impacts were not explicitly stated on the reports, a desirable characteristic. We also noted that when monitoring results were compared with previous ones, it was common to be with data collected during operation, therefore not connecting to the pre-mining baseline, and pointing some trends, but hardly describing impact magnitude or providing any interpretation.

Fauna monitoring is an interesting example to be explored. Terrestrial fauna monitoring should be capable to answer to the following impacts: fauna individuals' loss, fauna injury, population decline, diversity decrease and disturbance of terrestrial ecosystem stability. Taking the 2022 annual report, we observe that the fauna monitoring is twofold: general monitoring for different groups, and a fauna run-over monitoring.

For the general monitoring, the selected indicators were: abundance, species richness, diversity and equitability. Besides reporting those indicators, some analysis were made, being presented here two that try to express some understanding about impacts.

(1) Comparison of indicators for the same year by grouping the monitoring grid according to the area of influence, that appears in the 2022 annual report. For the group that supposedly is less impacted by the mining activity, there are two monitored areas: a control area, in a conserved sector of forest with similar characteristics of the suppressed vegetation on mining, and an area under influence of human activity other than mining, but possibly being indirectly impacted. Another group of monitored areas is the one where mining activities occur, and are already in recovering process. And a third group is composed by the directly impacted areas, that includes one where they release the fauna rescued during vegetation suppression activities for mining. Even if this comparison initially looks valid to settle differences that could characterize the impact, there are some bias on the grouping that make such comparison impossible.

(2) Interannual comparison. In the 2022 reports they were presented in a complete way, with a graph of abundance and richness for every monitored year. They also group those years under the EIS data (baseline), monitoring implantation data and monitoring operation data. Again, there are limitations to this comparison that are not explicit on the report. The fact that, when presenting this data, there are no further considerations about the monitoring grid or effort does not allow to say that the fauna richness prior or post mining have changed.

In both analysis, the report itself, even though putting up the comparison, does not state that the different results imply on the impact's magnitude, what would be expected. But it does not either explicit the comparisons' limitations, that we can only understand through the timeline of monitoring plans, and would be important to avoid misinterpretation. Also, having those limitations on sight would possibly point to monitoring features that could be improved to be more conclusive about the impacts, such as the grid location or the adopted indicators. In both cases, we deem there are more accurate analysis that can be done to understand the impacts' magnitude, for example, using the control area as comparison basis for the indicators, or adopting relative abundance indices to allow the trend analysis over the years (MCCOMB *et al.*, 2021).

As to the fauna run-over monitoring, it represents a contrasting scenario. To that monitoring, the selected indicators already provide evidence on impacts that we have reviewed (fauna individuals' loss and fauna injury specifically): taxonomic identification, abundance, richness, number of run-over individuals, animal condition (dead or alive) and run-over rate. Also, the monitored areas are clearly defined as the areas where the impact occurs, to be: the internal mine roads, the dedicated railway that is used to transport the ore to the harbor, and the public highway that connects the mine and the nearest town, used daily to transport employees and supplies.

As monitoring is conducted on a daily basis, it enables the ongoing rescue of injured fauna, taken to the wildlife rehabilitation facility, installed in the mining plant in 2020, thereby mitigating the impact. It is also possible to extract information about locations that have increased fauna run-over, about the most impacted fauna groups, and propose additional mitigating measures based on that evidence. One example are the wildlife passages installed in 2023 on the railway surroundings, focused on arboreal mammals.

It is worth mentioning that the origins of this monitoring plan is different from the general fauna monitoring. It is more recent, having started in 2019, and was motivated by observed incidents that were reported to the regulating body. In contrast, the general monitoring stemmed from the EIS. Fauna run-over was not identified as an impact in the EIS and consequently, no mitigation or monitoring was originally proposed. The run-over monitoring plan was designed on more robust grounds, aiming at looking for spatial patterns and the most impacted species, while the objectives of the general monitoring

plan are wider, but also vague, looking to estimate ecological parameters of population, determine the spatial distribution of species, analyze patterns and seasonal influence and identify threatened species. As a consequence, since its inception, fauna run-over monitoring informed the proposition of mitigating measures, to be refined with monitoring knowledge; On the other hand, the purpose of the general monitoring does not seem, at least it is not stated on the reports, to evaluate the efficacy of mitigation (what is done on other monitoring plan that accompanies fauna rescued on vegetation suppression, but not connected when interpreting results), and alert for any possible adaptation or improvement.

Conclusion

An accurate description of impacts is essential for designing monitoring plans and for interpreting their results. In the reviewed case, it was found that compliance reports do not necessarily seek to determine the magnitude of impacts or evaluate mitigation effectiveness, but when monitoring was targeted at supporting impact mitigation, in the case of fauna run-over, an integrated approach has proved to be capable of promoting an effective and adaptive management of biodiversity impacts.

The adoption of biodiversity targets by companies may be an opportunity to deepen the analysis of already available data from compliance related monitoring and transform them in information of interest to a range of stakeholders, thus not limited to regulatory compliance.

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Tiering biodiversity from SEA to EIA

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Abstract
Biodiversity protection has a pivotal role in the just transition of Impact Assessment (IA) to promote sustainability. Tiering biodiversity from Strategic Environmental Assessment (SEA) of sectoral and land use plans to Environmental Impact Assessment (EIA) of projects is a way to promote this. This paper presents some results of research that uses an existing analytical framework to help understand the extent of consideration of biodiversity in SEA and EIA, and the level of tiering of that knowledge. First, we benchmark the biodiversity coverage in both SEA and EIA literature to understand better the potential for transferring biodiversity knowledge from SEA to EIA. Second, the same analytical framework was used to benchmark the level of tiering of biodiversity evident in case studies from Brazil and the United Kingdom. The application of the framework demonstrates that IA tiering is still very limited despite all recommendations to improve it. Finally, some recommendations are presented to strengthen the tiering of biodiversity in IA practice.

1. Introduction

Since the Convention on Biological Diversity (CBD) was signed, through to the most recent Post-2020 Global Biodiversity Framework (GBF) published in 2021 and agreed as the Kunming-Montreal GBF at the 15th Conference of the Parties (COP 15 – held in December 2022) (Hughes et al., 2022; Chan et al., 2022), impact assessment (IA) instruments have taken a special place for protecting biodiversity (Treweek et al., 2005; Bond et al., 2021; Mandai and Souza, 2021; Milner-Gulland et al., 2021).

In terms of improving the efficiency of knowledge transfer across levels of decision making, Lee and Wood (1978) conceptualized tiering of actions through IA. Some suggestions to encourage tiering on biodiversity-related issues have recently been proposed. Coutinho et al. (2019) emphasized that tiering from SEA to EIA can help to identify critical areas for biodiversity and ecosystems and help to protect or conserve them. Gallardo et al. (2022a) discussed the use of the ecosystems concept as a thread to facilitate tiering in IA and Cumming and Tavares (2022) emphasized that a multi-tiered

approach can help to conserve ecological connectivity within and between the boundaries of national parks.

However, to ensure the efficacy of approaches designed to tier biodiversity knowledge from SEA to EIA, there is a need to have some means of measuring the levels of knowledge at the two tiers and the extent of its transfer. The main objective of this paper is to test an analytical framework previously developed for benchmarking global biodiversity objectives in SEA and EIA using both a representative sample of IA literature, and case studies from Brazil and the United Kingdom.

2. The analytical framework

An analytical framework comprising 18 biodiversity objectives that was previously developed from international policies by Gallardo and Bond (2023) (see Figure 1) was used as the means of determining the focus of biodiversity knowledge at the different tiers of IA.

Themes	Main objectives distilled
Reducing threats to biodiversity	1. to reduce threats to biodiversity
Actively protecting biological diversity of threatened species	2. to guide actions to conserve biological diversity mainly related to threatened species
Wetland conservation	3. to conserve wetlands and their resources
Conservtion of wild flora, fauna, and natural habitats	4. to conserve wild flora and fauna and their natural habitats
Conservation of terrestrial, marine, and avian migratory species	5. to conserve terrestrial, marine, and avian migratory species throughout their range (habitat), to protect endangered migratory species
Conservation of ecosystem services	6. to protect ecosystem services
Protection of genetic diversity	7. to protect genetic diversity
Sustainable use of biological diversity	8. to promote the sustainable use of the components of biological diversity
Fair and equitable sharing of genetic diversity benefits	9. to promote the fair and equitable sharing of the benefits arising out of the utilization of genetic resources to meet people's needs
To promote afforestation and conservation	10. to reverse the loss of worldwide forest; to enhance forest-based sustainability benefits; to significantly increase the area of protected forests worldwide and other areas of sustainably managed forests
To combat desertification	11. to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification
To halt and reverse land degradation	12. to halt and reverse land degradation
To increase biodiversity	13. to increase biodiversity by avoiding any new degradation of land, reduces existing degradation, and restores already degraded land
To manage risks of LMO	14. to protect biological diversity by managing the risks of Live Modified Organisms (LMOs)
to propose tools and solutions for achieving biodiversity objectives	15. to propose tools and solutions for implementation and mainstreaming (2050 goals to 2030 milestones)
To undertake ex ante assessment of actions affecting ecosystem services and biodiversity	16. to undertake an assessment should towards sustainable development and ecosystem health and biodiversity
To assessment implications of changes in ecosystem services for human well-being	17. to assess the consequences of ecosystem change for human well-being and to enhance the conservation and sustainable use of ecological systems and their contribution to human well-being
To maintain up-to-date knowledge of ecosystem services and biodiversity	18. to perform regular and timely assessments of knowledge on biodiversity and ecosystem services and their interlinkages at the global level in order to provide a summary of the status of biological diversity to ensure that biodiversity is conserved and used sustainably
International Biodiversity Milestones*: The IUCN Red List of Threatened Species (Red List); CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora; The Ramsar Convention; The Bern Convention; The Bonn Convention (the Convention on Migratory Species); Convention on Biological Diversity (CBD); United Nations Forest Instrument; Agenda 21; UN Convention to Combat Desertification; The Cartagena Protocol on Biosafety to the Convention on Biological Diversity; The Millennium Ecosystem Assessment; Aichi Biodiversity Targets (Strategic Plan 2011-2020); The Nagoya Protocol on ABS; IPBES: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services; Sustainable Development Goals; Post-2020 Global Biodiversity Framework – 2020: (2030 actions targets); Global Biodiversity Outlook (GBO) (there are 5 reports); BBNJ (biological diversity areas beyond national jurisdiction) agreement under the United Nations Convention of the Law of the Sea (UNCLOS)	

Figure 1 – Analytical Framework for evaluating extent of inclusion of biodiversity objectives in IA (modified from Gallardo and Bond, 2023).

3. Methods

The analytical framework was firstly applied to SEA and EIA literature to determine the extent to which the international biodiversity policies' objectives are currently addressed, firstly locating the relevant literature to evaluate; and then applying the analytical framework to this literature.

Based on a Scopus search, 503 papers on SEA (published between 1996 and April 2022) and 3383 papers on EIA (published between 1991 and April 2022) were found, which after being filtered resulted in 55 papers on SEA and 127 papers on EIA. Grey literature sources were also identified using the Google search engine (7 results for SEA and 16 results for EIA) to give a final sample of 62 documentary sources for SEA and 143 documentary sources for EIA. All the documentary sources were searched using terms developed from the themes and objectives presented in Figure 1 (see Gallardo and Bond, 2023). This analysis indicates which biodiversity objectives are considered at each level and so highlights possibilities for tiering, albeit there is no indication of whether tiering actually takes place.

The analytical framework was also applied to case studies of SEA followed by EIA, to identify evidence of IA tiering in practice. Two contrasting jurisdictions for SEA regulation and biodiversity were selected: Brazil (high biodiversity (Fearnside, 2016), limited SEA practice (Gallardo et al., 2021; Nadruz et al., 2018)); and England (extensive loss of biodiversity (Cunningham et al., 2021; RSPB, 2021), extensive SEA practice with some drivers for tiering (Bond and Fischer, 2022)). In both case studies, the plans and projects operate within a context of ecological conservation designations, which inform the IA processes.

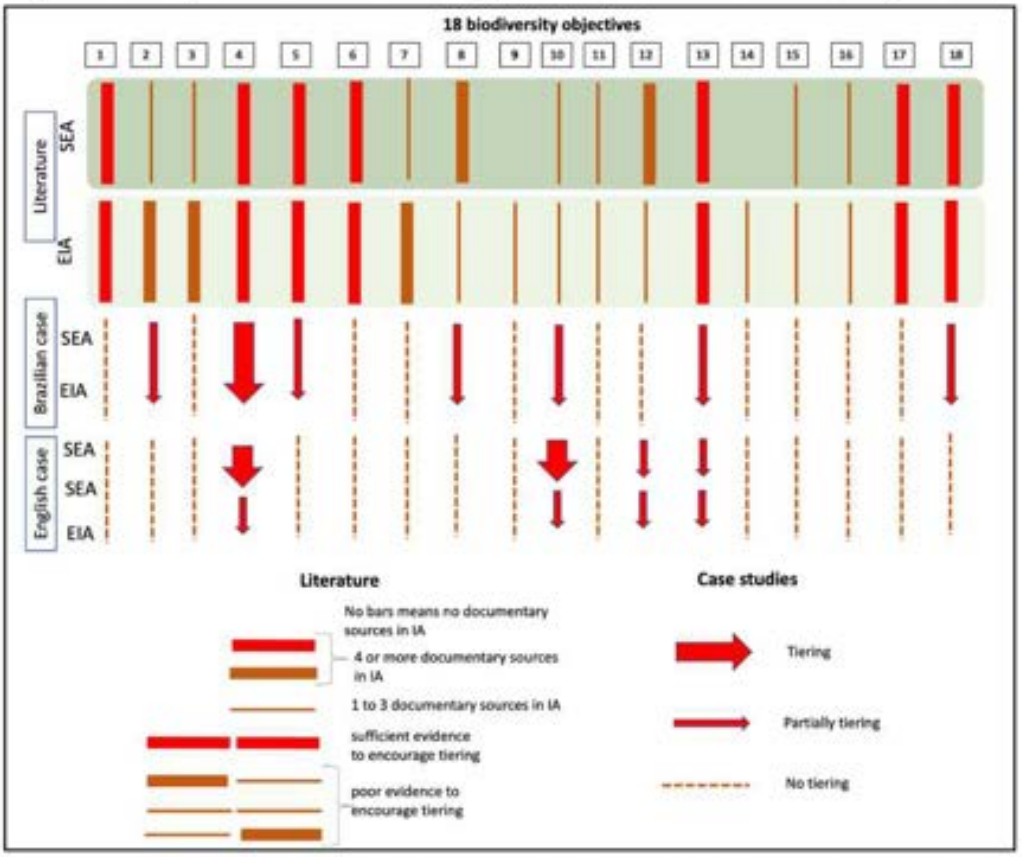
The analytical framework was used in both case studies to investigate a) the extent to which global biodiversity objectives are addressed at the SEA and EIA levels; b) the extent to which there is explicit reference in the lower tier (EIA or SEA) to the biodiversity objectives mentioned in the higher tier (SEA).

Regarding the Brazilian case, the SEA of the Multimodal Transport and Mineral-Industrial Development Program of the Cacao Region (Bahia state) (http://www.lima.coppe.ufrj.br/images/documentos/projetos/aae_sumario_executivo-porto-sul.pdf) was selected because the decree law (11.235/2008) that approves the environmental and biodiversity protection policy in the state of Bahia, has an article that allows the State to request an SEA to evaluate planning. The Environmental Impact Statement (EIS) Porto Sul Complex (http://licenciamento.ibama.gov.br/Porto/Porto%20Sul%20-%20Bahia/EIA/) is an EIA project derived from the development program analysed in this SEA. The English case study includes two tiers of SEA and a project EIA. This case study will consider one example of the SEA for the Greater Norwich Local Plan, GNLP: https://gnlp.oc2.uk/docfiles/46/GNLP_SA_Reg18(C)_Final.pdf) which is a collaboration between the local authorities of Norwich City Council, Broadland District Council, and South Norfolk District Council. There is a neighbourhood plan adopted within the GNLP for a proposed new town (Rackheath Neighbourhood Plan: https://www.southnorfolkandbroadland.gov.uk/downloads/file/67/rackheath-neighbourhood-plan) which is consistent with the GNLP. Then, planning applications to deliver the housing expected are separately submitted to the local authority (which in

this neighbourhood is Broadland District Council), for example, the North Rackheath housing application (https://secure.broadland.gov.uk/MVM/Online/dms/DocumentViewer.aspx?PK=771254&SearchType=Planning%20Application), which has to be consistent with the neighbourhood plan and was subject to EIA.

4. Results and Discussion

Figure 2 presents the results from the application of the analytical framework firstly in relation to the objectives identified in the documentary sources for SEA and EIA, and secondly for the Brazilian and English case studies of SEA followed by EIA.



Sources: modified from Gallardo and Bond (2023) and Gallardo and Bond (submitted).

Figure 2 – Evidence of biodiversity focus within SEA and EIA from literature and the evidence for biodiversity tiering taking place from SEA to EIA in the two case studies (Brazilian and English).

Figure 2 reveals those objectives that are referenced more at EIA level than SEA level (objectives 2, 3 and 7). Objectives 9 and 14 have little reference at the EIA level, but no reference at the SEA level. For objectives 1, 4, 5, 6, 13, 17 and 18, there is some

evidence that there is relatively frequent consideration in both EIA and SEA. From the literature, prompts can be identified which help to explain how tiering can be facilitated. For example, to encourage tiering to reducing threats to biodiversity (objective 1), conservation actions considering red list species can be guided at the SEA level using Citizen Science as a tool (Barnard et al., 2017) whose data can be confirmed and detailed at the EIA level project, for example, through indicators for a listing of threatened ecosystems by individual projects (Botts et al., 2020).

Thérivel and González (2021) highlight biodiversity as a relevant environmental issue to be addressed at different tiers of plan-making and EA practice. Figure 2 shows that evidence of explicit tiering of biodiversity knowledge from the SEA to the EIA in the Brazilian case is limited, albeit some tiering practice is evident for seven out of the 18 biodiversity objectives. For the English case, the scope of biodiversity is understandably smaller (only four out of the 18 biodiversity objectives) than in the Brazilian case and with limited tiering results, albeit the proportion of objectives considered that were tiered (fully or partially) is much higher than in the Brazilian case. Except for objective 4 for the Brazilian case, the transfer from the planning level to the project level (EIA) was always partial, restricting the potential benefits of EA tiering. The analysis of the Brazilian and English case studies demonstrates that tiering of biodiversity objectives does exist, but is limited, in line with previous findings (Sánchez and Silva-Sánchez, 2008; Coutinho et al., 2019; Gutierrez et al., 2021; Gallardo et al., 2022a).

4. Conclusions

Considering that all 18 objectives have some analysis mirrored in the sets of papers analyzed from the literature, the practice of IA, in accordance with Craik (2017), is helping to shed light on biodiversity goals. Consideration of some biodiversity objectives is widespread showing that certain biodiversity issues are widely covered in the IA literature and a variety of methods may already be available to capture these elements of biodiversity in current IA practice as demonstrated by the methods developed by Brownlie and Treweek (2018); Mandai and Souza (2021); Gutierrez et al. (2021); Gallardo et al. (2022b).

The importance of biodiversity objectives being considered in the SEA planning cycle for the subsequent EIA is that the strategic aspects of biodiversity are not only present but detailed at the level of local actions in individual projects or initiatives. The extensive literature on the consideration of biodiversity in SEA and EIA practice demonstrates the connection between these themes subject to the analytical framework being valid. Further development of this analytical framework can help to improve its ability to fully reflect biodiversity tiering, and may lead to the development of metrics and, ultimately, suggested methods to enhance tiering of biodiversity knowledge.

Our study finds limited evidence of biodiversity tiering considering two contrasting Brazilian and English planning cases. The Brazilian case shows that even though a wide range of biodiversity objectives are considered in planning guided by the SEA and that some may even be present in the EIA, an explicit connection between them is not guaranteed. Likewise, the English case, which shows limited consideration of

biodiversity issues even with mature planning in the EA process, also reveals an incomplete connection between tiers.

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Innovative Approaches to Quantify and Rank Impacts for EIA Scoping

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Abstract

The criteria and indicators used to determine the significance of environmental impacts in environmental and social impact assessments (ESIAs) vary by country and region. In most cases, the procedures for identification and analysis of impacts are based on professional judgments of government officers or consultants and generally use subjective qualitative criteria. This paper explores economic valuation methodologies to quantify and rank the impacts of environmental assessments using common and well-established metrics to determine the significance of environmental impacts of investment projects in low and middle-income countries. Methodologies to quantify and rank environmental impacts using welfare economic valuation have been used in various low- and middle-income countries (LMICs), where it has helped to identify priority environmental health problems and inform interventions that can be implemented to address them. Economic valuation techniques can provide actionable tools in promoting a Just Transformation, help making the world free of poverty on a livable planet.

1. Introduction

The world urgently needs to address the triple environmental crises of climate change, biodiversity loss, and pollution and to do so in a socially acceptable and equitable manner (UNEP, 2021). Environmental and Social Impact Assessment (ESIA)[1] is an indispensable tool to address these crises as it enables decision-makers and other relevant stakeholders to assess the potential environmental and socioeconomic- risks and impacts of investment projects and open governmental decision-making to public scrutiny (Abracosa et al., 1987; Ortolano et al., 1987). Additionally, ESIA can potentially contribute to a Just Transition[2] by identifying environmental priority challenges, providing a vehicle for stakeholder engagement, and designing interventions to improve environmental sustainability, economic welfare, enhance social inclusion, and foster green jobs.

This paper describes the methodologies used for scoping impacts in ESIAs, determining the significance of environmental impacts, and ranking those impacts. It also discusses how economic valuation provides an actionable tool and evidence of its use in promoting a Just Transformation.

2. Rationale for Enhancing EIA Scoping in LMICs.

In 1970, the United States (US) enacted the National Environmental Policy Act (NEPA). It requires federal agencies to integrate environmental considerations into their planning and decision-making processes and to engage in comprehensive environmental reviews for proposed projects[3]. Many low and middle-income countries (LMICs) have adopted requirements for environmental assessments of public and private investment projects. However, in LMICs, ESIAs have been used primarily to identify the best available measures to avoid, minimize, mitigate, and compensate for environmental and social impacts of investment projects.

[1] Also referred to as environmental impact assessment (EIA), environmental and social impact assessment (ESIA) is the preferred term as it stresses the explicit examination of social issues.
[2] https://climatepromise.undp.org/news-and-stories/what-just-transition-and-why-it-important
[3] https://www.epa.gov/nepa/national-environmental-policy-act-review-process

A key criterion for EIA effectiveness and efficiency is to ensure that the assessments focus on significant impacts. To meet this criterion, most countries have adopted two important steps in their EIA process. The first step, screening, refers to the process "to determine whether or not a proposal should be subject to EIA and, if so, at what level of detail" (IAIA 1999). One of the screening procedures used around the world is a typology list that defines the types of projects that require an EIA. The lists are often too rigid, which limits their ability to filter out the actions that would not generate significant environmental effects, and thus, a wide range of actions must complete the analysis. Otherwise, the lists are too prescriptive, and thus, many investments that could generate significant effects get filtered out as they don't meet the criteria stated in the typologies.

Scoping, the second step, is the process of identifying the environmental and social issues that are likely to be significant and relevant to address in the EIA and eliminating the issues that are of little concern (Rathi, 2021). The scoping phase aims to distinguish the impacts of a specific action likely to be significant from those that are not. Glasson et al. (1999) define scoping as "determining, from all a project's possible impacts and from all the alternatives that could be addressed, those that are key, significant ones," which should be subject to further assessment.

3. Methodologies for Scoping and Assessing Environmental Impacts

Screening and scoping of EIA varies by country. In many cases, the EIA scoping is based on generic terms of reference or terms of reference prepared by governmental officers that could include nonsignificant impacts or filter out the most significant environmental and social impacts of investment projects. Several scoping methods have been developed since the 1970s, including the following.

The **Checklist Technique** includes lists that usually cover all possible significant impacts of investment projects. The checklists usually take the form of questionnaires to elicit the necessary information about investment projects. Some checklists include a list of environmental and social impacts per type of project.

The **Matrix Technique** includes checklists and summaries of impacts assessed. The matrices link a particular environmental aspect to a specific action of the development project and, in a way, explain the nature of the impact. The Leopold Matrix (Leopold et al., 1971) consists of a matrix that weights each particular environmental and social aspect to the specific actions or activities of the development project and explains the nature of the resulting impact. The procedure is centered around a large matrix containing 8800 cells; the horizontal axis has 100 columns for development characteristics representing activities that might cause positive or negative environmental impacts.

The **Network Technique** includes determining interrelationships among the different aspects of the affected environment and identifying the flow of energy or impact throughout the environment resulting from investment projects. There are different types of networks, such as sequence diagrams, directed diagrams, or impact trees. The networks can be used to show both temporal and spatial flows of impacts.

In Overlay Techniques, now supported with the Geographic Information System (GIS) software, individual impacts, such as the effects on soil, water, settlements, and noise, are individually summarized and clearly highlighted by mapping over the area using choropleths (shaded zones) to indicate the relative intensity of the impact. By this technique, the individual maps are transferred onto transparencies, which are then

laid over one another to produce a composite effect. Thus, the individual effects are summed up to show the total impact of the project.

Qualitative environmental and social impact assessment methods based on professional judgment valuation. These methodologies focus on the evaluation of the impacts by assigning importance values (based on professional judgment) to the environmental and social parameters and quality scores. Robu (2003) defines the importance units for the selected environmental components to be considered with values changing between 0 and 1 according to the number of environmental impact parameters in the category of the selected environmental component (Robu, 2003; Robu et al., 2007).

Usati et al. (2013) introduce the method where environmental quality categories are assigned to each environmental quality class with the definition of the actual state of the environmental component/element. Following the determination of the quality classes for each parameter of the environmental component/element, the environmental element quality scores are determined as the summation of the quality scores. The scores are based on professional judgment estimates of environmental status from 1 to 6. Status 1 is given when an activity or project is not influencing the environment, while status 6 corresponds to an environment degraded and not suitable for preserving flora and fauna (Usati et al. ,2014).

Ortiz et al. (2018) use a multi-criteria decision analytic (MCDA) approach for environmental impact assessment, which relies on impact prioritization (with input from stakeholders' views) divided into four main phases: (1) creating the stakeholders' platform; (2) making a preliminary identification and assessment of impacts; (3) categorizing impacts; and (4) assessing and prioritizing negative impacts using MCDA. Ramos-Quintana et al. (2018) tailored the Driving Force, Pressure, State, Impact, and Response method (DPSIR) to construct a causal pathway of environmental impacts and responses.

The criteria and indicators used to determine the significance of environmental impacts in ESIAs at the screening and scoping stages vary by country and region. Assessing the significance of environmental impacts in ESIAs in low and middle-income countries can be challenging due to various factors, including limited regulations that define maximum thresholds for acceptable changes (resettlement, biodiversity loss, dam safety, accidents, and others) and availability and quality of baseline data. **Economic analysis of environmental impacts**

Economic analysis translates the multiple effects of a project into monetary values, which allows for the comparison of disparate impacts using a common, well-established metric. Through different methodologies, economic analysis can quantify the environmental impacts of investment projects, including human health (mortality and morbidity), ecological improvements (market products, recreation activities, and aesthetics), or reduced material damages (EPA 2016).

Monetization enables the comparison of economic values in a common unit, facilitating the identification of significant impacts in ESIA scoping. At the core of economic valuation lies the concept of welfare economic valuation, which involves assigning monetary values to the impacts on human well-being and overall societal welfare caused by environmental changes. This approach allows for a more nuanced and quantitative assessment of damage associated with environmental impacts of projects.

Several methods for economic valuation are based on people's_behavior. Below, we describe some of these methods.

- Hedonic Pricing examines the impact of environmental quality on market prices, particularly in the real estate and labor markets. By analyzing property values in relation to environmental characteristics (e.g., air quality, water quality, natural amenities, or land contamination) or the differences in wages of people exposed to different environmental and occupational risks, the implicit prices people are willing to pay for specific environmental amenities or the compensation value for increased environmental health risks in the workplace can be estimated.

- Averting and mitigating behavior is based on the premise that people acknowledge the existence of a risk and take measures to mitigate it. This approach infers the value of environmental quality from an individual willingness to pay for avoiding, preventing, or mitigating the effects of negative environmental changes.

- The travel cost method is mainly applied to ecosystem services contributing to recreational activities and assumes that the valuation of an ecosystem service site is directly linked to the price an individual is willing to pay to visit a recreational site. This method is different from the contingent valuation described below, as people's behavior is observed in real markets rather than hypothetical situations. Stated-preference techniques, including contingent valuation and choice modeling, involve estimating the willingness to pay individuals for a specific environmental improvement.

- Contingent Valuation Method involves asking hypothetical questions about environmental outcomes and the highest amounts individuals would be willing to pay to reveal the monetary value placed on environmental quality.

- Choice modeling requires respondents to choose and rank their preferred options from a set of alternatives made up of a combination of attributes that describe an environmental outcome. Implicit prices are estimated for each attribute, reflecting the people's willingness to pay for them (Baker & Ruting, 2014).

Other techniques include:

- Damage Cost Avoided methodologies estimate the economic value of preventing or mitigating environmental damages. They estimate the costs that would be incurred if the environmental damage were not addressed.

- Restoration cost estimates the cost of restoring the environment to its original state after it has been damaged. While like the Damage Cost Avoided approach, this method focuses on the expenses involved in restoration efforts rather than costs to avoid environmental damage.

- Benefit Transfer involves applying economic values derived from existing studies to similar environmental impacts in different contexts and geographical areas. It allows for the estimation of values when original primary data is not available.

Using estimates of the value of statistical life, economic valuation has led to estimates of the global cost of health damages associated with air pollution of about $8.1 trillion every year, which is equivalent to 6.1 percent of global GDP. Economic valuation of lead exposure impacts and cadmium exposure on human health resulted in estimates that amount to $10.35 trillion every year and from $2.8 to $5 trillion per year respectively. These estimates underscore the potential to use economic valuation to quantify and rank the environmental impacts of activities.

4. Conclusions

In many LMICs, the identification of significant impacts in EIA scoping currently relies on the professional judgment of those preparing and approving the ESIAs. Economic valuation of impacts makes it possible to quantify and rank the environmental impacts of investment projects. By assigning monetary values to environmental impacts, economic analysis can complement other methodologies and approaches used to assess the significance of a project's impacts. The quantification of environmental impacts is an evolving process that may require iterative adjustments based on new data, feedback, and changing project conditions.

Economic analysis has several advantages, including an extensive body of theoretical and empirical advice to support it and its potential to provide economic valuation associated with goods and services that are traded in the market (e.g., extraction of natural resources or paid recreational services), as well as non-market goods and services (e.g., health and ecosystem services). Economic analysis can further provide insights into distributional impacts among different stakeholders, including the poor and vulnerable groups. Further, expressing environmental impacts in monetary terms can lead to more effective communication among stakeholders as impacts may become easier to understand, particularly for those affected communities. This information can help understand the potential effects of a proposed project and its contribution to a Just Transition and a livable planet.

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Universalization of basic sanitation versus environmental licensing and IA

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Introduction and Contextualization

In 1981, the Brazilian National Environmental Policy, Law No. 6,938, listed among its instruments Environmental Impact Assessment (EIA) and Environmental Licensing (EL), without immediate specific regulation.
In 1986, the National Environmental Council (CONAMA), through CONAMA Resolution nº 001, established criteria, definitions, responsibilities, and general guidelines for the application of EIA, to be prepared in the format of an Environmental Impact Statement (EIS) and its Report of Impacts to the Environment (RIE) for activities, undertakings or projects that modify the environment, as an integral element of its Environmental Licensing process.
In 1997, the same council, through CONAMA Resolution No. 237, sought to provide more precise guidance on Environmental Licensing, which had not been regulated until then, defining environmental studies as any study on environmental aspects that subsidizes the analysis of the required license. The Resolution emphasizes the need to prepare an EIS-RIE in the case of licensing of activities that actually or potentially cause significant degradation to the environment, which will be publicized, and a public hearing will be held, when appropriate.
In the last few years, a series of proposals for regulating Environmental Licensing were taken to the National Congress, including the General Licensing Law, PL nº3729/04, approved by the Chamber in mid-2021, which is still awaiting approval from the Senate.
Brandão and Gallardo (2023) carried out a historical documentary analysis of the proposals for regulating Environmental Licensing and the authors highlight that, regarding this version, there is the fact that the mandatory Environmental Licensing of projects related to water and sewage treatment plants has been removed, which can pose serious risks to the environment.
It is valuable to make it clear that, in Brazil, basic sanitation is related not only to sewage systems but also to drinking water systems.
In this sense, it must be recognized that water and sewage services are fundamental factors of public health and basic living standards, and their global universalization represents one of the most essential struggles of the 21st century. Sanitation prevents diseases and promotes human dignity and well-being, in addition to being fundamental for economic development.
The 2030 Agenda established by the United Nations (UN) in 2015 determines the 17 Sustainable Development Goals (SDGs), among these objectives are water and sewage, with the aim of ensuring the availability and sustainable management of water and sanitation for all until the year 2030.
In Brazil, the quality of water supply and sewage services is still deficient and unequal; the universalization of these services in the country represents a major challenge. According to the 2022 Basic Sanitation Ranking, carried out by Instituto Trata Brasil, in the 100 largest cities in the country alone, there are still around 35 million people who do not have access to treated water and 100 million who do not have sewage collection and, in practice, less than half of the sewage collected is treated.
There is another aspect to emphasize when (not) applying impact assessment to basic sanitation projects as we consider climate changes and the challenges they bring to this sector.

This work aims to highlight environmental impacts commonly identified in Environmental Impact Statements specifically for Water Treatment Plants, the mitigating and compensatory measures presented, among other relevant information and concerns regarding the projects, and thus, contribute to the discussion on the exemption of these projects from undergoing an Environmental Licensing and an Environmental Impact Assessment process.
The methodology used involved bibliographic and documentary review, in addition to analysis of Environmental Impact Statements and their reports referring to proposals for water treatment plants. Two reports were used in this stage.
Another research is being developed, doing the same analysis on sewage treatment plants studies. There will be a final paper putting both analysis together and providing a wider discussion on the topic.
Key-words: basic sanitation; drinking water; water treatment plants; Environmental Impact Statement.

Results and discussion

WTP Tanque – Itabira, Minas Gerais (MG)

The study presents locational alternatives for the installation of the project, including a list of pros and cons for each of the locational alternatives, showing data on river intake flow rates, kilometers of pipeline that would be necessary, as well as the regions through which this system would need to be built. This type of thinking is also extended to the intake alternatives, considering the terrain geometry and the pumping stations that would be necessary for transporting the water.
Another important point is the analysis of environmental interferences that should be avoided through the survey of presence of components in this region, such as indigenous peoples, traditional communities, cultural heritage sites, and others. Finally, after all these surveys, a comparative matrix is created, in which the best alternative is chosen and marked as recommended by the study. This choice reconciles both the best routes and the smallest impacts, arriving at the intersection between what is economically viable and ecologically less invasive.
The study also presents the measures that must be adopted when the treatment plant is already in operation, discussing the impacts that will occur, whether in the emission of liquid effluents, atmospheric emissions, noise, and solid waste, foreseeing that the sludge will be thickened and dewatered in geotextile bags and subsequently properly disposed of, without detailing how this disposal would be carried out.
In the EIS, information is presented about the climate, air quality, noise, rocks, terrain, water resources, soils, fauna, flora, health, education, sanitation, housing, and economy of the region.

WTP Itapoá, Santa Catarina (SC)

Regarding the EIS of the Itapoá Water Treatment Plant in SC, the document begins with the motivations that led to the proposal for the construction of the project, including production and pumping deficits, reservoir deficits, intermittence during summer periods, absence of an effective loss reduction program, and deficiencies in operation and maintenance activities.
The study describes the possible impacts generated by the activity, in addition to specific impacts, showing the areas of influence, evaluating locational alternatives, diagnosing physical, biotic, and socioeconomic aspects, as well as proposing measures for prevention, mitigation, and/or compensation of negative impacts and measures for enhancing positive impacts.
Regarding locational alternatives, the study demonstrates concern regarding the Ombrófila forest areas in the region, which limit the locational implementation possibilities of the plant. The location was chosen considering the insufficient quality of soil on the banks of the Saí-Mirim

River (alternative 1), being the defined location strategically well-positioned from a water distribution perspective.
Regarding fauna and flora, concerning birds, some species found in the region are threatened of extinction; therefore, as a mitigation measure, plans for the recovery of the riparian forest near the WTP site were proposed, as well as the annotation of areas with native forest for environmental compensation, accompanied by a two-year environmental monitoring program of wildlife species.
Table 1 presents some of the negative impacts highlighted from the two reports and the mitigation/compensation actions and programs listed to each of them.

Table 1 - Main environmental impacts and mitigation/compensation actions listed in EIS-RIE's of water treatment plants.

IMPACT	MITIGATING, COMPENSATORY AND/OR CONTROL
Disturbance/driving away/death of animals	Assist employees with how to proceed in the presence of native species
	Adoption of measures that seek to reduce noise levels, control and organize the traffic of trucks, people and machinery
	Implement an Environmental Education Program, aiming to raise environmental awareness of workers and the surrounding population
Suppression of vegetation cover	An area of the same size as the one removed, in the same region, will be compensated with forest replacement
Change in air quality	Measures to minimize or even avoid the occurrence of this impact involve: controlling emissions in land preparation and cleaning activities, in the movement of materials, equipment and cargo vehicles, through moistening work areas, washing truck tires when exiting the project onto public roads, and regulating vehicles in accordance with standards, which must be detailed in the Environmental Management Program
Increased noise and vibration levels	As a way of minimizing impacts related to noise, it is suggested to monitor the sound propagation of the flow of vehicles around the WTP to neighboring residential areas. It is also important that periodic maintenance is carried out on transport equipment
	The operation of the equipment responsible for capture and flocculation takes place in a closed environment and during the daytime
Change in soil quality	Mitigating measures relate to controlling the generation and adequate final disposal of solid waste and effluents. For this purpose, it is suggested to use areas containing designed waterproofing and drainage systems, to prevent waste generated by civil construction, handling of products for supply and maintenance of vehicles and equipment from reaching the ground. In addition, periodic maintenance must be carried out on machines and equipment to prevent oil and grease spills

Change in the landscape	There are no mitigating measures in relation to the impacts on the landscape resulting from the implementation of the project
Soil erosion/instability	The project must be implemented in progressive stages, in order to reduce soil exposure to the erosion process
	Minimization of soil movements during rainy seasons or times
	Implement environmental protection devices that prevent silting
	Promote the maintenance and cleaning of watercourses and natural drainage
	Implement Erosive Process Control Program
Change in the quality of water resources	Control of the generation and adequate final disposal of solid waste and effluents arising from activities carried out on the construction site. It is suggested to use areas containing designed waterproofing and drainage systems. In addition, periodic maintenance must be carried out on machines and equipment to prevent oil and grease spills
	Carry out periodic maintenance on the operational system, in order to maintain the characteristics of the effluents within permissible standards (CONAMA Resolution 357/05 and CONAMA Resolution 430/2011)
Risks of work accidents	It will be necessary to implement a Social Communication Plan, aimed at disseminating information about the project to the population of the region, enabling the insertion of criticisms, expectations, suggestions and local demands
	Employees must be required to use PPE (Personal Protective Equipment)
	Machines, equipment, systems and other installations that operate automatically must contain devices that interrupt their operation when safety limits are reached
	Access to machine and equipment operating areas will be permitted only to authorized people
	Each machine or equipment that operates on electricity must have an emergency key or stop button
	All electrical installations must be adequately protected against occasional impacts from water, dust, animals and the influence of chemical agents
	Starter keys for machines and equipment must be stored and protected against accidental activation
Generating expectations in the community	It will be necessary to implement a Social Communication Plan, with the same goals of the one mentioned previously

Conclusion

Thinking about contributing to the debate on the possibility of exemption for water treatment plants in the Environmental Licensing with Environmental Impact Statement, when analyzing the EIS-RIE's of the WTP Tanque and WTP Itapoá, it is possible to highlight:
- the concern with the locational alternatives of the project. Considering the longitudinal extension of the water bodies, there are many possibilities for the location of the WTP itself and the point of water intake to capture river water. Speculating on a project in which there is no need to conduct these studies, the chosen alternative will be the most financially favorable.
- also regarding location, another concern is with peoples, villages and protected areas near these locations. The studies listed locational possibilities and selected the one that presented the lowest number of environmental impacts, demonstrating that the non-performance of these studies would most likely result in (avoidable) environmental degradation.
- another important factor is the counter proposals for mitigation and control of the predicted environmental impacts.
There is another thing that is, it was expected that there would be a greater concern regarding the sludge generated by the plants, which was scarcely commented on in both studies. Treatment plants sludge has been a topic of discussion but rarely treated with attention. If Environmental licensing and impact reports are dropped out, this topic might be even more neglected in new projects.
By the end, with the proposals of monitoring programs and mitigating measures, WTP's can fulfill their role of treating and providing better quality water to the population while also not negatively impacting the environment.
Universalization is an urgent need in basic sanitation services, but putting the environment in risk just because of distributing treated water is not a valuable argument, mainly when we see all the climate and global changes impacting on the availability and quality of water, at the same time we see heavy rains bringing so many damages and even diseases to people, reinforcing the role that Environmental Licensing and Impact Statements must play.

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No Longer at the Margins:

Unlocking Potential of Informal Waste Pickers for Inclusive and Climate Just Solutions to Solid Waste Management

Varalakshmi Vemuru, Harjot Kaur and Geetika Hora[1]

In the world of informal waste pickers, there are two coexisting and somewhat conflicting realities of formal recognition as green agents in some countries and a continued discrimination and precarious existence in others. As very few people have access to formal waste collection, these informal waste collectors support climate change mitigation by helping to collect waste and unclog landfills. Some countries have modified and adapted their legal and policy environments to formally recognize the work of informal waste pickers as being integral to solid waste management systems. Waste pickers have organized themselves into collectives, cooperations and networks to help their members in accessing crucial services, but more importantly, are also constantly negotiating for a seat at the table in solid waste management policy fora. In contrast, millions of informal waste pickers continue to roam streets in search of waste and throng landfills to extract recyclable waste in extremely hazardous conditions, wear no protective gear and often face strong restrictions and punitive actions. Women and children are engaged in overwhelmingly large numbers in waste picking and are exposed to exploitation and violence. There have been several policy reforms in the recent years, but the bigger question is how to translate policy shifts into actual improvements in the work conditions and well-being of informal waste pickers? In this topic that is so clearly caught between elements of continuity and change, we aim to spark a dialogue around some of the potential priorities for development agencies to consider as they put their financing and negotiating capacities into increasing number of solid waste management programs across the world.

The Solid Waste Management Challenge: Promoting inclusion alongside shifts towards formalization and mechanization.

Informal waste pickers at the landfill site in Dushanbe, Tajikistan talking about their

Those who contribute the least to generating waste are most at risk from its adverse effects. According to the World Bank, the world generated 2.24 billion tons of solid waste and projected to increase to 3.88 billion by 2050. The high-income countries account for a staggering 32 percent waste generated while they account for only 8 percent of the world's population. However, a welcome shift is that Solid Waste

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Management (SWM) has been finally recognised as one of the significant solutions in the global climate action tool kit - expanding its significance from just a decarbonising pathway to an effective lever of a 'just green transition'. It has also emerged as a critical source of livelihood for some of the poorest, most disenfranchised, and at climate-risk demographics. It is estimated that almost 20 million people across the world are engaged in informal waste picking and recycling. This engagement is mostly informal in nature, and involves work in extremely hazardous conditions, devoid of adherence to safety protocols and regulations. Countries across the globe are looking to transition their SWM systems embedding more efficient, resilient, and sustainable practices. While this is good news, the global discourse must commit itself equally to focusing on the associated human capital, especially the informal waste pickers who face acute stigma and remain on the social, economic and spatial margins. They need to be harnessed into a more skilled and empowered workforce, requiring shifts towards a more formalised, regulated and just work environment, especially for women who are at increased risk of gender-based violence both in their families and at their workplace.

What has shifted the needle on informal waste pickers' inclusion? Three areas of dynamic change

There is no dearth of innovative programs, progressive legislations, and waste picker-led movements in different parts of the world. Most of these 'wins' have been hard fought ones, in contexts that were unsupportive of the roles of informal waste pickers. In this section, we mention three broad areas where there has been dynamic change.

Legal recognition of informal waste pickers through policy and legal reform. There are countries which have changed or adapted existing laws to officially recognize the work & roles of waste pickers in waste management. For instance, in a landmark ruling in 2011 in the Constitutional Court of Colombia, the rights of informal recyclers were formally recognized requiring the State to adopt measures for recyclers' rights to health, education and food and other social services. It also pushed for policy change to include recyclers in Solid Waste Disposal Programs of collection, classification, and marketing of inorganic or recyclable waste. In South Africa, the government has changed its policy and developed new national guidelines for waste pickers integration in SWM systems. These guidelines provide for formal contract between the cooperative and industry/municipality and waste picker organizations by supporting them to bid for tenders; provision of space for sorting, storage, baling and possibly processing; and a comprehensive capacity building & mentorship program specifically designed to support waste picker cooperatives.

The power of organizing and collective strength. The compelling models of waste pickers coming together as cooperatives and enterprises across countries, in Brazil, Argentina, Colombia, India, and South Africa provide future pathways towards improved dignity, livelihoods and living conditions for many informal waste pickers and their families. From promoting access to social safety nets, health services and education to offering cost effective solutions to municipalities

for waste collection, sorting and recycling; the waste picker organizations have many achievements to show.

We found of great relevance, a unique model of Roma Entrepreneurship Development Initiative (REDI) in North Macedonia, which seeks to integrate estimated 5,000 informal waste collectors, largely from the Roma community, through a sustainable social enterprise approach. It established the "Waste Management and Collection Company - REDI Recycling" in 2020 and has since then pioneered primary waste collection systems in residential buildings and incorporated eco-friendly solutions such as electric tricycles for waste collection. It has established its footprint by securing collaborations with multiple municipalities in the capital, Skopje, aligning itself with waste management laws and impacting 60,000 individuals of the city. In Pune city in India, the municipality signed a contract with a waste picker organization to become service providers for the door-to-door collection of waste. In 2023, around 4,300 SWaCH volunteers collected garbage from about 80 per cent of the households, collecting almost 600 tons of MSW per day. This saved the municipality over INR 150 million per annum in waste handling costs alone apart from the dignity and better working conditions to the waste pickers.

Waste Picker Organizations in Brazil won a large, prestigious contract in 2014 and put the potential of waste pickers in global limelight.

The Movement of Brazilian Waste Pickers (MNCR) saw positive results of its efforts to integrate waste pickers in recycling services of the country when close to 840 waste pickers organized in cooperatives were contracted to manage waste from 12 football stadiums across the country during the Football World Cup in 2014.

Getting Waste Pickers their Due: Efforts for Regulated and Safe Work Conditions. Formal and dignified work arrangements for waste pickers include options to formalize their work, formulation of policy and legislative reforms towards more regulated work hours and wages, defining safety protocols, registering them for social benefits and entitlements, health insurance, prevention of child labor and policies to prevent Sexual Exploitation and Abuse. However, these demands have been met with varying success and promise. In Tanzania, the World Bank worked with other partners and the government to develop a sanitation worker guideline, which included waste pickers, to ensure adherence to labour laws and improved working conditions. Government of India's National Child Labour Project (NCLP) seeks to withdraw and rehabilitate children engaged in hazardous work by linking them to education and healthcare.

How can the development agencies support & scale-up the ongoing work?

In their role as donors & partners with governments in supporting large scale interventions, especially in low-income countries, the development agencies need to demonstrate greater commitment to ensure dignity and recognition for informal waste pickers not just through influencing policy but also through

innovative projects with cutting-edge interventions. Below we explore some of these options which offer tremendous promise and potential.

Support the collection, collation, and dissemination of marginalized voices through social dialogue and impact assessments. If programmes around SWM are not sufficiently tracking impacts on informal waste pickers in their interventions, it is important to ensure that social assessments prior to program design recognize and elaborate upon informal waste pickers as critical stakeholders. This needs to be further integrated into the monitoring and evaluation systems. Beyond project boundaries, supporting dedicated research and social inclusion studies can help bring out the range of challenges, but also the crucial potential of informal waste pickers in green and inclusive solutions to SWM and climate change. These can be used as advocacy and sensitization tools with governments. It is also useful to build on insights from select promising practices from across the world, but especially from the developing countries which are experiencing staggering population growth and urbanization.

Forge unique partnerships and collaborations between civil society, policymakers, and the private sector to discuss emerging trends and solutions towards inclusive SWM systems that integrate roles of informal waste pickers. The aim should be to spark new dimensions for delivering climate justice and social inclusion through the solid waste management sector.

- *Sensitizing and enhancing capacities of governments and public sector organizations.* Organizing trainings and promoting effective use of primary research and social assessments which highlight not just numbers, but also challenges faced by informal waste pickers and effective forms of engagement in SWM and might make for some powerful sensitization material.

- *Policy influencing for consensus building on role of waste pickers.* The practical challenges of dealing with and exploring models to integrate role of informal waste pickers into formal SWM systems leads many governments to resist exploring their engagement in more formal ways. Bringing to their attention some of the models that have been tried in other countries will encourage peer to peer learning and motivation.

- *Supporting small-scale waste picker organizations* that are looking to graduate into social enterprises and 'green businesses' will require comprehensive package of interventions including assuring flexible and reliable finance, technical capacity enhancement, incubation and mentoring support, while also looking at shifts in policies and legislations for such enterprises to operate effectively and go to scale.

Ensure financing for integrated as well as stand-alone interventions to support informal waste pickers. Since 2000, the World Bank has committed over $4.7 billion to more than 340 solid waste management programs in many countries. Financing has bene for developing state-of-the-art waste management systems; supporting major waste producing countries to reduce consumption of plastics and marine litter through comprehensive waste reduction and recycling

programs; and reducing food waste through consumer education, organics management, and coordinated food waste management programs. Each of these proposed solutions must address the impact on informal waste pickers and explore opportunities to strengthen their engagement for livelihood opportunities and well-being. Some of these are discussed below:

- *Skilling of informal waste pickers for enhanced livelihood opportunities and of private and public agencies to employ and retain them.* The importance of climate change and the jobs agenda for the World Bank presents a great opportunity to enhance labour market capacity of the SWM sector leading to 'triple wins': creating employment opportunities, contributing to environmental protection, and improving public health. These are welcome shifts and need to be backed with funding and taken to a wide range of stakeholders for dialogue and then subsequently translated into actual programs. Specific focus on women's economic empowerment can be explored, given the bold and ambitious vision of new World Bank Gender Strategy.

- *Interventions to improve work conditions.* World Bank's programs in Jamaica, South Africa and Tanzania offer insights and impacts of defining strong labor management procedures for ensuring regulated working conditions for sanitation workers and using these project-level opportunities to influence larger policy ecosystem towards safety and dignity of sanitation workers. Few projects on SWM are under preparation and immediate dialogue and effort to tap into existing good practices on inclusion of waste pickers can allow for timely inclusion of interventions, budgets and institutional mechanisms.

Getting citizens informed and involved. The stigma and exclusion from poorly informed citizens break the morale and trust of informal waste pickers. However, efforts such as in Latin America and India where campaigns, interactive platforms, inviting waste pickers to schools and colleges to talk on topics such as a green solution to waste management, inclusion in circular economy and climate change have acted as huge 'morale boosters' for waste pickers. Their demand for dignity above everything else needs to form the core of such efforts.

World Bank's Environment and Social Framework has evolved from earlier safeguard policies with focus on 'minimizing social risks' to enhancing social and gender outcomes of the projects. While the ESF already provides for identification of these workers as 'vulnerable groups' and encourages development of mitigation measures there is a strategic need for a 'social dialogue amongst all stakeholders (municipal organisations, communities, innovators, policy makers, social scientists) and application of social impact assessments to first plug the knowledge gap and mainstream the conversation about the 'collective social impact' on the target population through an inclusive design blueprint.

Through this paper, we hope to provoke interest and commitment towards evolving an inclusive and climate-just pathway for informal waste pickers. If the

recent efforts of waste picker organizations and networks are anything to go by, they are well-poised to make their voices heard and potential felt. Are we ready?

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Sustainability and regional assessment in next generation impact assessment

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Summary:
The paper introduces sustainability-based next generation regional assessment and considers relevant Canadian experience.

Introduction:
Regional assessment is an area of long recognized and too rarely realized potential. This paper is about how regional assessments should be done as a key component and venue of next generation impact assessment. While next generation impact assessment is a loose concept open to various framings and emphases, it is essentially a consolidation of what we've learned and what we now need to address in impact assessment.

Regional assessment
Regional assessments are promising means of mobilizing strategic perspectives and tools to address four problems and opportunities beyond the usual capacity of project assessments:

- cumulative effects, and what to do about them;
- broad alternative options for development or conservation or some combination;
- consistent regional/strategic guidance for project planning and assessment (to ensure project contributions to desirable futures as well as to make project planning and assessment easier); and
- mobilization of more comprehensive tools, including continuing governance arrangements, for facilitating just transformation, protection and rehabilitation.

In Canada, we have as yet too few exemplary models within the assessment realm, but we have decades of equivalent experience in regional and sectoral planning (e.g., for forest management, electric power systems, urban growth management) and in *ad hoc* applications.

Sustainability-based next generation impact assessment - foundations
Next generation impact assessment is a consolidation of learning from two overlapping sources. The first is our 50+ years of IA experience about what works, what needs repair and what needs belated application. The second involves major new global understandings and obligations – especially those centred on dynamic complex systems and unsustainable trajectories – that we must now apply in assessments.

Lessons from 50+ years of IA experience
The multitude of lessons from IA assessment experience so far do not fit in a short list, but the following points are indicative of their range and interdependence. Effective, efficient and fair impact assessment relies upon

- law-based requirements with clear core processes and substantive expectations;
- flexibility to address the diversity of undertakings and contexts at the project and regional/strategic levels;
- comprehensive scope covering all key effects and their interactions;
- early initiation;

- comparative evaluation of alternatives;
- credibility: rigour, timeliness, impartiality, transparency, open participation, fair administration, explicit criteria, reasons for decisions;
- effective follow-up;
- broad and continuous learning; and
- interjurisdictional collaboration.

Complex systems

We live in a world of highly complex systems with interacting components and endless dynamic feedbacks at multiple linked scales in which

- connections and interdependencies are at least as important as components;
- prediction of individual effects is only a step to anticipating interactions among effects and consequences;
- human interventions play major roles;
- uncertainties and surprises abound; and
- recognizing cumulative interactive effects is crucial, but only a start to identifying potentially viable futures, plausible pathways to them and adaptable strategies for combining just transformation with protection and rehabilitation.

Unsustainable trajectories

Much of what we are doing, locally to globally, is moving us deeper into unsustainability. Assessment today must help to reverse negative local to global trajectories including those of climate change, degradation of the biophysical foundations for ecological services, and conflict-inducing inequities (the result of most benefits from our already excessive exploitation of the biosphere going to those already most advantaged). Note that the three act together to make each other worse.

In that context, mitigating significant adverse effects is not nearly enough. Nor is balancing economic, ecological and social objectives. Instead, we need to align these objectives, reverse fatally trajectories, and foster mutually supporting initiatives and relations. Assessment must now deliver positive feedbacks – seeking best options for delivering multiple, mutually reinforcing, fairly distributed and lasting gains – through protection and rehabilitation of what's desirable and just transformation of what is not.

Sustainability-based next generation impact assessment: the package

The current working package of sustainability-based next generation impact assessment components has 14 categories.[1] They could be reframed as 41 or 10. In any framing, they constitute interdependent parts meant to incorporate the past lessons and current understandings/imperatives.

1. Sustainability-based purpose, scope and criteria for evaluations and decisions
2. Application in integrated, tiered assessments covering all potentially significant undertakings at the regional, strategic and project levels
3. Interjurisdictional cooperation, collaboration and upward harmonization
4. Respect for Indigenous knowledge, rights and authority and facilitation of reconciliation
5. Suitable streams for assessments of projects and regional/strategic undertakings of different character and significance

6. Meaningful public participation
7. Full-process learning
8. Early process initiation
9. Rigorous and credible impact assessments focused on cumulative/interactive effects and uncertainties
10. Comparative evaluation of potentially reasonable alternatives, including the null option
11. Credible, accountable and authoritative decision making for assessed undertakings, policy making and other core initiatives in the IA regime
12. Follow-up of compliance with conditions, effect predictions, and effective response to monitoring findings
13. Independent and impartial implementation and administration
14. Effective, efficient and fair process

All components have implications for why, how, when and where to do regional assessment.[2]

Key potential benefits of next generation regional assessments
The main advantages of regional assessment are tied to strategic-level capacities for effective attention to the big, neglected issues and imperatives listed above. Current unsustainable trajectories will bring increasing demands for these capacities, especially in regional transformation applications (e.g., to guide energy shifts to non-fossil options, rehabilitate degraded and climate-stressed lands or waters, and/or meet Indigenous rights obligations).

No less significant are the credibility and learning advantages of impartiality, transparency and meaningful public participation at the regional/strategic level.

Arguably, next generation regional assessments are among our best routes to medium to long-term effectiveness, efficiencies, fairness in assessment regimes and beyond. They can deliver credible and authoritative direction for many regional activities, not only project assessments. They can inform and complement other strategic-level initiatives (e.g., in energy, transportation climate change mitigation and just transition). If they provide foundations for better continuing governance arrangements, the gains may be more lasting. And if their successes encourage broader adoption, they can contribute to a culture of sustainability application well beyond the assessment realm.

The catch is that none of that is likely to be easy.

Key challenges/difficulties facing next generation regional assessment
Predictably, serious challenges and difficulties accompany the advantages. Next generation regional assessment is demanding. It looks across generations in a world of short-term incentives. It takes transformational imperatives seriously in times of increasing avoidance and hostility to demands for more disturbing change. It embraces complexity, uncertainty and surprise when simplicity, clarity and predictability are preferred. It emphasizes interactions and overall consequences in governance structures with fragmented powers, mandates, expertise and capacities. It adjusts to the diversity of regional concerns and possibilities, despite demands for routinization and manageability. And those are merely the broad conceptual tensions.

At the practical level are complex issues, inadequate information, limited experience, uncertain futures, conflicting jurisdictions, time constraints, governments' preferences for strategic level secrecy and expedience, and opposition to adding another layer of assessment.

None of these factors makes the agenda for regional assessments any less important. But they add pressures for capable delivery and demonstrable success.

Canadian regional assessment experience so far

Canada has legislated assessment requirements at the federal level, in all ten provinces, in all three territories and in several Indigenous jurisdictions. None of them includes a regional assessment regime as sketched out above. However, Canada has tested many near-equivalent models in regional planning, including in cases where major transformations have been needed (e.g., in regional growth management planning in Ontario and British Columbia, in conversion to more sustainable multipurpose forest management and in land planning and management with Indigenous governing authorities).

These have been accompanied by decades of experiments with diverse, ad hoc applications, mostly not called regional assessments but with similar scope, agendas and process principles. Particularly notable examples include the following:

- exceptionally large project assessments with major regional implications;[3]
- overlapping assessments of major projects and larger systems;[4]
- planning-based collaborative regional undertakings;[5]
- regional planning in the territories;[6] and
- special regional strategic assessments by independent, third-party panels.[7]

Since 2019, a few formal regional assessments have been authorized under the federal *Impact Assessment Act.* Of these, two parallel regional assessments on anticipated offshore wind development on the east coast are in progress and have issued interim reports.[8] Two more (on the health of a heavily-used portion of the St. Lawrence River in Quebec[9] and on proposed mining and infrastructure development in the remote Ring of Fire region of northern Ontario[10]) were initiated in response to requests from Indigenous governing bodies but have been suspended or slowed by jurisdictional conflicts or difficulties in negotiating terms of reference.

While no detailed analysis is possible here, one core lesson is evident. Despite the enormous diversity of regions, issues, scales, legal foundations, initiating and enacting bodies and delivered products, virtually all the completed cases have been characterized by a broad enough scope to qualify as sustainability-based, at least some inter-jurisdictional collaboration, attention to cumulative effects and alternatives, open consultative processes, impartial credibility, learning, strategic-level contributions and influence at the project scale. No less important given the difficulties identified above, all were possible.

Conclusions

In a world with 50+ years of IA experience, recognized complexity and unsustainable trajectories, regional assessment is highly promising and the roles to be played are crucial – for global as well as regional reasons.

Very little about regional assessment is easy. Especially in cases where regional assessments are needed most (transformation needs, weak or absent existing tools for managing regional cumulative effects, inadequate collaborative governance, poorly understood issues and options, tensions among key players) applications have been and will continue to be challenging. Nevertheless, the record of Canadian regional assessments and equivalents includes a diversity of remarkably positive achievements, even in quite challenging circumstances.

Ambition has been key. While many regional efforts under an assessment banner have focused on cumulative effects studies and stakeholder engagement, regional assessment equivalents have included innovative initiatives developing new regional growth management plans or guiding major transformation of policy and practice in managing watersheds, forests or energy systems. Most have taken many years and have been turning points in even longer deliberations. But they have demonstrated the possibility as well as the value of regional processes that address big issues, compare alternative futures and strategic options, and deliver transformational strategic-level guidance.

Regional assessments in Canada have also been increasingly collaborative, extending beyond federal/provincial cooperation to overdue inclusion of Indigenous governing bodies.

In general, the Canadian record reflects more frequent adoption of sustainability-based next generation assessment approaches, aiming to

- contribute to sustainability and embrace complexity, even when that language is not used;
- incorporate next generation procedural components – open, consultative processes, transparency, rigour, accountability, and follow-up – and respect their interactions:
- be effective – through sufficient ambition to deliver credible and influential strategic direction and support for project assessments and other initiatives; and
- be timely while also being realistic about time required for clarifying issues and options and building sufficient collective understanding and process trust.

Applications of the sustainability-based next generation assessment package across a diversity of cases with very different approaches, substantive issues and processes also indicate needs for flexibility.

Some future regional assessments may be reasonably well-focused and quick – where the process is sufficiently credible and builds on an established foundation of issue awareness, trust and capacity, and where a suitable governance structure is in place. Others will be considerably more complex – involving challenging research, deliberation and learning about current concerns and options including just transformations. Perhaps all will be increments in larger and longer processes informed by interim reports, continuing experiments, learning and governance adjustments.

With that combination – ambitious core principles/components, flexible specifics for diverse applications and a succession of mostly incremental accomplishments – regional assessments share the most plausible strategy for next generations' sustainability.[11]

Endnotes and references

[1] See A. John Sinclair, Meinhard Doelle & Robert B. Gibson (2021): Next generation impact assessment: Exploring the key components, Impact Assessment and Project Appraisal, DOI: 10.1080/14615517.2021.1945891.

[2] In the accompanying presentation slide deck, this list of the 14 next generation assessment components is followed by discussion of key tasks and roles for next generation regional assessments, and substantive and process/governance considerations for decision making on where to do next generation regional assessments.

[3] Successive examples of advanced, effectively regional assessment, covering the same region are the two assessments of major proposed gas pipeline projects in the Mackenzie Valley of the Northwest Territories – the Mackenzie Valley Pipeline Inquiry (the Berger Inquiry) completed in 1977 https://publications.gc.ca/site/eng/9.700299/publication.html and the Mackenzie Gas Project Joint Panel Review completed in 2009 https://publications.gc.ca/site/eng/9.651807/publication.html. Both recognized the proposed projects as undertakings with determinative regional implications, took a broad sustainability-based approach to their review (implicitly in Berger's case) and engaged in extensive public consultation, including formal hearings.

[4] One example is the overlapping assessments of Manitoba Hydro's Keeyask hydroelectric power dam project and the utility's provincial electric power system. See Manitoba Clean Environment Commission's review of the Keeyask hydroelectric generation project, http://www.cecmanitoba.ca/reports.html and the Manitoba Public Utilities Board's "Needs For and Alternatives To" review of Manitoba Hydro's "Preferred Development Plan" http://www.pubmanitoba.ca/v1/proceedings-decisions/mh-nfat/index.html electric power system plan.

[5] A notable example is the work of the Canada/Ontario Royal Commission on the Future of the Toronto Waterfront, led by David Crombie. The Crombie Commission recognized that dealing effectively with waterfront lake contamination depended on better management of the contributing watersheds, sewage and stormwater run-off systems, greenspaces and impermeable surfaces, associated land uses, etc. See the Commission's final report, Regeneration –Toronto's waterfront and the sustainable city (1992) https://publications.gc.ca/site/eng/9.699883/publication.html.

[6] Territorial land use planning results include those in the North Yukon, Peel Watershed and Dawson regions of Yukon [see https://planyukon.ca/] and the North Baffin Regional Land Use Plan [see https://www.nunavut.ca/land-use-plans/north-baffin-region-land-use-plan and the Keewatin Regional Land Use Plan, https://www.nunavut.ca/land-use-plans/keewatin-regional-land-use-plan in Nunavut.

[7] A regional strategic assessment with exemplary reputation for effective consultation, well-founded recommendations and evident practical influence despite a quick (1 year) and low-cost (modestly over $300,000) process is the Bay of Fundy tidal energy regional/strategic assessment, led by Meinhard Doelle and Joshua Leon. See their final report (2008) https://oera.ca/research/tidal-energy-strategic-environmental-assessment-bay-fundy-phase-i.

[8] For information on the Regional Assessment of Offshore Wind Development in Nova Scotia, see https://iaac-aeic.gc.ca/050/evaluations/proj/83514. For information on the Regional Assessment of Offshore Wind Development in Newfoundland and Labrador, see https://iaac-aeic.gc.ca/050/evaluations/proj/84343.

[9] For information on the Regional Assessment of the St. Lawrence River Area, see <https://iaac-aeic.gc.ca/050/evaluations/proj/80913>.

[10] For information on the Regional Assessment in the Ring of Fire Area, see https://iaac-aeic.gc.ca/050/evaluations/proj/80468.

[11] The accompanying presentation slide deck includes an appendix with 23 sustainability-based next generation regional/strategic assessment process design criteria.

Vision for creating a toolkit for proportionate considerations of health in SEA

(Abstract 285)

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Abstract

Health assessment requirements in SEA are usually not explicitly outlined in the environmental laws. The scope and approach of health assessment are subjected to case-by-case interpretations, resulting in a high diversity of assessment outcomes. In creating a toolkit to guide health in SEA practice, work is required in four major areas: interpretation of health, scoping for different levels and types of SEA, assessment approach and stakeholder engagement.

Introduction

Incorporating health considerations in Strategic Environmental Assessment (SEA) practice has become a hot topic. On the one hand, there has been rising awareness of the potential human health impact associated with environmental changes among the human health and impact assessment communities (Bond *et al.*, 2011; WHO Regional Office for Europe, 2022b). On the other hand, requirements for the consideration of human health have been implemented in international and local laws, such as the UNECE Protocol on Strategic Environmental Assessment to the Convention (United Nations Economic Commission for Europe, 2017) and The EU SEA Directive (European Parliament and Council of the European Union, 2001).

It is observed that there were many inconsistencies and divergencies in the considerations of human health impacts in SEA practices (WHO Regional Office for Europe, 2022b). In advancing SEA practices for better protection of human health, it is necessary to find a balance between the ideal coverage of human health impact and what could be delivered. In this think piece, I examined the contexts for including human health in SEA practice and suggested the key areas of work in developing a toolkit to guide health assessments in SEA. While it primarily references the European context, the arguments would also apply to other regions.

The connection between environment and human health impacts

Human health is defined as a "State of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (p.1, World Health Organization, 2020), and the physical environment has long been recognised as a determinant of health (World Health Organization, 2017). Environmental pollution is confirmed to be linked to the risk of developing various non-communicable diseases and premature death (European Environment Agency, 2020).

In recent years, the agendas regarding the relationship between the physical environment and health have been expanded. WHO is promoting the One Health approach to address human

health threats associated with human interactions with the physical environment (WHO Regional Office for Europe, 2022a). In addition to the disease risks caused by environmental pollution, One Health emphasises that the stress of the physical environment is closely related to threats and the benefits of human health. For example, the quality of ecosystem services and the flow of pathogens (WHO Regional Office for Europe, 2022a).

The broadened environmental and health agendas also highlighted the need for a change in the approaches to addressing the impacts on human health. The conventional approach of the source-pathway-receptor model is good at addressing impacts that have clear, identifiable sources and pathways. However, issues raised in the One Health initiatives illustrate that stressors caused by environmental changes have cumulative impacts and can impact human health directly and indirectly.

The requirements for assessing health impacts in SEA

Assessment of the impact of human health in SEA is required by international and local laws. The most notable one is the EU SEA Directive (Directive 2001/42/EC), which has been transposed to all EU countries. Annex 1 of the EU SEA Directive stated that environmental factors, human health, and their interrelationships should be assessed in SEA (European Parliament and Council of the European Union, 2001). Another international legislation, the UNECE Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context, explicitly puts environment and human health together in the text, which requires human health to be assessed and considered as part of the environmental impact (United Nations Economic Commission for Europe, 2017).

While the legislation requires human health to be assessed together with environmental impacts, the requirements of health assessment "emphasise the need for broad and comprehensive information on the factors and their interrelationship" (p. 30 European Commission, 2016). The law leaves much room for interpretation, particularly in two areas. First, the environmental laws do not define how the environment works as a health determinant, i.e. does it include the wider aspects of health, such as mental health and well-being or its interrelations with the social and economic determinants? Second, the scope or depth of the health assessment is not outlined. Numerous environmental subjects were identified in the text, including air, water and landscape; however, it is not a fixed list, and the assessment is described to cover other environmental and health subjects if applicable to the specific context (European Commission, 2016). It is up to the authorities and practitioners to identify what environmental and health impacts need to be assessed and how.

The inclusion of health in current SEA practice

Case studies revealed that there has been a significant variation in the assessment of health impact in SEA. A study by the WHO Regional Office for Europe (2022b) found that SEA cases had a high degree of diversity in the interpretation of health, such as the health determinants, analysis of health impact and discussion of health relationships. This diversity was suggested to be linked

to the requirements of the countries and regions, as well as the types of policies, plans and programmes that the SEAs were applied to.

Several observations were made in the cases described in the WHO Regional Office for Europe (2022b) case study report and the Impacts Hub website [1]. The environmental impacts on biophysical health were commonly assessed, but there was limited discussion of the analysis and determinants other than biophysical health (WHO Regional Office for Europe, 2022b). Overall, every SEA case developed its own scope of health and has different subjects covered in the assessment. In addition to the health risks associated with environmental pollution, the broader impacts identified could include safety, quality of life, education, employment, health services and other indirect health impacts.

Without further in-depth investigations, it is unclear how each SEA case determines its scope of health assessment. The variations seem to reflect the space of interpretation in the legislative requirements. While many of the cases have broadened the interpretation of health determinants, many subjects in the latest health initiatives are still missing or have rarely been included, such as actions of health equity, antimicrobial resistance and further pandemic prevention.

Vision for the creation of a toolkit

The goal of creating a toolkit for assessing human health impacts in SEA is to support healthy Policies Plans and Programmes (PPPs) by providing guidance on assessing health, delivering health objectives and incorporating health in the decision-making process. Four main areas need to be worked on:

First, it needs to have an agreed interpretation of the environmental determinant of health. The foundation of health assessment is to identify the connection between environmental and health impacts. While most of the SEA follows the health definition in the WHO constitution (WHO Regional Office for Europe, 2022b), the role of the physical environment in the physical, mental and social well-being is not explicitly defined. Cases show that the interpretations of health determinants fall into a spectrum, from narrowly limited to biophysical to wide determinants of mental and social health. There is currently no standard on where health in SEA should be placed in this spectrum, and health is interpreted on a case-by-case basis. An agreed interpretation would be essential for both the authority and the practitioners to identify the health determinants and outline the criteria of the assessment.

Second, there is an ample need to create scoping guidelines for health assessment for different levels and sectors of PPPs. In SEA practice, health assessments should be proportionate. As such, scoping of health assessments should consider the requirements, local context and nature of the specific SEA. As shown in the case studies by the WHO Regional Office for Europe (2022b) and other cases on the Impacts Hub website, the level of SEA (i.e. national, regional or local) and sectors (e.g. land use, transport, energy) are key elements in diverging the scope of health

[1] https://www.impactshub.com/case_studies/

assessments in the cases. Currently, the SEA guidelines tend to be generic in providing arching principles (e.g. the guidance of the EU Directive). These arching principles should be transposed to fit the needs of the different types of SEA, particularly the health objectives and scale of health impacts they apply.

Third, the assessment approaches of environmental and health impacts should be revised. The environmental and health impacts conventionally adopt a source-pathway-receptor model. This model would not be sufficient to assess complex or communicative impacts of environmental changes. The latest drafted notes for the implementation of the UNECE SEA Protocol suggested the use of the Driving Force, Pressure, State, Exposure, Effect, and Action (DPSEEA) framework on more complex health assessments while keeping the overall approach balanced (United Nations Economic and Social Council, 2023). The DPSEEA framework is commonly used in Health Impact Assessment practice (Briggs, 1999), but there are limited empirical studies on designing or adopting the different assessment approaches in SEA. Finding a proportionate and balanced approach requires further research studies and discussions between authorities and practitioners.

Fourth, there needed to be extended engagements with stakeholders, including the authorities and the public. With SEA taking into consideration broadened health subjects and social aspects of the health impacts, it requires a wider range of information and expertise. The latest drafted notes for the implementation of the UNECE SEA Protocol highlighted the need for consulting with extended environmental and health authorities to establish cross-sector involvement in the SEA process (United Nations Economic and Social Council, 2023). The need for further public involvement is less discussed. The Aarhus Convention protects the individuals' rights to access to information, public participation in decision-making, and access to justice in environmental matters. The content of the convention should also be interpreted as applying to health issues (Ebbesson *et al.*, 2014). With wider health determinants to be assessed in SEA, a corresponding extension of public engagement would be necessary.

Conclusion

There has been growing concern about the wider connection between environmental and human health. It is challenging for SEA to extend its scope and apply appropriate assessments of human health impacts. While international laws require the assessment of human health in SEA, there is much room for interpretation, and case studies found a high degree of diversity in the definition and scope of health in current SEA practice. Creating new guidelines and toolkits is essential in effectively addressing health impacts in SEA. It is suggested that much work is needed in the interpretation of health, scoping for different levels and types of SEA, assessment approach and stakeholder engagement.

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Baffled systems or culturally competent assessment?

by Jane Munday

Introduction

Mining and major projects disturb large amounts of land to which First Nations people hold enduring relationships. As a result, First Nations groups are demanding more control over the means by which these impacts are assessed, a greater share of the benefits, and devolved decision-making that respects the worldviews and knowledge systems of those most affected by development.

The stakes may be high, quite apart from the disturbance to country and values. The inability to influence decisions can create a sense of powerlessness, compounded by histories of colonisation and cumulative disempowerment.

Decolonising impact assessment, therefore, means First Nations peoples gaining agency or self-determination, in line with the Aashukan Declaration (IAIA Montreal 2017). Fundamental to self-determination is culturally competent impact assessment, which requires:

- impact assessment practitioners with the skills, knowledge and aptitude to work empathetically and ethically in intercultural settings
- shared decision-making that draws on cultural authority
- First Nations controlled or co-managed impact assessment systems.

Advances aligned with these goals include cultural impact assessments, community-led assessments, holistic research that blends western science with First Nations worldviews, and a growing trend to First Nations exercising sovereignty through their own community-led projects.

The final step in decolonising impact assessment is overcoming the cultural deficits (Howitt et al. 2013) of regulatory systems baffled by other worldviews. Bureaucratic, project-driven, compliance-based assessment too often remains captured by the dominant biophysical culture of Western science, with studies done in silos.

This paper presents a hierarchy of empowerment, outlines the elements of a culturally competent impact assessment system and suggests governance structures that might enable it.

Empowerment hierarchy

The empowerment hierarchy moves from planning and decision-making controlled by external agendas to empowered governance by First Nations who have the resources and agency to act in their own interests. At the bottom of the hierarchy is scientific impact assessment that treats cultural issues as an afterthought and disregards alternative worldviews and perspectives. At its apex are First Nations' impact assessment systems and governance.

1. **Tokenistic consideration in biophysical, scientific impact assessment systems:** Real influence on projects is political and outside the regulatory processes. The focus of studies is gaining regulatory approval and mitigating impacts. 'Consultation' generally starts after key decisions have been made. Formal scientific assessment studies marginalise alternative worldviews and pay tokenistic attention to cultural impacts.

2. **Dedicated cultural reports but in a silo:** Cultural studies may be done, but within systems that compartmentalise ecological, spiritual, cultural and social dimensions. The effectiveness of reports will likely vary depending on the competence of researchers and the receptiveness

of regulators and proponents to their findings. Cultural Impact Assessment and Cultural Heritage Assessment reports may provide community, anthropological and archaeological insights. But if reports are merely attached as appendices to environmental or planning approval documents, findings and recommendations may have a peripheral influence on decisions.

3. **Indigenous led, with control of research principles, objectives and process.** First Nations people engage their own experts, set their own terms of reference, commission their own studies (with participant funding support). The process should afford a central place to peoples' interests, values and priorities. Reports will recognise the legitimacy of First Nations' knowledge systems and strengthen the hand of participants during agreement-making, as with the Kimberley Social Impact Assessment in Western Australia in 2010 (O'Faircheallaigh 2009; 2023). In British Columbia in 2016, the Squamish Nation did its own environmental assessment. The proponent, Woodfibre, took part voluntarily and signed a legally binding Squamish Nation Environmental Certificate to ensure all conditions were met (Bruce 2017; Bruce & Hume 2015). However, without a mandate to adopt findings, such reports may still remain on the sidelines of regulatory decisions.

4. **Holistic, harmonised assessment:** Scientific and First Nations perspectives are blended in one report, giving equal status to scientific and Indigenous knowledge and experience. Such reports may inform agreement-making and shared approaches to managing impacts and restoring country. A good example is a report by the Anishinaabe Nations of the Four Winds Partnership who worked with the Ontario Ministry of Transport in Canada on a harmonised assessment of a proposed highway (Niiwin Wendaanimok Partnership and Narratives 2021).

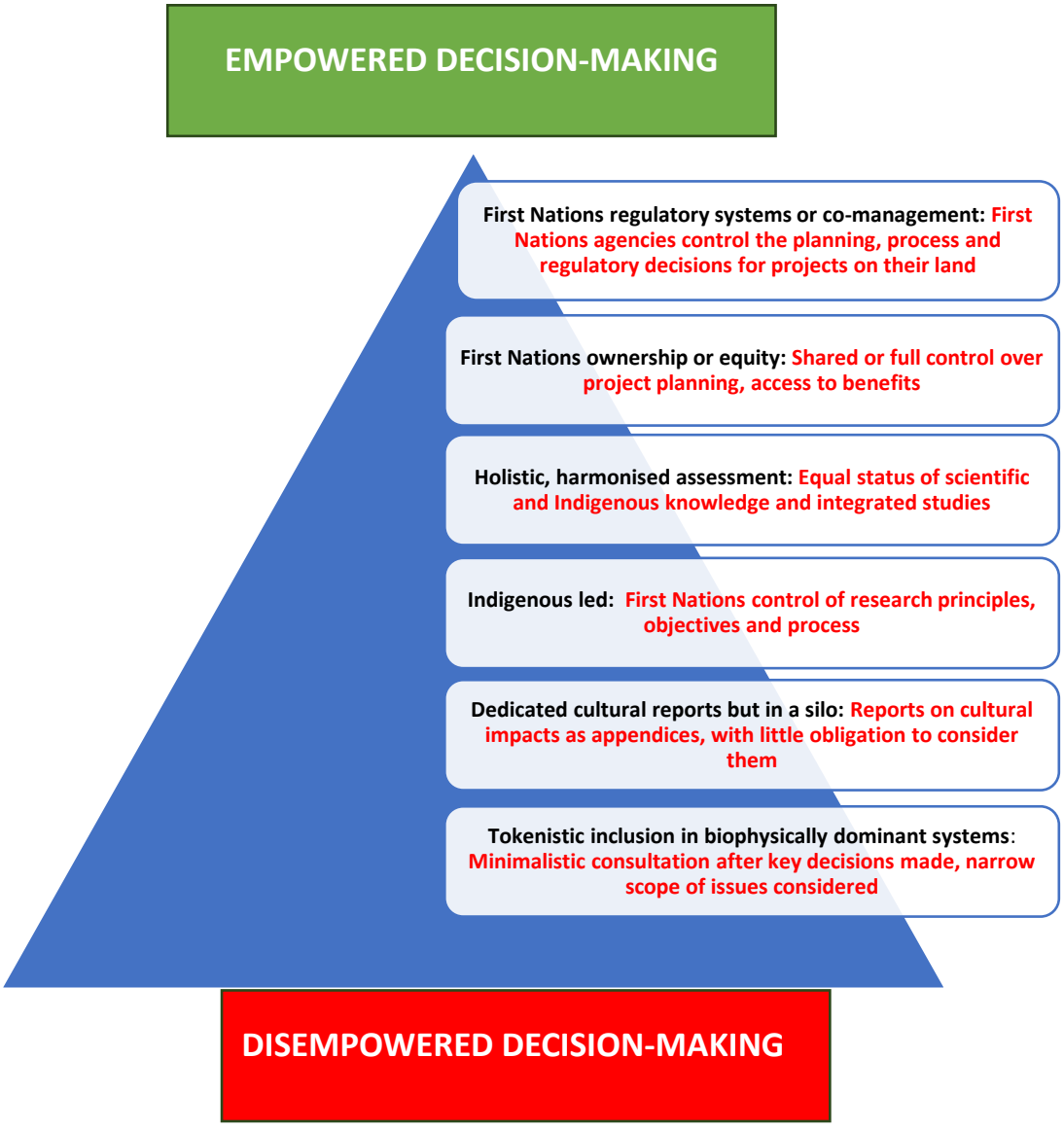
5. **First Nations ownership or entity in projects:** First Nations may invest in their own projects or take equity positions in development on their land, as is increasingly the case in the clean energy sector. The Keeyask Hydroelectric Facility is a partnership between Manitoba Hydro and four First Nations groups who signed a development agreement in 2009 (Cree Nations Partners 2012). However, if First Nations are minority partners, they may face risks, such as a loss of investment funds, delays in a return on investment or legacy costs if projects fail (see Kung et al. 2022). Success may depend on groups' capacity to negotiate and ability to manage conflicts of interests (Kung et al. 2022; O'Faircheallaigh 2023). And externally controlled regulatory systems can lead to absurdities: such as traditional owners having to engage anthropologists to consult with themselves to establish they have provided free, prior and informed consent to their own projects.

6. **First Nations impact assessment systems and governance structures.** A key constraint for First Nations' input to impact assessment is regulatory systems that compartmentalise holistic, interconnected worldviews into environmental, social or cultural domains (Jolly 2022). First Nations or Indigenous impact assessment would recognise communities as self-determining nations, with the right to generate their own impact assessment systems in ways chosen by communities themselves (Jolly 2022).

   First Nations impact assessment might include governance structures with the power to decide at the screening stage whether a proposal can even proceed to assessment. First Nations people would then determine appropriate institutions, principles and processes that

achieve positive outcomes and reflect culturally appropriate participation and decision-making.

Ideally development would be informed by strategic land use planning and community aspirations. Initial process would incorporate early and authentic engagement, allow affected peoples to fully consider their options, provide the right to say no, devolve control, and respect First Nations leadership, knowledge and worldviews. A good example is the co-managed environmental impact review boards of Canada's Northwest Territories. Of course, such models must be appropriately resourced or they may raise unrealistic expectations of control.



Culturally competent systems

Retarding progress in achieving culturally competent systems is the mutual incomprehension that arises from discrepant worldviews and project-driven and compliance-based impact assessment. All too often impact assessment practice fails to follow leading practice guidelines - such as those produced by the World Bank, lender agencies and IAIA - because its focus is protecting the environment - not people and culture - or on speedy approval of economically important projects.

Few regulatory agencies have culturally competent social scientists, anthropologists, economists or First Nations people able to assess and give weight to cultural impacts, qualitative data and First Nations controlled research. When social and cultural impacts do get a seat at the regulatory table, the seat all too often is white-anted by the cycles of crisis and complacency that typify economic development.

The quality of impact assessment, therefore, remains at the whim of individual regulator capacity or more enlightened and accommodating proponents, with many of the best studies done outside regulatory systems (Munday 2020).

A culturally competent impact assessment system would include:

- a mandate to consider a broader set of values and impacts than are covered in mainstream scientific studies
- governance structures that devolve authority to give First Nations people real input and influence over planning, the process of impact assessment and decision-making
- the intercultural capacity, or skills, knowledge and aptitude to incorporate First Nations' knowledge, worldviews, shared decision-making and co-managed natural resource management
- First Nations able to decide at the screening stage whether projects on their territories should even proceed to assessment
- decisions grounded in strategic resource planning and community aspirations
- staff with the mandate and skills to work in the intercultural spaces where impacts occur and co-production of knowledge evolves.

Barriers to cultural competence can be organisational (the degree to which leadership and the workforce reflect the composition of the population), institutional leadership (including diversity) and structural (bureaucratic processes, use of interpreters and communication) (Betencourt et al. 2016).

Cultural competence also requires highly participative processes, respect for human rights and accommodation of diverse value systems.

In summary, impact assessment systems are culturally incompetent because they are dominated by biophysical systems that privilege quantitative, technological science over insightful, community driven social and cultural impact assessment.

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Towards an evidence base to support Power-to-X (PtX) decision-making in South Africa

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Abstract ID: 307

Summary Statement

Power-to-X (PtX) technology development is being rapidly pursued around the world. We present an initial evidence base to support strategic and site-specific decision-making for PtX in South Africa.

Abstract

Defossilisation is a priority, globally and in South Africa. Power-to-X (PtX) technologies could contribute greatly to achieving these ambitions. South Africa's renewable energy resources, land availability, platinum group metals resources, and port infrastructure, position it as a potential competitor in the global PtX economy. In addition to defossilisation, a domestic PtX economy could make substantial contributions to job creation, improve local livelihoods and facilitate a Just Energy Transition.

Vast technologies and infrastructure are required to create the electricity and water inputs to deliver PtX products (for domestic use and export), which, if developed at a sufficient speed, scale, and intensity, could have cumulative, unforeseen consequences. Given the complexity and sheer extent of the infrastructure required, a systems-thinking, data-driven, stepwise approach to site- and regional-scale decision-making is essential.

We present findings from a recent research study conducted by the Council for Scientific and Industrial Research (CSIR) for the German and South African governments, including:

- A detailed characterisation and description of South African PtX technology systems;
- A Driver-Pressure-State-Impact-Response (DPSIR) model integrating important social and environmental impacts and relationships;
- A spatial tool demonstrating regions most/least suitable for PtX development; and
- Site- and strategic-level recommendations to inform PtX decision-making.

Introduction

The transition from fossil fuels towards renewable energy is taking place globally, and in South Africa, at increasing pace and urgency. The global shift is driven by commitments to greenhouse gas reduction targets (IPCC, 2019) and the Sustainable Development Goals (SDGs) (Raman et al., 2022), plus the geopolitical need to develop new, sustainable energy supply chains and partnerships (Zakeri et al., 2022). Green hydrogen (GH_2) production and its Power-to-X (PtX) derivates (e.g. green ammonia and green methanol) may play a substantial, if not pivotal, role in this transition. PtX enables the conversion of electricity into high energy density carriers like hydrogen and synthetic fuels, which could replace fossil fuels in traditionally “hard-to-abate" sectors, like heavy-duty transport (e.g. shipping) and aviation.

South Africa’s renewable energy resources, extensive coastline, port infrastructure and platinum group metal reserves give it a competitive advantage in producing cost-effective PtX products (Lebrouhi et al., 2022). PtX could form a significant component of the South African energy economy over the next few decades if policy aspirations are realised. For this to happen, many decisions will need to be made at different spatial scales, across different spheres of government, involving a variety of stakeholders including the private sector and broader civil. Furthermore, if developed at sufficient speed, scale, and intensity, PtX development could have cumulative, unintended consequences. It is therefore prudent to openly embrace the prospects of a PtX economy in South Africa first by understanding the complex technological PtX system, recognising its potential benefits and risks, and thus pursuing holistic, co-produced, data-driven, and stepwise approaches to site and regional scale decision-making.

We present an initial evidence base to support PtX decision-making in South Africa using systems thinking approaches, Geographic Information Systems (GIS), as well as incorporating a mixed-method approach consisting of Working Group (WG) scoping workshops and quantitative surveys. The WG included representatives from various private and public organisations in engineering, sustainability science and policymaking.

Understanding the PtX technological system

Major infrastructure is required to enable PtX technologies (Lattemann & Höpner, 2008; Sheikh et al., 2016). The PtX technology system requires: electricity generated from renewable energies (RE) to power all components; freshwater – sustainably sourced from desalinated sea- or wastewater; electrolysers to produce GH_2; and facilities to synthesise ammonia or methanol by nitrogen and carbon inputs (Figure 1). This entire system further needs to be supported by various ancillary infrastructure like batteries, electricity transmission lines, pipelines, storage facilities, and roads to create a complete PtX value chain.

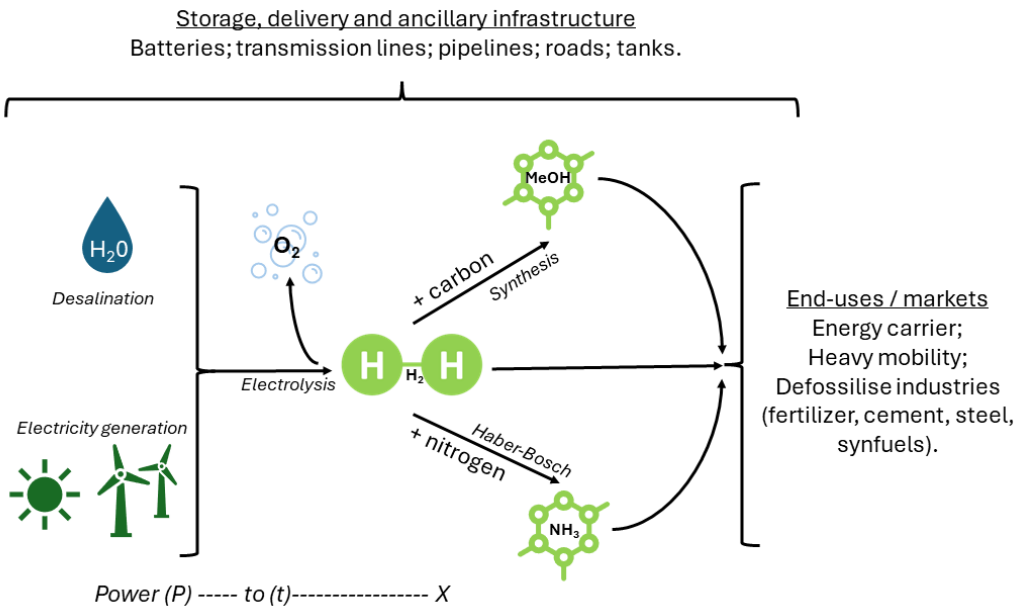


Figure 1: Electricity from renewable energy and sustainably-sourced water is used to produce hydrogen and a variety of PtX products including ammonia (NH_3) and methanol (MeOH), which have various end-uses.

Meeting the South African GH_2 production ambition of 4 Mt per annum (DTIC, 2022) would require new-build RE in the order of 40 GW, which translates into a land-take requirement in the order of 200 km^2 – only to power the elecrolyser component of the PtX technological system. This hints that land availability and conflict may well be a main constraint facing PtX development. Cumulative ecological and social footprints could rapidly approach or exceed limits of acceptable change and thus undermine progress towards SDGs. Quantitative assessment of PtX scenarios is needed to address uncertainties over the footprint scale required to support PtX production.

Contextualising potential benefits and risks

A Driver-Pressure-State-Impact-Response (DPSIR) causal framework (Cooper, 2013; OECD, 1993) was applied to present a high-level synopsis of the key environmental and social issues associated with a complex PtX technological system and economy (Figure 2).

Driving forces are the global and domestic trends pushing forward a South African PtX economy.

Pressures are the direct mechanisms through which PtX activities and infrastructure will positively and/or negatively affect people and the environment.

States are the most likely baseline receiving environments that will be affected by a South African PtX economy. They explain spatial aspect of the receiving environment and non-spatial aspects of the receiving environment.

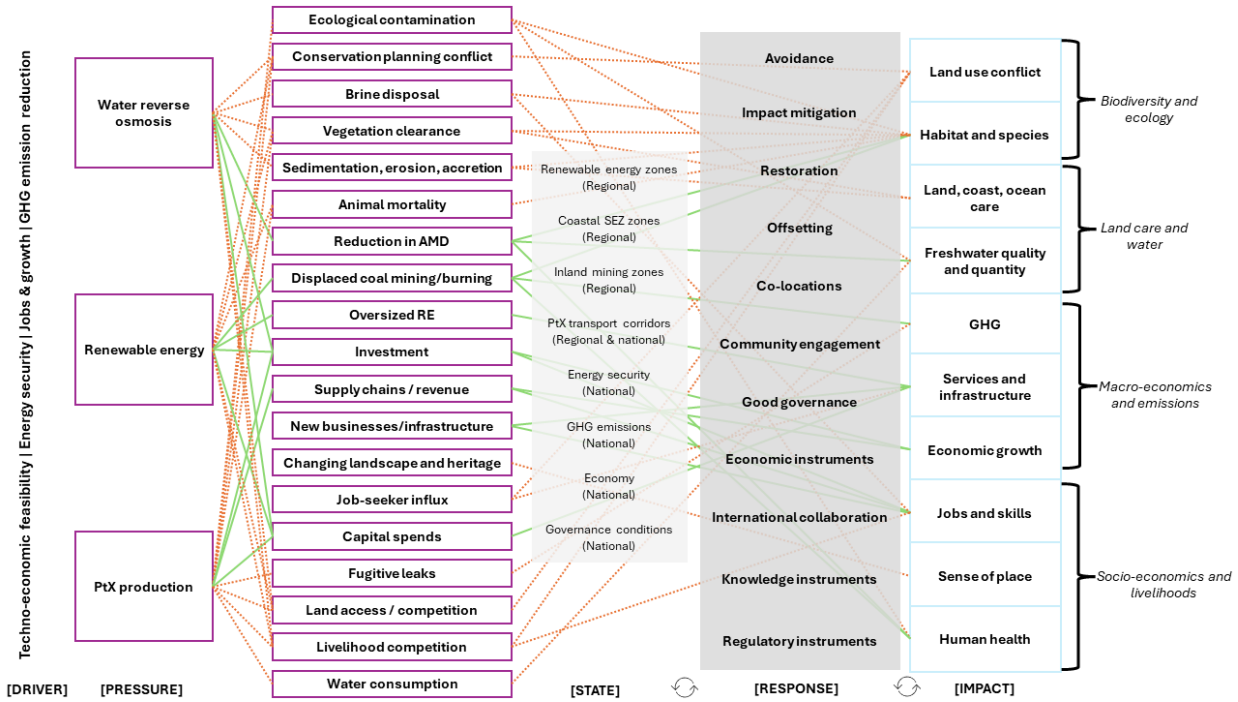
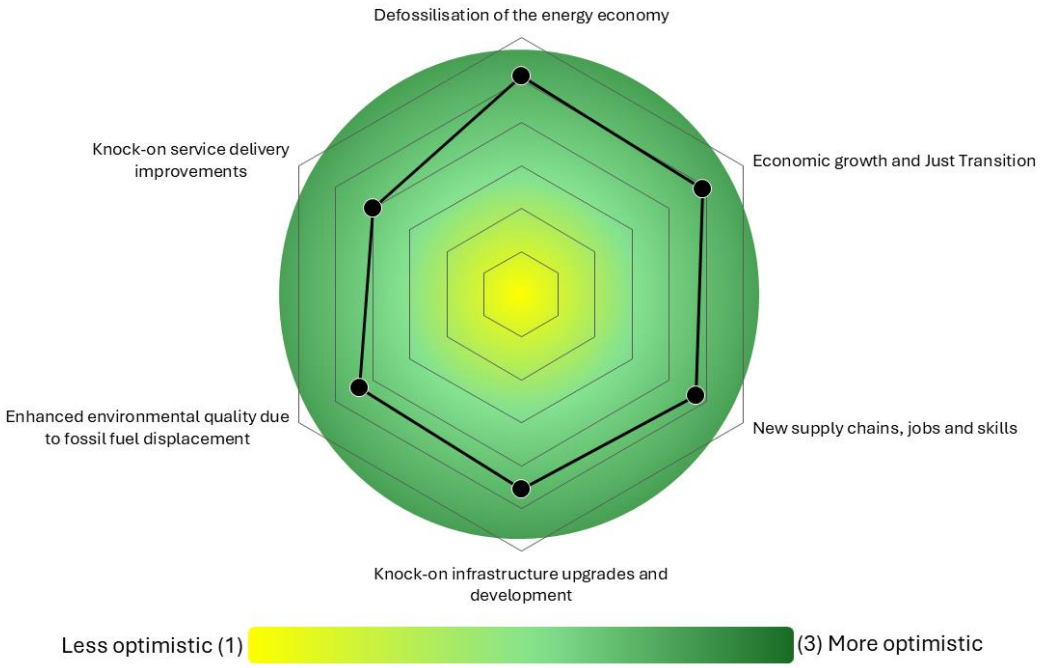


Figure 2: DPSIR summary diagram revealing a complex PtX social-ecological-technological system and the conceptual relationships between its drivers, pressures, states, impacts and responses. Responses can be implemented in anticipation of changing states to minimise adverse or maximise desirable impacts (as depicted here) or in reaction to changes that have manifested as impacts.

Responses are the options available for society to mitigate negative impacts and enhance positive ones. Eleven different responses classes were identified. Responses can be implemented in anticipation of changing states to minimise adverse or maximise desirable impacts or in reaction to changes that have manifested as impacts.

Impacts are net positive or negative effects on biophysical and social environments that may arise from PtX activities (Figure 3). Statements on these impacts were distributed to a multi-disciplinary WG (n=18). For positive impacts (green), WG members had to rate their levels of optimism, and for negative impacts (red), their levels of concern on a Likert Scale (1-3). Analysis of the WG responses provided an integrated, multidisciplinary perspective, highlighting which negative impacts posed the greatest risks, and which positive impacts may present the greatest opportunity.

a)



b)

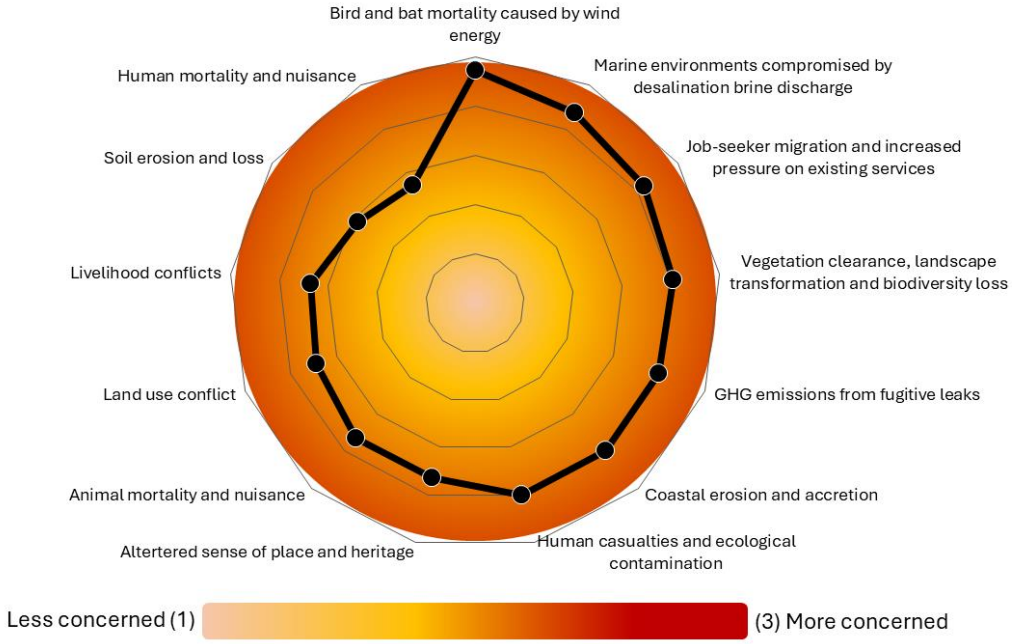


Figure 3: Outcome of co-produced scoping of PtX impacts where a Working Group (n=18) ranked their level of a) optimism for potential positive impacts; and b) concern about potential negative impacts.

Data driven decision-support

GIS analysis has increasingly become a crucial tool for sustainable infrastructure planning. It is used around the world for identifying suitable and optimal areas, based on a range of environmental, economic, and social parameters, for important infrastructure developments (DEA, 2015; Latinopoulos & Kechagia, 2015; Sánchez-Lozano et al., 2014), including more recently, for RE and GH_2 production (Messaoudi et al., 2019).

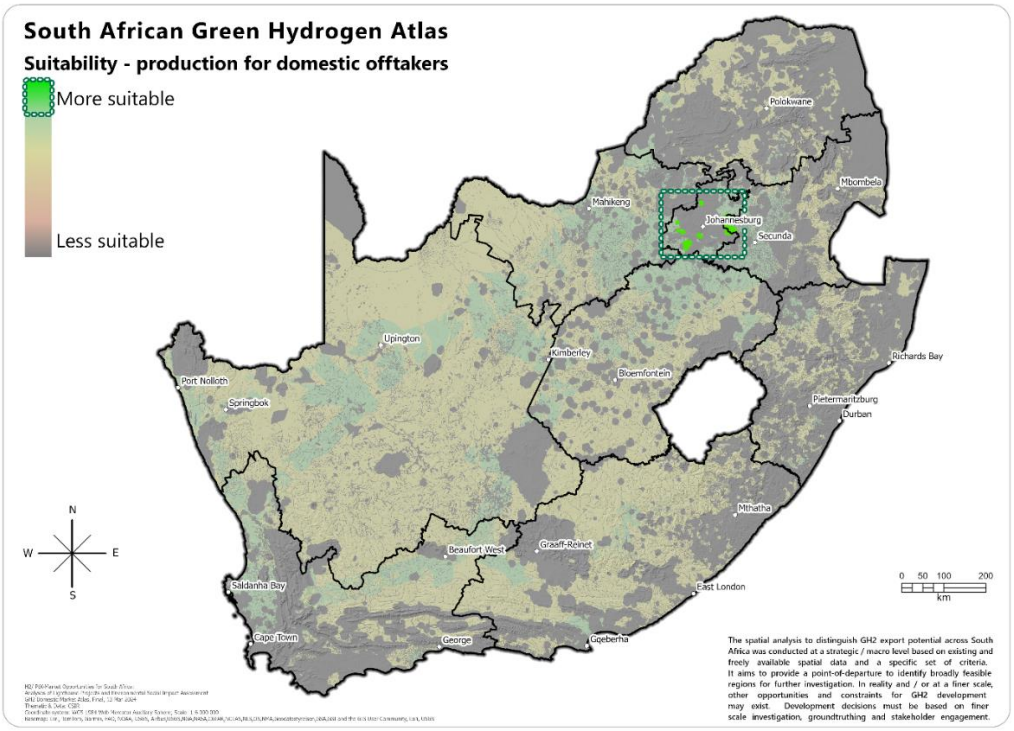
Spatially explicit siting variables which constituted 'push'- or 'pull' factors included environmental conditions and sensitivities, political planning contexts, uses and users of the environment, and technical/engineering requirements (Table 1). Variables were assigned relative importance (weighted) with scores developed through interdisciplinary consultations within the WG.

Table 1: Variables considered in a spatial Multi-Criteria Analysis represented 'push' (< >) and 'pull' (> <) factors to determine suitable regions for PtX production in South Africa, considering both domestic and export markets, arranged from most to least important weighting.

Increasing relative importance →		Domestic Market	Export Market
	Environmental safeguards (restricted)	Protected Areas <>	
		Heritage features <>	
		Watercourses and wetlands <>	
	Landuse and safety (restricted)	Population density <>	
		Built-up areas (urban) <>	
		High-value agriculture <>	
	Offtaker	Local industries (cement, steel, synfuel, oil) ><	Export ports ><
	Renewable energy	Solar & wind potential ><	
	Water	Desalinated seawater ><	
		Acid mine drainage regions ><	-
		Coal fired power stations ><	-
	Enabling infrastructure	Electricity grid ><	
	Environmental safeguards (non restricted)	Important Bird Areas (wind) <>	
		Conservation Areas <>	
		Steep slopes <>	
	Landuse and safety (non restricted)	Other agriculture <>	
		Built-up areas (industrial) ><	
	Policy alignment	All Special Economic Zones (SEZs) ><	Export port SEZs ><
		Renewable Energy Development Zones (REDZ) >< and Electricity Grid Infrastructure (EGI) corridors ><	

The resulting South African GH_2 Atlas is an aid to identify suitable regions for GH_2/PtX production, considering both export and domestic use options (Figure 4). Spatially explicit siting variables which constituted 'push'- and/or 'pull'-factors included environmental conditions and sensitivities, political planning contexts, uses and users of the environment, and technical/engineering requirements. Variables were weighted with scores developed through interdisciplinary consultations within the WG. The Atlas aims to provide a point-of-departure to identify broadly feasible regions for further investigation.

a)



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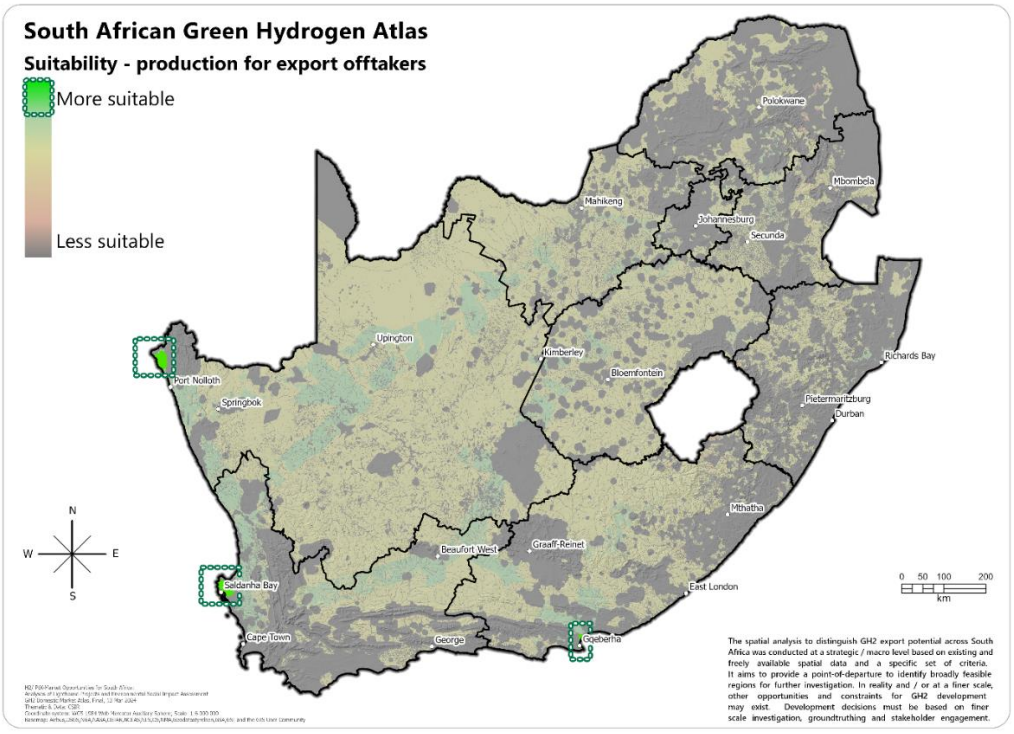

Figure 4: South African Green Hydrogen Atlas showing relative suitability for a) PtX production for domestic use; and b) PtX production for export.

Recommendations for PtX planning and decision-making

The scale and intensity of construction and operational activities required to support a burgeoning PtX economy need to be guided by wise, systems-based decision-making processes (USDOE, 2023) spanning all spheres of government and including the private sector and civil society, potentially over extended time periods. Most of these decisions will need to be contextual, meaning that certain activities may be permitted in one location and not others, or with a given set of requisite management actions. This will depend on the specific nature of the project proposal, its development activities, the local socio-economic context, and the ecological and cultural sensitivity of the location within which they are proposed, among other factors.

From an environmental and social sustainability perspective, the precautionary approach needs to be guided by robust processes of knowledge production, with the aim of promoting good decision-making. Two of the science-policy interfaces which are well established for this purpose are Strategic Environmental Assessment (SEA) for policy/programme-level guidance, and Environmental Impact Assessment (EIA), for project-level guidance.

SEA is a systematic decision support process aimed at ensuring that environmental and other sustainability aspects are considered effectively in policy, plan, and program making. In a broader sense, SEA seeks to integrate environmental and social considerations into strategic decision-making processes. To facilitate responsible and efficient decisions on PtX-related projects in the future at EIA-level, it is suggested that a strategic-level SEA is undertaken for PtX development in South Africa.

An SEA for PtX in South Africa should consider all development aspects and activities associated with a South African PtX economy, ranging from enabling infrastructure (e.g., renewable energy and seawater reverse osmosis), to competing land uses (e.g., tourism, conservation, and agriculture), to socio-economic issues of poverty, employment, human migration, social fabric and service infrastructure, as well as exploring the links with adjacent industries, provinces and countries also looking at PtX development.

Oriented by policy/programme-level knowledge production tools like SEA, site-specific good EIAs must be used to inform good decision-making for PtX project development, on a case-by-case basis. EIA tends to aggregate system elements into discrete ‘silos’ supporting administrative and bureaucratic efficiency (Bond et al., 2015). This is evident in the structure of an EIA report – usually separated amongst specialist studies. This makes it difficult to predict systemic effects, which can be several orders of magnitude more significant than direct impacts, (Lenzen et al., 2003). This may be particularly relevant when considering the complex technological PtX system, the components of which may sprawled over various and expansive geographies.

At the project level taking a systems perspective in conducting EIA from the outset, and employing certain tools that assist in gaining deeper insight into project impacts on complex receiving environments, can lead to more accurate and meaningful EIA outcomes. Such tools include cross-impact matrices, directed graphs, network analysis and scenario analysis, to mention a few (Duinker & Greig, 2007; European Commission, 1999; Perdicoúlis & Glasson, 2006). Despite the repeated acknowledgement that EIA and the decisions they inform would benefit from systems thinking approaches (Morrison-Saunders & Retief, 2012; Nooteboom, 2007), the uptake and application of

these as common impact assessment practice has been slow. Mainstreaming systems thinking in EIA would require those commissioning and practising EIA to go beyond minimum requirements, an undertaking that could be constrained by available time, resources and systems thinking capabilities (Snyman-Van Der Walt et al., 2022).

Conclusion

Vast technologies and infrastructure are required to create the electricity and water inputs to deliver PtX products (for domestic use and export), which, if developed at a sufficient speed, scale, and intensity, could have cumulative, unintended consequences. Using systems thinking, co-produced knowledge and GIS analysis to initially contextualise the complex PtX technological system we present a foundational evidence base for future planning, assessment and decision-making on PtX projects towards the sustainable and responsible establishment of a South African PtX economy.

Acknowledgements

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Financing Nature-Based Solutions for a Just Transition: Bamboo Afforestation in Hong Kong

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Abstract

Nature-based solutions (NbS) provide a 'triple win' potential to tackle global challenges related to biodiversity loss, land degradation and climate change, yet they are significantly underrated in terms of financial values. According to United Nations Environmental Programme (UNEP)'s State of Finance for Nature 2022, investments to NbS must be at least doubled by 2025 to deal with global crises, in which private sector investments are crucial for closing the financial gap. While the key role of NbS in green transition is clear, it alone does not guarantee a Just Transition due to its prime focus on environmental instead of social aspects. As catalysts for change, Financial Institutions (FIs) have a unique opportunity to champion a Just Transition that leaves no one behind while driving for ambitious climate crisis mitigation and adaptation efforts. Can Impact Assessment be the tool to help FIs integrate Just Transition principles in their efforts of scaling up NbS investments? Invaluable functions of Impact Assessment will be discussed through a NbS project funded by a FI, PricewaterhouseCoopers (PwC), in planting bamboos on an abandoned farmland which is rich in biodiversity at Ha Pak Nai in Hong Kong. This case shed light on the critical role of Impact Assessment in navigating Just Transitions in FIs through complexities and challenges. By effectively assessing the environmental, social, and economic impacts, FIs can make informed decisions that promote inclusivity, resilience, and sustainability. In this synergy, NbS investments can also be benefited from engagement with indigenous communities, tapping into their cultural knowledge and expertise about local ecosystems.

Introduction

According to World Economic Forum's The Global Risks Report 2023, 6 of the climate and environmental risks, including 'failure of climate change mitigation and adaption', 'natural disasters and extreme weather events', and 'biodiversity loss and ecosystem collapse', feature in the top 10 global server risks over the next decade (Heading & Zahidi, 2023). Among all global risks, 'biodiversity loss and ecosystem collapse' is considered as one of the fastest deteriorating risks over the next 10 years.

In the quest for effective solutions, there is a growing recognition to the crucial role of NbS in mitigating and adapting to these environmental challenges. Estimates by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) suggested that NbS can provide one-third of the climate mitigation needed until 2030 to meet the goals of the Paris Agreement (Brondizio et al., 2019). Despite NbS provide a 'triple win' potential to tackle global challenges related to biodiversity loss, land degradation and climate change, they are significantly underutilised and underfinanced. With reference to the UNEP's State of Finance for Nature 2022, investments to NbS are currently only $154 billion per year, that must be at least doubled by 2025 and tripled by 2030 to limit climate change to below 1.5°C, halt biodiversity loss and achieve land degradation neutrality (UNEP, 2022). The substantial funding shortfall in NbS reflects a desperate need to scale up finance for the nature, in which private sector investments are crucial for closing the financing gap and as catalysts for change in driving ambitious climate crisis mitigation and adaptation efforts.

Just Transition and NbS

To truly achieve a Just Transition, it is necessary for FI to go beyond the environmental focus of NbS and consider their social implications. While NbS have widely acknowledged for their potential to address global challenges related to biodiversity loss, land degradation, and climate change, solely prioritizing the environment may not guarantee a Just Transition. *Figure 1* illustrates the potential social risks associated with NbS if not adequately planned. One area of concern is the potential displacement of workers due to temporal, spatial, and structural misalignments during the transition, along with uncertainties surrounding labour rights. Furthermore, the preservation of indigenous rights and cultural links is essential, as restrictions on resource access can negatively impact their livelihoods and traditional practices. Additionally, it is vital to address intersecting inequalities and prevent socio-economic setbacks for marginalized communities.

Figure 1 Potential Transition Social Risks in Nature-based Solutions

In line with the Decent Work in Nature-based Solutions 2022 report (ILO, UNEP, & IUCN, 2022), a Just Transition aims to establish a fair and inclusive green economy by providing decent work and green job opportunities, managing transition risks, and ensuring that no one is left behind. This approach seeks to maximize the social and economic benefits of environmental actions while minimizing negative impacts on workers. By supporting affected workers, businesses, and communities, it endeavours to foster an equitable transition that benefits all stakeholders.

Impact Assessment as a Tool for Integrating Just Transition Principles

Impact assessment serves as a useful decision-making tool for guiding FIs in integrating just transition principles when investing in NbS. By aligning with currently available standards (i.e., IUCN Global Standard for NbS and ILO Just Transition Guidelines), as well as evaluating the viability and impacts of proposed NbS projects across environmental, social, and economic aspects, impact assessment enables FIs to make informed decisions that promote inclusivity, resilience, and sustainability.

In the environmental aspect, impact assessment plays a key role in helping FIs understand the current state and drivers of the project site, allowing them to assess the potential biodiversity net gain and return on investment. By assessing the baseline ecological situation, identifying biodiversity conservation outcomes, and identifying opportunities for ecosystem enhancement, impact assessment guides the design of NbS projects that are environmentally sound. In the social aspect, impact assessment is essential for assessing and addressing the potential social challenges posed by the NbS projects. It enables FIs to engage stakeholders from the earliest stages through site visits and consultations to identify the human well-being outcomes of the NbS. This process helps in identifying the specific drivers and responses to societal challenges associated with the project, allowing for the development of inclusive action plans that leaves no one behind. For NbS projects to be investable, it is essential to ensure their economic feasibility. Impact assessment facilitates this by assisting the cost-effectiveness studies and sensitivity analyses to justify the

project against alternative solutions. It also involves reviewing long-term principles and complementary funding mechanisms to secure resources for continuous implementation, ensuring the economic viability of the NbS project.

By utilizing impact assessment as a decision-making tool, FIs can effectively integrate Just Transition principles into their NbS investments. This holistic approach enables FIs to assess and address the environmental, social, and economic aspects of NbS projects, promoting sustainable and equitable outcomes while driving ambitious climate crisis mitigation and adaptation efforts.

Case Study

PwC funded NbS Project in Ha Pak Nai, Hong Kong

In 2022, the first bamboo afforestation initiative in Hong Kong. 'Project Prosperity', was initiated through a collaboration between PwC China and a local NGO called the 'A Plastic Ocean Foundation'. This partnership, funded by the PricewaterhouseCoopers Foundation, offers valuable insights into the application of impact assessment as a tool for FIs to navigate the principles of Just Transition in NbS.

Located on the northwestern coast of Hong Kong, Ha Pak Nai is a biodiversity hotspot renowned for its vital role as a nursery and feeding ground for the near-threatened horseshoe crab. Despite being home to one of the largest seagrass beds in Hong Kong, the environment of Ha Pak Nai has been adversely affected by pollution, soil erosion, and contaminations resulting from various human activities. The consequences of these damages are evident, with abandoned farming operations causing erosion and unchecked contaminations from nearby industrial activities seeping into the streams and sea. Moreover, Ha Pak Nai is particularly vulnerable to the increasing frequency of extreme weather events caused by climate change, including severe typhoons and heavy rainstorms, which significantly heighten the risk of flooding in the area.

Considering the potential impacts across environmental, social, and economic aspects, the NbS project has been carefully designed to address the diverse challenges and opportunities associated with its implementation in Ha Pak Nai. Bamboo was specifically chosen as the focal element of the project due to its unique characteristics and benefits.

From an environmental perspective, the strategic implementation of bamboo afforestation in the buffer zone and water-adjacent areas serves as a protective natural barrier, safeguarding the marine ecosystem by preventing pollution and soil erosion. Additionally, bamboo's phytoremediation characteristic enables it to clean up contaminants in the soil and reduce toxin concentrations, thus contributing to overall environmental improvement. The rehabilitation of abandoned farmland through bamboo afforestation also promotes the recovery of biodiversity in the area.

On the social front, the project goes beyond environmental conservation by focusing on a Just Transition through the creation of green job opportunities and on-the-job training for under-educated youth. Bamboo's versatility and adaptability make it an ideal resource for sustainable industries, offering economic opportunities and supporting the community's transition to a green economy. By empowering the climate-vulnerable community, the project encourages active social and environmental participation while addressing the underemployment of young adults in the village. The collaboration between the younger generation and experienced farmers, who possess indigenous knowledge gained from decades of rural life, holds great potential for making significant impacts. Furthermore, the project's circular model not only contributes to the rehabilitation of nature but also enhances resilience for coastal communities, providing a comprehensive solution to multiple challenges. This empowerment not only enhances their livelihoods but also promotes social inclusivity, fostering a just and sustainable future.

From an economic standpoint, the project leverages the harvested bamboo to produce eco-friendly bamboo tableware, which serves as a sustainable alternative to single-use plastic items. With the recent ban of single-use plastics in Hong Kong, the market demand for eco-friendly products presents a viable opportunity for economic growth and scale. Besides, bamboo's regenerative characteristics, such as its rapid growth and ability to grow back from its original root system, make it a sustainable and renewable resource for the project's long-term viability. The income generated from the sales of harvested bamboo and the manufactured bamboo products establishes a self-sustaining business model, ensuring economic growth and resilience within the community.

In conclusion, this NbS project in Ha Pak Nai showcases a comprehensive approach that effectively address environmental, social, and economic challenges. Through the strategic design of the NbS using impact assessment, the project mitigates environmental degradation, promotes social inclusivity and green job creation, and establishes a sustainable economic model. This case study exemplifies the potential for impact assessment to guide FIs in navigating Just Transition principles within NbS, contributing to a more sustainable and resilient future for communities like Ha Pak Nai.

Future Directions

As we continue to navigate the challenges posed by climate change, it becomes increasingly obvious that connection is key to building resilience and advancing sustainable solutions. In crafting strategies and financing initiatives to address climate change, it is crucial to prioritize the concept of a Just Transition, particularly about the individuals and communities directly affected.

Connection, both among stakeholders and with the environment, plays a vital role in fostering resilience. Collaborative efforts, such as the partnership between PwC China, the 'A Plastic Ocean Foundation,' and the Ha Pak Nai community in the 'Project Prosperity,' exemplify the power of collaboration and collective action. By bringing together diverse expertise, knowledge, and resources, we can develop holistic solutions that address the multifaceted challenges of climate change. Furthermore, building resilience requires recognizing and embracing the interdependencies between ecological, social, and economic systems. Only by adopting a comprehensive approach that considers the interconnectedness of these domains, we can create synergistic solutions that yield long-term benefits for both people and the environment. Inclusive and equitable decision-making processes are fundamental to the success of any climate change mitigation and adaptation strategy. The principles of a Just Transition guide us in ensuring that no one is left behind in the pursuit of sustainability. In the context of NbS, it is imperative to involve and empower local communities, particularly those most vulnerable to the impacts of climate change. By valuing and incorporating their traditional knowledge, perspectives, and needs, we can co-create solutions that are contextually relevant and socially just.

Looking ahead, future NbS investments should prioritize the strengthening of connections, the cultivation of resilience, and the promotion of inclusiveness. To effectively address climate change, we must foster collaborative networks, engage diverse stakeholders, and embrace a holistic approach that transcends disciplinary boundaries. By centering the principles of a Just Transition with the use of impact assessment, we can ensure that the pathways we design are equitable, sustainable, and transformative for both present and future generations.

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Environmental Protection Reviews of Canadian Nuclear Facilities

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Introduction

The Canadian Nuclear Safety Commission (CNSC) is Canada's sole nuclear regulator and is responsible for overseeing all nuclear facilities and activities throughout their entire lifecycle to protect health, safety, security, and the environment. The Commission's decisions are evidence-based and presented in the context of an open and transparent hearing process. The CNSC requires that the environmental effects of all nuclear facilities and activities be considered or evaluated when licensing decisions are made. Environmental reviews are conducted for all licence applications to assess and demonstrate potential interactions with the environment. The type and scale of the environmental review is determined by the location, scale, and complexity of the facility or activity and the associated environmental risks.

Depending on the nature of the facility or proposed new project, it may be subject to one of multiple of the following different types of reviews:

- integrated impact assessments under the *Impact Assessment Act* (IAA)
- federal lands reviews under the IAA
- federal environmental assessments under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012)
- environmental protection reviews (EPRs) under the *Nuclear Safety and Control Act* (NSCA)
- environmental assessments under provincial regimes and land claim agreements

This paper will highlight the evolution of the CNSC's approach to EPRs for existing nuclear facilities and how these reviews support the CNSC's mandate to disseminate objective, scientific, technical, and regulatory information and to build trust with the public and Indigenous Nations and communities.

What is an environmental protection review?

Under the NSCA, EPRs for existing nuclear facilities document CNSC staff's technical assessment of a licensee's environmental protection measures at a nuclear facility. EPRs act as a

comprehensive repository of CNSC staff's evaluation of health, science, and environmental compliance activities for a licensed nuclear site. In addition, the assessments incorporate results from the CNSC's Independent Environmental Monitoring Program and information from other regional environmental monitoring programs.

In 2021, CNSC staff starting developing EPR reports separate from specific licensing decisions. Now, EPR reports are developed based on the cyclical regulatory requirements related to a licensee's environmental risk assessment submissions, which is typically every 5 years. This change was brought about in part for the need to provide regular updates to the public and Indigenous Nations and communities in advance of licensing hearings on how nuclear facilities are implementing and maintaining the required environmental protection measures to identify, control, and monitor releases of radiological and hazardous substances and their potential effects on people and the environment.

Making technical information accessible for the public and Indigenous Nations and communities

Alongside the EPR reports, CNSC staff produce plain-language summaries that highlight key findings and information from the reports. These summaries are also posted on the CNSC's website and linked on the Open Government Portal. Social media posts on Facebook and X (formerly Twitter) also provide simplified messaging on report findings. In addition, CNSC staff have recently begun producing visual pamphlets to compliment EPR reports to help make the findings more digestible. The EPR report pamphlet for the Darlington Waste Management Facility, published in 2022, can be seen in Figure 1.

There are currently 11 stand-alone EPR reports for various types of nuclear facilities, including a nuclear generating station, nuclear processing facilities, a waste management facility, and uranium mines and mills. All reports are published on the CNSC's environmental protection reviews web page and linked on the Government of Canada's Open Government Portal in PDF and HTML formats to foster greater access to CNSC staff's technical review work and to promote openness and transparency with Canadians.

Building trust and awareness

EPR reports and the summary pamphlets are proving to be a great tool for outreach and consultation events and to answer general inquiries related to the operations of nuclear facilities. We are also seeing these reports referenced in interventions for Commission proceedings and used by licensees in their outreach and communications materials. By providing easy to understand EPR information in multiple formats, the CNSC is working to continuously foster trust, awareness, and transparency in the operation and regulation of nuclear facilities in Canada.

Always improving

Our team is always looking to build and improve upon the information provided in EPRs and how we share this information. Some of the areas we are evolving include:

- **Indigenous Knowledge –** working directly with Indigenous Nations and communities and knowledge holders on integrating their knowledge, values, land use information, environmental monitoring activities, and perspectives in the CNSC EPR reports, where appropriate and when shared with the licensee and the CNSC with their permission.

- **Climate change –** going forward, EPR reports will include an assessment of climate change considerations. They will provide an analysis of external hazards and environmental parameters, and whether a licensee has applied sufficient safety margins within their design.
- **Clear definitions of safety limits and risk –** improving how we explain how certain concepts related to safety limits and risk are established to protect the health and safety of workers, the public, and the environment near nuclear facilities.

Lastly, we want to focus on finding different opportunities for sharing these reports so that the public and Indigenous Nations and communities are aware that this information is available and easily accessible. We've established an internal EPR working group within the CNSC to address these opportunities for improvement and we welcome any feedback or suggestions for the public and Indigenous Nations and communities on our EPR reports and associated products and procedures.

French summary

Le mandat de la Commission canadienne de sûreté nucléaire (CCSN) comprend informer objectivement le public sur les plans scientifique ou technique ou en ce qui concerne la réglementation du domaine de l'énergie nucléaire et d'établir un climat de confiance avec le public et les Nations et communautés autochtones. Pour l'aider à réaliser ce mandat, le personnel de la CCSN publie des rapports d'examen de la protection de l'environnement (EPE) afin d'assurer la transparence de l'évaluation par le personnel de la question de savoir si un titulaire de permis prendra les mesures appropriées pour protéger l'environnement ainsi que la santé du public.

Les rapports d'EPE du personnel de la CCSN résument les évaluations techniques des données de surveillance environnementale d'un titulaire de permis, les évaluations des risques environnementaux et d'autres soumissions liées aux mesures et aux programmes de protection de l'environnement. Nous incluons également de l'information sur les activités de vérification indépendantes, comme le Programme indépendant de surveillance environnementale de la CCSN, les études régionales pertinentes sur la santé, les programmes de surveillance et les études sur le savoir autochtone.

Ces rapports fournissent des données et des analyses faciles à comprendre et sont disponibles sur le site Web de la CCSN et sur le Portail du gouvernement ouvert du gouvernement du Canada. Pour rendre les constatations de nos rapports d'EPE accessibles à toutes les audiences, nous avons créé des brochures pour mettre en évidence les principales constatations. Un ajout récent à nos rapports est une section sur les impacts potentiels du changement climatique sur les installations nucléaires et les mesures d'atténuation en place.

Les rapports d'EPE se sont avérés être un outil de discussion précieux lors des délibérations de la Commission, des activités de sensibilisation du public et lors de la mobilisation des Autochtones. En fournissant de l'information sur les EPE faciles à comprendre dans de multiples formats, la CCSN s'efforce continuellement de favoriser la confiance, la sensibilisation et la transparence dans l'exploitation et la réglementation des installations nucléaires au Canada.

Figure 1: Sample of an EPR pamphlet

Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

Canada

Environmental Protection Review

The following is a summary of the Environmental Protections Review (EPR) for the Darlington Waste Management Facility (DWMF) located in the Darlington Nuclear (DN) site in Clarington, Ontario. EPRs are an evidence-based technical assessment conducted by the Canadian Nuclear Safety Commission (CNSC) staff, as required by the *Nuclear Safety and Control Act*.

Darlington Waste Management Facility

The DWMF is in the traditional territory of the Michi Saagiig Anishinaabe people. These lands are covered by the Williams Treaty between Canada and the Mississauga and Chippewa Nations.

The DWMF consists of two in-service storage buildings, a dry storage container processing building, and the Retube Waste Storage Building (RWSB). Releases from the DWMF are significantly lower than those from the nearby Darlington Nuclear Generation Station (DNGS) and emissions from the DWMF should be considered as a small fraction of the overall emissions and releases from the DN site as a whole.

Key Findings

Airborne Emissions	Waterborne Effluent	IEMP	Health Studies
✓	✓	✓	✓

CNSC staff found that Ontario Power Generation (OPG) has implemented and maintained effective environmental protection measures to adequately protect the environment and the health of persons.

Scan to access the full report or find it at **nuclearsafety.gc.ca**

Indigenous Knowledge

The CNSC recognizes the importance of considering and including Indigenous knowledge in all aspects of the CNSC's regulatory processes, including in environmental protection reviews.

To find out more, visit the CNSC's Indigenous Knowledge Policy Framework

Effects to the Environment

CNSC staff reviewed OPG's assessment of current and predicted effects of licensed activities on the environment and health of persons in the 2020 environmental risk assessment for the DWMF.

Atmospheric Environment

OPG controls and monitors airborne emissions from the DWMF to the environment, including monitoring of both radiological and hazardous emissions. CNSC staff found that OPG's air emissions have remained below CNSC-approved licence limits and that the environment and public health remain protected.

Terrestrial and Aquatic Environment

There is no terrestrial or aquatic monitoring specific to the DWMF since releases from the DWMF are negligible. OPG has comprehensive site-wide aquatic and environmental monitoring programs that demonstrate that the terrestrial and aquatic environments around the DN site remain protected.

Human Environment

OPG monitors the environment surrounding the DN site to determine if there is an impact to human health through breathing the air, drinking and swimming in the water, and eating plants, fish, and wildlife from the area.

Annual public limit (µSv)	2017	2018	2019	2020	2021
1000	0.7	0.8	0.4	0.4	0.6

The estimated annual radiological doses shown above have remained below the regulatory annual dose limit for the public (1000 µSv). CNSC staff have found that impacts to human environment from radiological and hazardous substances released from the DWMF are negligible.

For questions, contact: ea-ee@cnsc-ccsn.gc.ca

Releases to the Environment

Hazardous and radiological substances have the potential to cause negative impacts to both humans and the environment. Release limits are established to ensure releases remain at levels protective of the environment and human health.

Airborne Emissions

Under normal operating conditions, there is a negligible potential for hazardous airborne releases. However, there is a small potential for radiological airborne emissions at the DWMF resulting from welding and vacuum drying activities. The DWMF has in place high-efficiency active ventilation systems to reduce these potential releases. OPG monitors the airborne emission data weekly and it has remained **significantly below** the applicable release limits from 2016 to 2021.

Waterborne Effluent

There are negligible liquid releases from operations of the DWMF. However, stormwater and foundation drainage[1] were monitored for tritium and gross gamma. The stormwater and foundation drainage are primarily influenced by air emissions from external facilities (such as tritium washout from the nearby DNGS).

The waterborne effluent of tritium and gross gamma in annual stormwater releases remained **significantly below** the administrative limits from 2016 to 2021.

[1] OPG monitored water collected by the drainage systems located along the foundation of buildings within the DWMF.

The exposure pathway

This figure illustrates a conceptual model of the environment around a generic nuclear generating station site (including a generic radioactive waste management facility) to show the relationship between releases (airborne emissions or waterborne effluent) and human and ecological receptors or exposure pathways.

Health Studies

The CNSC reviews health studies as an important component of ensuring that the health of people living near or working in the DN site are protected.

CNSC staff review:

- ✓ International radiation epidemiology reports
- ✓ CNSC's studies and scientific publications
- ✓ Provincial and national-level studies and reports

CNSC staff have not observed and do not expect to observe any negative health outcomes connected to the DN site and the DWMF.

CNSC Independent Environmental Monitoring Program (IEMP)

The IEMP is carried out by CNSC staff in publicly accessible areas and consists of taking samples from the environment and analyzing them for harmful substances released from facilities in all areas of the nuclear fuel cycle.

The IEMP results for 2021, 2017, 2015 and 2014 confirm that the public and the environment surrounding the DN site **remain protected**.

Results are consistent with the results submitted by OPG.

Scan to view the IEMP results or find them at nuclearsafety.gc.ca

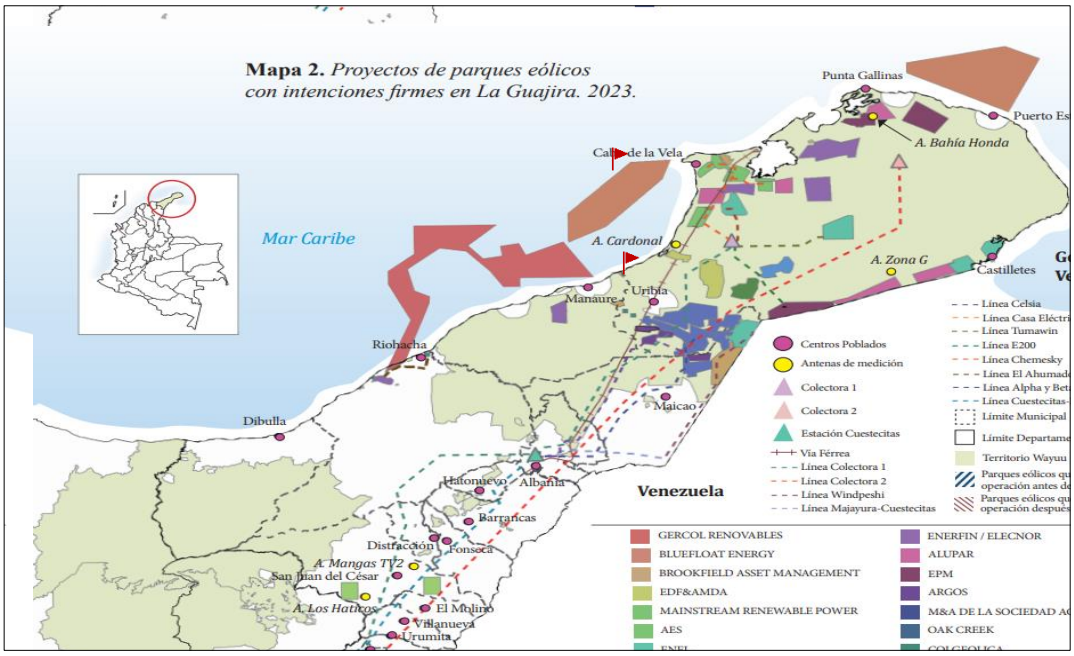
Sector Wide Human Rights Impact Assessment of the Wind Sector in La Guajira, Colombia: scoping phase analysis

Viviana Arango – Project Coordinator, CREER
Valentina Ricón - Researcher, CREER

Introduction

For the green transition to be a just transition, the human rights of affected communities and workers need to be respected when developing energy projects. This means that affected communities and workers should be engaged in the identification of human rights risks and opportunities of energy developments in a timely and safe manner, and that their input is meaningfully reflected in project plans.

La Guajira in Colombia is one of the regions with the highest wind potential in the world – both on shore and offshore. It is a territory rich in resources and culture, but it also has a fragile ecosystem inhabited by extremely vulnerable communities, including Wayúu indigenous peoples. La Guajira has been under pressure from coal extraction, suffered from more than 40 years of armed violence, and is very vulnerable to climate change. There is a serious risk that the development of around 60 wind projects in La Guajira exacerbates the vulnerability and human rights challenges affecting the Wayúu, especially Wayúu women.



Map 1. Wind projects with firm intentions in La Guajira.
Source: Indepaz 2023

The Centro Regional de Empresas y Emprendimientos Responsables (CREER) and the Danish Institute for Human Rights (the Institute) are developing a Sector Wide Impact Assessment (SWIA)

on human rights for the wind sector[1] in Colombia to look at the combined impacts of these projects in the region. The expected results from the project are:

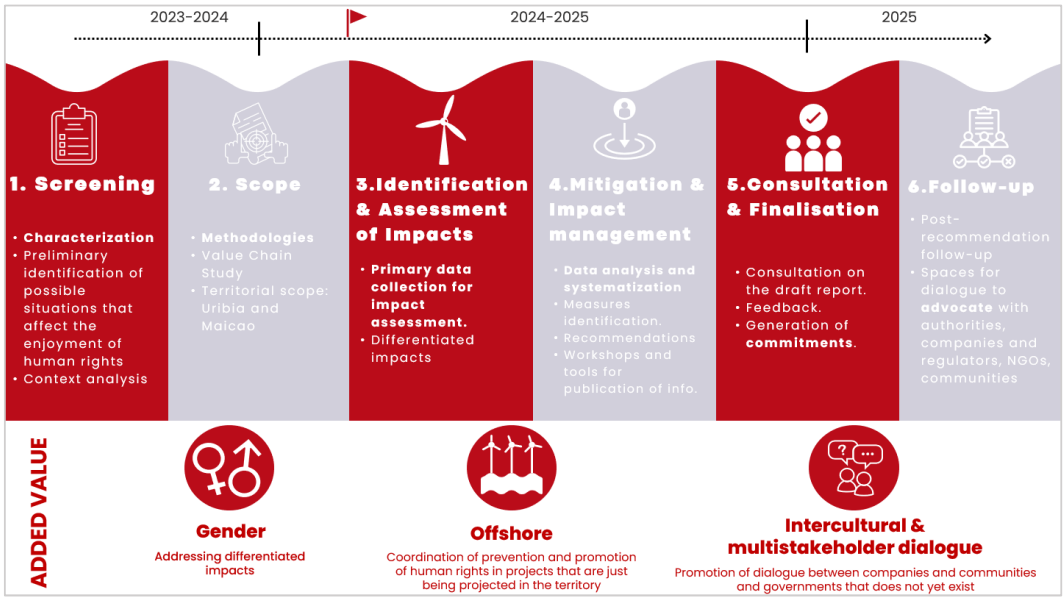
- A systematic and robust identification of actual and potential impacts in human rights related to the wind developments that can inform decisions;
- Recommendations for companies and government on how to prevent and address such human rights violations;
- The creation of safe spaces for dialogue and learning between parties that currently have serious problems listening and understanding each other;
- A robust improved methodological approach, that can be implemented in any energy corridor, in complex social settings like indigenous territories, that is consistent with new developments and best practice;
- Better outcomes for the communities hosting these projects.

Methodology

The central methodology is a Sector Wide Human Rights Impact Assessment (SWIA), which consists of 6 phases (see graphic). The SWIA is based on a collaborative approach to ensure that communities and specific groups are involved in decision-making processes, can access information and receive capacity building on the topics of their concern, as well as ensure that their experiences and expectations reach energy companies and decision makers. Moreover, key business and governmental actors are invited to dialogue and capacity building sessions to discuss the findings and identify shared solutions. The screening and scoping stages were completed in 2023. This included a mapping of all relevant actors, planned projects and companies involved in La Guajira, as well as of the relevant legal framework, policies, and procedures.

The Institute and CREER worked with local indigenous experts to understand the unique and complex land rights and gender dynamics of the Wayúu people and understand how to ensure respectful and meaningful participation of community actors in future processes. Good relationships were established with organisations and individuals, including state actors, energy companies, and community organisations.

[1] The sector is understood as the relationship of the different actors involved in the projects that make up the economic activity and its purpose (state agencies, public entities, companies in their different links, communities, guilds, civil society, etc.)



Scope of the SWIA for the wind sector

The proposed scope of the study comprises actual and potential human rights impacts of land-based wind projects as well as of planned off-shore wind in the municipalities of Uribia and Maicao in La Guajira, Colombia. The scoping phase of the study identified, among the key issues:

- Inadequate procedures for Free, Prior and Informed Consent (FPIC);
- Conflicting mandates and legitimacy of traditional authorities and representatives, as well as exclusion of specific community groups during engagement and land access agreements;
- Impacts to intangible cultural heritage and disruption of sacred areas;
- Gender based violence and exclusion of women from decision-making;
- Inadequate and opaque benefit-sharing agreements;
- Increased conflict and violence.

Main findings

The preliminary identification of possible situations that affect the enjoyment of human rights are:

SITUATIONS	DESCRIPTION
LACK OF ACCESS TO INFORMATION	-Absence of consolidation of information on the quantity, routes, environmental licensing processes, and parent companies and third-party owners of the projects. -There is no clear information on the value chains of onshore or offshore projects to recognize the points where the greatest impacts on human rights may occur.
MULTIPLICITY AND MULTICAUSALITY OF CONFLICTS (Social, environmental, cultural, economic, intra-clan, etc.)	-There is a lack of recognition of Wayuu knowledge, worldviews, and culture by companies in the sector, leading to conflicts. -Generation of conflicts due to (asymmetric) negotiations of prior consultations.

FREE, PREVIOUS, AND INFORMED CONSULTATION AS A FOCUS OF CONFLICT IN NEGOTIATIONS WITH THE WIND SECTOR	-Absence of regulation and lack of knowledge by communities about the figure of "Advisors" operating in FPIC. -Negotiations between companies and communities that do not have institutional capacity for accompaniment in FPIC. -Prior Consultation is the only space for dialogue that ethnic communities have with the State, limiting the essence of the right and becoming a space that generates conflicts.
ABSENCE OF A GENDER APPROACH TO RECOGNIZE THE IMPACTS OF THE WIND SECTOR	-Political participation and decision-making scenarios do not have sufficient representation of women or young people. -There is no analysis that accounts for the gender approach and the differentiated impacts of the wind sector on women and sexual diversities.
NEED FOR A BROAD INTERCULTURAL PERSPECTIVE	-Lack of recognition of the existing cultural diversity in La Guajira, which invisibilizes actors such as Afro, peasants, Guajira people. -There is a crisis of legitimacy of Wayuu authorities. There is a multiplicity of "ancestral" authorities (legitimate within Wayuu communities) and "traditional" authorities (certified by the Ministry of the Interior) that generate problems of representativeness and relationship with companies when generating dialogues and agreements, which can generate conflicts within the communities or intra-clan conflicts within the Wayuu communities. -Despite the existence of extractive sector projects offshore, the cultural elements surrounding offshore wind projects represent possible high impacts for Wayuu communities.
WEAKNESSES AND GAPS IN THE REGULATORY AND PUBLIC POLICY FRAMEWORK	-Policies, regulatory framework, and responsibilities of the different State entities are diffuse and weak, and have faced multiple changes in the last government. For example, in issues such as: transfers, project closure, energy communities, PCFI, etc. -Absence of measures to ensure the adequate implementation of a human rights approach.
SECURITY ISSUES (context and protection of leadership)	-Risks to the civic space, especially for socio-environmental leaderships that carry out actions for the defense and protection of their territories. -Actions by illegal groups, disputes over territorial control, and drug trafficking routes can affect the operation of wind projects and increase violence in these areas, as well as the presence of the team on the ground.

Modeling Wildlife Roadkill Risk on São Paulo Highways Amidst Sugarcane Area

Rodrigo Ferreira da Silva, MSc[1]

Introduction

The issue of wildlife roadkill on highways is a highly relevant environmental concern, raising both biodiversity preservation and road safety issues. Wildlife roadkill has been highlighted in numerous studies due to its significant negative impact on biodiversity as well as its implications for operational safety and associated costs (Abra et al., 2019). Estimates indicate that the annual number of medium to large mammals hit by vehicles in Brazil reaches approximately 9 million according to Pinto et al. (2022), while an analysis by the Brazilian Center for Road Ecology Studies [CBEE], based on 14 scientific studies, reveals that 5 million large animals are killed annually on Brazilian highways (Vasconcelos, 2017).

The state of São Paulo, with a population of 44.4 million inhabitants (IBGE, 2023), combines the most diversified economy in Brazil with important forest remnants that harbor rich biodiversity. In the context of São Paulo's agribusiness, the beginning of this century was marked by a sugarcane expansion from the mid-2000s, leading to competition for land use with other agricultural activities (Camara and Caldarelli, 2016).

The limited understanding of the interaction between the expansion of sugarcane planting areas and highway infrastructure in the state of São Paulo has raised concerns among some highway concessionaires located in the western part of the state. This is because research and attention often focus on regions with more preserved vegetation, such as forest remnants and Conservation Units, which are predominantly located in the eastern part of São Paulo.

The discussions of the Working Group for the Wildlife Roadkill Mitigation Plan, conducted by CETESB, initiated the strategic analysis of this issue with the São Paulo sugarcane and highway sectors. CETESB's Board Decision number 141, dated August 2018 (DD 141/2018), established normative criteria for the disposal of dead animals on highways (CETESB, 2018). Highway Operators, responsible for highway management, are required to submit semiannual public reports to CETESB, detailing occurrences of wildlife roadkill within the highway domain and the disposal of live animals and removed carcasses. All reports are available for public consultation upon request.

This work aims to develop a mathematical model capable of predicting the occurrence of wildlife roadkill on highways, to be applied in the Northwest of São Paulo, a region characterized by long stretches of highways crossing agricultural areas, notably sugarcane. Such a model will enable the identification of critical sections, allowing the implementation of measures to mitigate occurrences and protect wildlife. The practical application of this model in road construction and maintenance projects in the region may help anticipate and minimize negative impacts on wildlife.

In this context, specific wildlife roadkill data provided by the concessionaires Triângulo do Sol and Entrevias, as well as the Department of Highways of the State of São Paulo [DER/SP], along with land use and occupation information provided by the MapBiomas Project, were analyzed. The highways selected for analysis are SP-310, SP-322, SP-326, SP-333, and SP-463, all located in the northwest region of the state of São Paulo.

The development of the work consists of an applied study with the development of a spatial prediction model for wildlife roadkill on highways in the Northwest of São Paulo, using a Poisson-type model, in order to classify and geolocate areas according to the risk of these events occurring.

For the predictive analysis, spatial analysis techniques were applied, with the definition of a regression model, aiming to identify areas with the highest risk of roadkill. The R software was used for data manipulation and analysis, in addition to the geoprocessing software ArcGIS and QGIS for spatial analysis and map generation.

1. Institution: Department of Development of Strategic Actions for Licensing, Directorate of Environmental Impact Assessment, São Paulo State Environmental Agency, CETESB, São Paulo, Brazil. E-mail address: rodrsilva@sp.gov.br.

Wildlife Roadkill Incident Database

Data collection was carried out using the tables sent by Highway Operators to CETESB. The dataset includes information such as road characteristics, surrounding area characteristics, affected species, the number of animals hit, and their condition after the incident. Figure 1 illustrates the spreadsheet model presented semiannually, according to DD 141/2018.

REGISTRO DE ACIDENTES COM ATROPELAMENTO DE ANIMAIS E DESTINAÇÃO DE ANIMAIS ACIDENTADOS																				
Ocorrência[1]	Coordenadas Geográficas (UTM)[2]			Características da Via[4]	Características do Entorno[5]	Data[6]	Hora[7]	Rodovia[8]	Km[9]	Sentido[10]	Classificação[11]	Nome[12]			Quantidade[13]	Destinação[14]	Coordenadas Geográficas (UTM)[15]			Obs.:[16]
	X	Y	Fuso[3]									Grupo	Popular	Científico			X	Y	Fuso[3]	

Figure 1. Spreadsheet model with records of animal roadkill incidents. (CETESB, 2018)

Wildlife roadkill incidents were compiled to feed the model, restricted to data on wild animals and those collected over the years 2019, 2020, and 2021. This restriction limits the analysis to three complete seasonal cycles, covering both wet and dry periods, which greatly influence wildlife behavior. The result of this preparation was a spreadsheet with geographic coordinates, which was used to generate a “shapefile” named “Wildlife Incident Points.”

Land Use and Land Cover Database

The land use database used comes from the MapBiomas Project. The database is obtained from Landsat satellite image mosaics, with a spatial resolution of 30 meters, where classifications are made that result in land use maps. The classification methodology is dynamic and procedural, aiming to improve the classification of each typology. The classification performed by the MapBiomas algorithm is carried out at various levels of detail. In this study, four macro land use classes were defined (1 - Vegetation, 2 - Agriculture, 3 - Non-vegetated Areas, and 4 - Water), based on the general classification of the MapBiomas database.

Geographic Databases

Four geographic databases in “shapefile” format were used to develop the work. All databases were reprojected to be worked on in the Universal Transverse Mercator projection system, with a central meridian at 51º west, a scale factor (k) of 0.999600, and the SIRGAS 2000 Datum, zone 22. The databases consist of:

1. Wildlife roadkill incidents on São Paulo highways between 2019 and 2022, obtained from the data processed by CETESB;
2. The 2016 road database of the State of São Paulo, prepared by the National Department of Transport Infrastructure [DNIT];
3. The State Boundary of São Paulo, prepared by the Geographic and Cartographic Institute of the State of São Paulo [IGC];
4. Land use and land cover map produced by MapBiomas.

Cartographic Database Processing

The processing flow of the geographic databases for the model involves several steps. Initially, a 200-meter buffer is generated from the selected highways to serve as input for the model. This buffer is then divided into 1-kilometer segments. Subsequently, the buffer is intersected with the land use map to create a land use base surrounding the highways. Additionally, the buffer is intersected with the database of wildlife roadkill occurrences, establishing a roadkill occurrences base on the selected highways. Ultimately, these datasets are combined to generate the prediction model.

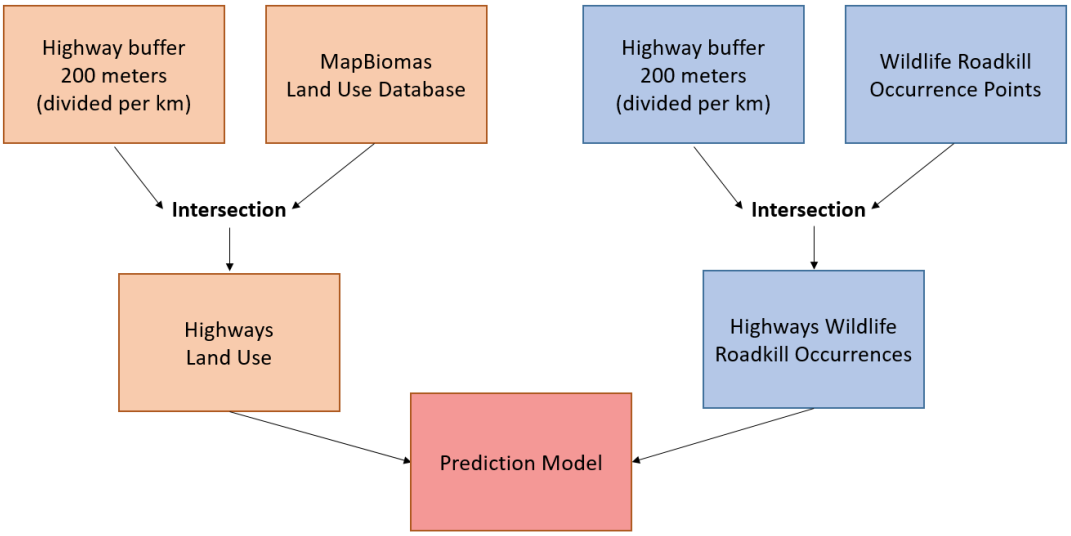


Figure 2. Flowchart of cartographic database processing

Prediction Model

In this study, a generalized linear regression model of the Poisson type for count data was selected, which falls under the group of Generalized Linear Models [GLM]. This model is appropriate for estimation when the dependent variable is quantitative with integer and non-negative values (count data).

According to Favero and Belfiore (2017), for a Poisson regression model to be valid, it is essential that the dependent variable follows a distribution with a mean equal to the variance, known as equidispersion. If this condition is met, it is feasible to estimate the corresponding regression model. Equation 1 presents the Poisson regression model:

$$\ln(\hat{Y}_i) = \alpha + \beta_1 \cdot X_{1i} + \beta_2 \cdot X_{2i} + \cdots + \beta_k \cdot X_{ki} \quad (1)$$

In Table 1, the variables used to execute the prediction model and their respective measurement scales are presented.

Table 1 - Variables and Measurement Scale of the Prediction Model

Variable	Type	Description	Scale
Number of Animals	Dependent	Total number of individuals involved in wildlife roadkill incidents. Data sourced from the Highways Wildlife Roadkill Occurrences" database.	Ratio
Vegetation	Predictor	Land use class that includes all areas with vegetation formations present in the surroundings of highways (buffer of 200 meters). Data sourced from the "Highway Land Use" database.	Ratio
Non-vegetated areas	Predictor	Land use class that includes all areas not occupied by vegetation formations and water present in the surroundings of highways (buffer of 200 meters). Data sourced from the "Highway Land Use" database.	Ratio
Agriculture	Predictor	Land use class that includes all cultivated areas present in the surroundings of highways (buffer of 200 meters). Data sourced from the "Highway Land Use" database.	Ratio
Water	Predictor	Land use class that includes all areas occupied by watercourses and bodies of water in the surroundings of highways (buffer of 200 meters). Data sourced from the "Highway Land Use" database.	Ratio

Application of the Model

To apply the model, it is necessary to obtain the layout of the new highway and perform the following process. A 200-meter buffer is generated from the new highway and divided into 1-kilometer segments. This buffer is then intersected with the land use map, followed by running the prediction model. The output is a file containing predictions of wildlife roadkill per kilometer, which can be transformed into a map.

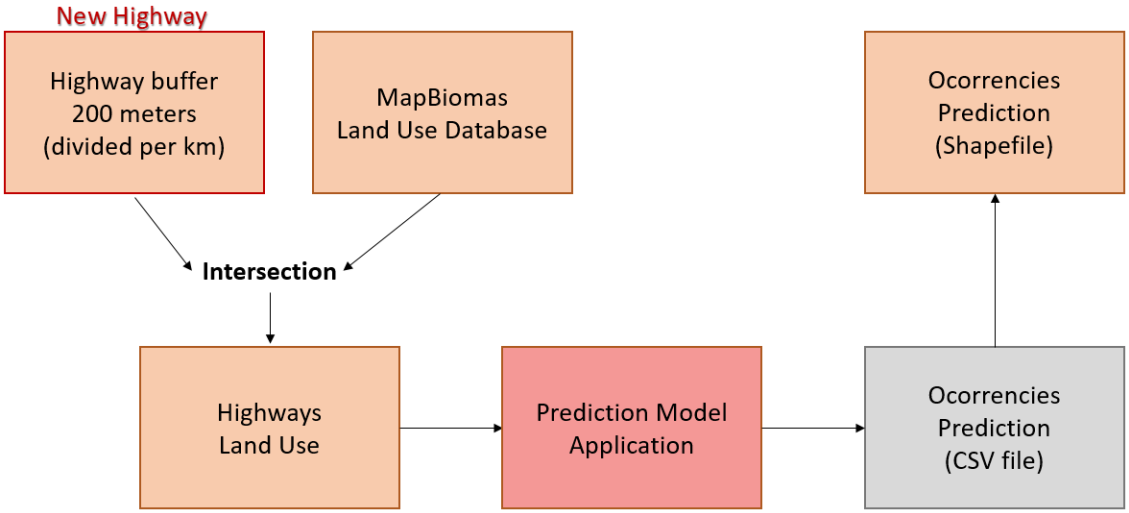


Figure 3. Flowchart of Prediction Model Aplication

This workflow was applied to generate predictions of wildlife roadkill occurrences on the road connecting Highway SP-310 to the city of Olímpia, spanning 42 kilometers.

A proposal for improvements to this road was then simulated, transforming it into a modern dual-carriageway highway with parameters similar to those used in the model training. The output shapefile "Occurrences Prediction" was used to develop the Wildlife Roadkill Prediction Map (Figure 4), which graphically illustrates the areas most sensitive to wildlife through a choropleth pattern. This pattern symbolizes the statistical surface with color-coded areas, ranging from cooler tones (green) to warmer tones (red), indicating increasing relative risk of roadkill events based on the expected numbers from the model.

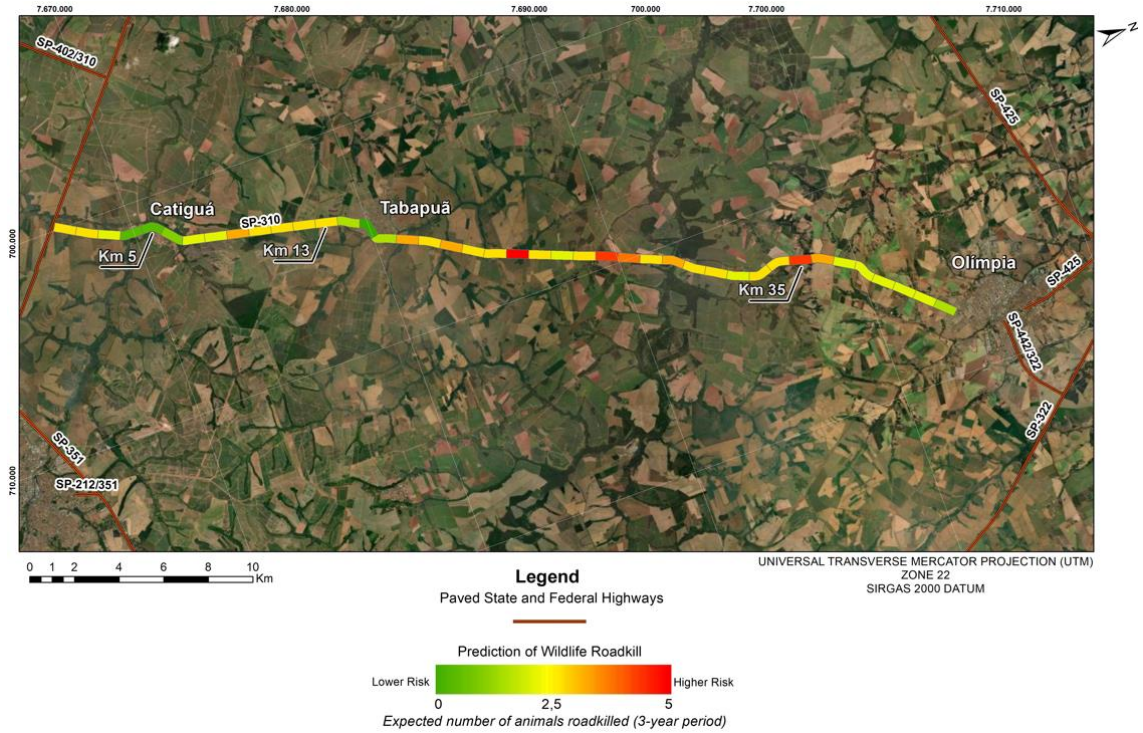


Figure 4. Map of Wildlife Roadkill Prediction Occurrences

The observed result on the map represents the predicted number of occurrences over a three-year period. By exploring these results, it is possible to identify how land use characteristics impact the model's response, as observed in Figure 5, which provides examples of areas classified into green, yellow, and red risk levels.

Km 5
Surroundings: Urban Area
Classification: Lower Risk

Km13
Surroundings: Agriculture
Classification: Intermediate Risk

Surroundings: Forest Fragment
Classification: High Risk
Km 35

Figure 5. Examples of land use characteristics of road classified by risk levels

Analyzing the map during road layout definition and in the development of an executive highway project, with the identification of areas with high potential for roadkill occurrences, can contribute to defining areas of greater importance for implementing wildlife crossing devices. This facilitates landscape connectivity and safe passage for these animals. Risk mitigation planning may also include strategies to modify driver behavior, such as appropriate signage, installation of speed reducers (like speed bumps, signs, radar, and rumble strips), and environmental education programs.

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Biodiversity Risk Management for Challenging International Projects

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1. Introduction

Effective biodiversity risk management (BRM) in international projects is important for several reasons, reflecting both ethical considerations and pragmatic concerns tied to environmental sustainability, social responsibility, and regulatory compliance. Integrating BRM into corporate and development strategies is essential for mitigating human-caused biodiversity losses and ensuring the sustainability of global economies and societies (Hummel et al., 2008; Addison et al., 2018; Carvalho et al., 2022).

Achieving No Net Loss (NNL) and Net Gain (NG) for biodiversity is an essential part of the Mitigation Hierarchy (MH; avoiding, minimising, restoring, and then offsetting residual impacts) to avoid the negative impacts of development activities. These goals ensure that unavoidable biodiversity losses are balanced by measurable gains, contributing to overall biodiversity conservation (Gardner et al., 2013; Sonter et al., 2020; Pope et al., 2021). In the corporate context, the implementation of certifiable standards on biodiversity management reflects a proactive environmental strategy by organisations and emphasises the importance of effective BRM in corporate sustainability (Boiral et al., 2017).

Applicable standards and requirements for biodiversity offsetting outline the integration of biodiversity offsets within the MH to achieve NNL in natural habitats (NH) and a NG in critical habitats (CH), as mandated by IFC Performance Standards (PS6) (IFC, 2012) and Guidance Notes (GN6) (IFC, 2019). The development of a Biodiversity Offset Management Plan (BOMP) adheres to international good practices, including the Business and Biodiversity Offset Programme (BBOP) Standard and the Biodiversity Offset Design Handbook, alongside guidance from the World Bank.

Key principles for designing and implementing biodiversity offsets involve aiming for overall benefits to biodiversity and ecosystem services, applying the MH, seeking long-term benefits, and using a landscape approach. Offsets should achieve additionality, align with existing initiatives, and be developed through participatory processes involving stakeholders. Offsets must deliver measurable biodiversity gains, be like-for-like or of higher conservation value, and not compromise ecosystem functions.

1.1. Challenges

The pursuit of achieving NNL and NG of biodiversity in international projects is fraught with challenges, many of which stem from safety risks, socio-political conditions, and the inherent complexity of measuring and mitigating impacts, sometimes remotely. These challenges underscore the need for robust, innovative strategies in BRM.

Biodiversity impacts and the benefits of conservation measures often manifest over different temporal and spatial scales. Immediate impacts may lead to long-term losses, while the benefits of mitigation or offset activities may take years to materialise, making it challenging to ensure true NNL or NG. The variability and complexity of natural ecosystems make it difficult to establish clear baselines and quantify losses and gains in a scientifically robust manner. Importantly, international projects may span a range of ecosystems, from forests and wetlands to deserts and oceans, each with its unique biodiversity and ecological functions. The complexity of ecosystems make it challenging to assess, monitor, and mitigate impacts comprehensively. Furthermore, different ecosystems require different management strategies and conservation approaches, requiring a deep understanding of local ecological conditions and Priority Biodiversity Values (PBVs). Making matters more challenging, the availability of existing biodiversity data is often limited in such areas, leading to incomplete or biased baselines that fail to represent the true biodiversity patterns and dynamics (Zizka et al., 2021).

Safety risks, particularly in remote or unstable regions, pose significant challenges for biodiversity conservation efforts. Projects located in areas with difficult terrain, extreme weather conditions, or limited access can make field surveys and conservation activities hazardous for personnel. This not only hampers the collection of crucial baseline data but also affects ongoing monitoring and mitigation efforts required to achieve NNL or NG (Dallimer & Strange, 2015; Busscher & Vanclay, 2018; Zizka et al., 2021). Furthermore, the presence of dangerous wildlife or concerns about health risks (e.g., diseases) further complicates fieldwork, limiting the ability to conduct thorough assessments and implement conservation actions.

Socio-political conditions in project locations can significantly impact BRM efforts. Political instability, conflict, or weak governance can obstruct the implementation of biodiversity conservation measures and undermine the enforcement of environmental regulations. Moreover, in regions where land tenure issues prevail, the establishment of biodiversity offsets or conservation areas may be challenged by competing land uses or unclear land rights, complicating efforts to achieve NNL or NG (Busscher & Vanclay, 2018). The socio-political context also affects stakeholder engagement (crucial for the success of biodiversity initiatives) as it may hinder effective communication and collaboration with local communities, indigenous peoples, and government entities.

1.2. Solutions

Innovative techniques and tools have revolutionised the way biodiversity assessments and conservation efforts are conducted, particularly in the context of achieving NNL and NG objectives for biodiversity (White et al., 2021). Techniques such as drone surveys, environmental DNA (eDNA) sampling, and camera trapping have significantly enhanced the capacity for biodiversity assessment (including the establishment of robust baselines and the identification of often elusive species) and monitoring, supporting the achievement of NNL and NG objectives (Table 1) (Meek et al., 2016; Bevan et al., 2018; Varela-Jaramillo et al., 2023). These advancements allow for more efficient, accurate, and less intrusive monitoring of wildlife and ecosystems, supporting effective BRM. These technologies can enable data collection from remote or inaccessible areas, reducing the need for physical presence in potentially hazardous locations. In areas with socio-political instability, involving local communities and stakeholders in data collection and monitoring efforts can not only provide valuable insights but also create a sense of ownership and cooperation, contributing to the sustainability of biodiversity management initiatives. Moreover, the sharing of data collected during baseline and monitoring surveys with relevant local, national, or global biodiversity databases has been identified as a specific opportunity for businesses to improve biodiversity impact mitigation (White et al., 2023). By contributing to these databases, organisations can enhance the overall knowledge base and facilitate collaborative efforts to address biodiversity challenges in regions with safety risks and socio-political instability.

Table 1. Innovative methods for biodiversity surveys and their advantages for achieving NNL / NG.

Method	Advantages
eDNA sampling	Used to quickly assess the biodiversity of an area, including detecting rare or elusive species, which is critical for designing effective NNL and NG strategies. It is particularly useful in aquatic environments where traditional survey methods may be less effective.
Drones	Drone surveys support NNL and NG objectives by providing comprehensive data on habitat quality and extent, enabling precise impact assessments and the monitoring of restoration efforts. Drones can also access remote or difficult terrain with minimal disturbance to wildlife.
Camera trapping	Helps identify species composition and population trends, informing the development and success of biodiversity offsets and conservation measures. This method is especially useful for nocturnal or cryptic species that are otherwise difficult to observe.

Method	Advantages
Remote sensing and GIS	Critical for planning and monitoring NNL and NG initiatives, allowing for the assessment of large-scale environmental impacts, the identification of potential conservation areas, and the evaluation of habitat restoration efforts.

2. Case studies

RSK has been at the forefront of supporting numerous international projects across a diverse array of sectors, for clients operating with a commitment to environmental sustainability and biodiversity conservation. The following case studies exemplify RSK's multidisciplinary approach, showcasing innovative strategies and collaborative efforts employed to achieve NNL or NG in biodiversity. These examples highlight strategies to navigate the complexities of large-scale international projects, ensuring that BRM is integrated into project planning and execution.

2.1. Linear development project in Northern Angola

In Northern Angola, a linear development project presented significant challenges for BRM due to lingering threats from landmines remaining from the civil war between 1975 and 2002. The presence of landmines rendered comprehensive baseline surveys difficult, as traditional survey methods were constrained by safety concerns. Consequently, surveys were limited to areas along roads, with precautionary approaches such as critical habitat assessment (CHA) and residual impact assessment (RIA) being employed to identify PBVs and impacts and mitigate risks.

Remote sensing technologies were utilised to infer habitat presence and species distribution as proxies for direct monitoring, facilitating the identification and management of biodiversity risks. The detonation of landmines posed additional environmental threats, including habitat loss and fragmentation, edge effects, soil erosion, sediment loading in water sources, and the emission of fugitive dust (Berhe, 2006).

The CHA identified several PBV species, including three reptiles—Slender-snouted Crocodile (*Mecistops cataphractus*), African Softshell Turtle (*Trionyx triunguis*), and Angolan Adder (*Bitis heraldica);* five birds—White-headed Vulture (*Trigonoceps occipitalis*), Bateleur (*Terathopius ecaudatus*), Braun's Bush-shrike (*Laniarius brauni*), Grey Parrot (*Psittacus erithacus*), and Red-footed Falcon (*Falco vespertinus*); three fishes—Congo Blind Barb (*Caecobarbus geertsii), Oreochromis macrochir*, and *Labeobarbus ansorgii*; and six plants—*Rotala robynsiana*, *Rotala smithii*, *Genlisea angolensis*, *Leiothylax quangensis*, *Dalbergia macrosperma*, and *Inversodicraea cristata*.

Further surveys were recommended to refine PBVs from the CHA, including targeted bird surveys along road edges and aquatic eDNA surveys. Key BRM strategies encompassed the avoidance of wetlands, plant translocation if necessary, progressive habitat restoration following landmine clearance, avoidance of breeding bird seasons, and additional baseline surveys post-clearance. In some cases, biodiversity offsets might be required to compensate for unavoidable impacts.

Overall, the project in Angola underscores the complexities of BRM in regions with challenging socio-political conditions, highlighting the necessity for innovative approaches and adaptive management strategies to safeguard biodiversity in the face of significant environmental and safety constraints.

2.2. Project in West Africa

Mali, a West African nation has faced significant socio-political challenges, including persistent instability and conflict since a coup in 2012. Subsequent coups in August 2020 and May 2021 have further disrupted efforts to establish stable governance. The country grapples with various armed groups, including jihadist organisations linked to al-Qaeda and ISIS, and ethnic militias, which exploit ungoverned areas in the northern and central areas to launch attacks on military and civilian targets. This ongoing conflict has created a severe humanitarian crisis, with millions requiring aid and facing displacement, food insecurity, and health crises exacerbated by environmental factors like droughts.

In this challenging context, our project focused on monitoring PBVs. During this monitoring, camera trap footage in April 2019 captured an African Wild Dog (AWD; *Lycaon pictus*), a species not recorded in the country for 30 years. This sighting of a young female AWD, likely dispersing from Senegal's Niokolo-Koba National Park or an unrecorded nearby pack, highlights the complexities of BRM in unstable regions. AWDs have extensive home ranges of up to 1,500-2,000 km², leading to low population densities and significant conservation challenges (Ginsbery et al., 1997). The habitat in the project area does not support a resident AWD pack, but the dispersal behaviour observed is critical for understanding the species' movements and conservation needs.

Globally, AWD populations are fragmented and endangered, with fewer than 1,409 mature adults in West Africa. They face severe risks from habitat fragmentation, human conflict, and diseases (Woodroffe & Sillero-Zubiri, 2020). The sighting underscores the urgent need for effective conservation strategies in Mali, where illegal semi-mechanized artisanal mining along rivers and creeks degrades habitats and disrupts wildlife movement. These activities threaten not only AWDs but also other species like hippopotamuses (*Hippopotamus amphibius*) that rely on these aquatic ecosystems. The degradation of critical wildlife corridors due to mining and other human activities necessitates immediate measures to mitigate impacts and protect biodiversity in the region.

This case study illustrates the intricate challenges of managing biodiversity risks in areas with complex socio-political conditions. The incidental discovery of the AWD emphasises the importance of continued monitoring and adaptive management strategies to address both conservation challenges.

2.3. Barrick Gold's offset: the Fina Project

Barrick Gold initiated the Fina Project to offset biodiversity impacts from the Loulou Gold Mine in Mali. The project is situated within the Fina Reserve, part of the UNESCO-classified Biosphere Reserve Boucle du Baoulé, located 80 km northwest of Bamako and covering 104,900 hectares. The region faces a severe biodiversity crisis, with threats of permanent wildlife loss. The Fina Project, launched on October 7, 2021, is a 15-year initiative beginning with a 5-year commitment from Barrick Gold, which pledged $5 million through its Loulou Gold Mine subsidiary for initial funding.

The project is managed by the NGO BIO.DUR.SHAHEL (Bios) under a contract with the Direction Nationale des Eaux et Forêts (DNEF). The offset strategies include habitat restoration and measures to prevent further biodiversity loss. Additionally, the project encompasses the development of a business and management plan that focuses on community development, livelihood restoration, habitat management, and education.

Despite these well-structured plans and commitments, the Fina Project faces significant challenges due to the security situation in the region. The area has been classified as a red zone, plagued by banditry and the risk of terrorism, which places the project's staff and operations in jeopardy. This instability threatens the achievement of the project's biodiversity goals and NG objectives.

Such extrinsic factors highlight the limitations faced by companies operating in isolation in unstable regions. Even with adherence to best practice standards, the security risks can undermine project outcomes. A potential solution to mitigate these challenges is to centralise offset funds and strategies for all similar projects within unstable regions. This approach could provide a coordinated response to security threats and improve the resilience and effectiveness of biodiversity offset initiatives in challenging environments.

3. Conclusions

Addressing BRM in regions afflicted by political unrest and safety issues necessitates innovative approaches to ensure NNL and NG targets are met. The argument for national offset strategies, as highlighted by Kormos *et al*. (2014) in the context of great apes in countries with socio-political risks such as Mali, underscores the need for a coordinated response to protect biodiversity effectively. Implementing centralised offset funds and strategies could mitigate the challenges faced by isolated projects operating in unstable regions.

One model is South Africa's National Biodiversity Offset Policy, which links compensatory actions to achieving specific targets, such as limiting ecosystem loss to predefined thresholds (Simmonds et al., 2019). This policy demonstrates the potential benefits of a unified national approach, ensuring that biodiversity conservation efforts are resilient to extrinsic threats. By adopting similar centralised strategies, other regions facing political and security challenges can enhance the effectiveness of their biodiversity offset initiatives, securing better outcomes for biodiversity conservation.

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Analysis of the EIA of Landfills for Sustainability in Perú

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Abstract

Solid waste represents a serious problem that needs to be solved. In countries such as Perú, landfills are still viable alternatives for waste management (Minam, 2023). However, its implementation has many aspects, both economic, social and environmental. This article will analyze in a comparative manner the Environmental Impact Assessments (EIA) carried out in Perú on solid waste (Senace, 2023), in order to know their alignment with the Sustainable Development Goals, placing special emphasis on Goals 3: Good Health and Well-being, 6: Clean Water and Sanitation, 11: Sustainable Cities and Communities, 12: Responsible Consumption and Production and 14: Life Below Water (INEI, 2023).This article will seek to know if the landfills evaluated with the respective environmental management instrument contribute to the fulfillment of the Sustainable Development Goals and therefore to a Just Transformation. To assess alignment with the Sustainable Development Goals, the monitoring and follow-up system of its indicators will be used, and for the identification of the incidences of socio-environmental conflicts, the monthly reports of social conflicts of the Peruvian Defensoría del Pueblo will be used.

Introduction

Solid waste is a global problem. In countries such as Perú there is a lot to be done regarding this issue, however, it is a problem that causes conflicts, especially in areas where waste management is not the most adequate and the population suffers the effects of pollution.

This article relates the parameters studied in the EIAs to the SDGs and how they can help measure whether environmental management instruments can help achieve the 2030 targets. In addition, environmental conflicts related to solid waste in 2023 are analyzed.

Background

Solid Waste in Perú

In Perú, 21 million tons of solid waste are generated every day. (Servindi, 2024), of which only 1% is recovered. (Servindi, 2024).

According to Gómez, R., & Flores, F. (2014). In Perú, the view on waste management is changing, from being simply a cleaning issue to one that involves recycling and integrated management. The authors note that there are economic incentives to reduce waste going to landfill and an increase in recycling.

According to the National Environmental Information System, the composition of municipal waste is as follows: 9.2% hazardous, 13.7% non-usable, 22.5% inorganic, 54.6% organic (SINIA, 2019).

Landfills in Perú

According to Duran (2020), 55% of the solid waste generated in Perú is taken to a landfill, the rest is taken to illegal waste dumps.

Landfills are infrastructures for the safe final disposal of solid waste based on engineering methods. (OEFA, 2022).

Mixed landfills are those that also handle hazardous waste. (OEFA, 2022).

Perú has 47 landfills and 6 security landfills. (SINIA; 2019).

In Latin America

According to Gonzales & Stamm, (2022) in Chile, landfills have not been the complete solution to the solid waste problem in Santiago de Chile, in fact, they have been the

creators of other environmental problems, as well as social conflicts. The authors point out that landfills have caused several environmental injustices.

The author Mahecha Bustos (2019) describes the case of the Doña Juana landfill located in Colombia, which ended up becoming an environmental problem for this country, one of the causes being its location. The article indicates that landfills can cause major problems of inequality in the population, due to the conflicts they can generate in the surrounding population.

The author Lara (2022) carries out an analysis of the sanitary landfills "La Perseverancia" and "Loma de Mejía" located in Mexico, which present conflicts due to their location and protests of the population. The researcher concludes that public authorities have a fundamental role to play in avoiding or reducing this type of conflict.

According to Guevara, et al (2020) in Bariloche, Argentina there are conflicts related to solid waste due to informal businesses around them. One of the main liabilities of this area is solid waste. The landfill is more than 40 years old and presents the problem that leachate contaminates the water resource.

Methodology

The Environmental Impact Studies related to the landfill published on the SENACE website, which is the Peruvian authority in charge of approving such studies, have been used. The EIAs that are in accordance with SENACE and already approved, have been used.

The content of these EIAs has been compared with the SDGs and their targets to determine whether they are properly aligned.

In addition, the report published by the Peruvian Defensoría del Pueblo for December 2023 has been used to learn about socio-environmental conflicts related to solid waste management.

Environmental Impact Assessments (EIA) of landfills and their alignment with the Sustainable Development Goals.

EIA 1

Environmental Impact Study 1 corresponds to a safety landfill for the treatment and final disposal of hazardous solid waste located in Trujillo, Peru. The project aims to reverse the impacts of poor waste management as waste is currently taken to a landfill.

The approximate generation of industrial waste in the area is approximately 10 to 13 tons per day.

According to the EIA, the potential impacts of the project are:

Atmosphere: air quality, emissions, odors and noise.

Soil: Morphology and relief, land use change and soil quality.

Flora, Fauna, Cultural status, Socio-economic environment.

EIA 2

The project deals with a safety landfill in the south of the country, located in Moquegua, where the infrastructure to handle hazardous waste is scarce. This is a project that will also contribute to the recovery of waste before final disposal.

The potential impacts of the project are:

Physiography: alternation of the earth's surface.

Soils: Alteration of soil quality, change of land use, soil compaction.

Air: vibrations, particulate matter, gases, odors, noise

Wildlife: Habitat Loss

Flora

Social: economy, employment, fear of pollution.

EIA 3

The third IEA is also a security landfill located in the south of the country, in the Arequipa region.

Impacts have been considered in the following aspects:

Air: particulate matter, noise, odors, emissions, vibrations

Soil: land use: relief, quality

Water: surface water quality, groundwater quality

Landscape

Flora

Fauna

Aquatic ecosystems

Customs

Employment

Economy.

These factors taken into account are related to SDG 3 as it is linked to the goal of reducing air, water and soil pollution by 2030.

It is related to SDG 6 as it is linked to the target of minimizing water pollution with chemicals by 2030. Landfills, if properly managed, are a technology that minimizes environmental pollution.

It is linked to SDG 11 as there is a specific target on waste management in cities. In Perú's growing cities, they are a necessary tool for solid waste management.

There is a relationship with SDG 12 as it talks about rational management of products throughout the life cycle. Therefore, it is important to think beyond landfills but in the life

cycle of their products, in responsible consumption, in design for recyclability, among other strategies linked to the circular economy.

And finally, there is a relationship with SDG 14, as landfills in Perú prevent waste from reaching marine ecosystems.

Social conflicts related to solid wasted in Peru during 2023

The issue of waste and sanitation accounted for 4.5% of conflicts in Perú. (Defensoría del Pueblo , 2023).

There are problems due to the mismanagement of solid waste, the lack of collection, as well as conflicts over the location of projects destined to be sanitary landfills.

Some examples:

• Landfill: Huánuco. No dialogue

• Landfill location: Puno: there is dialogue

• Farmers protest prevented the final disposal of waste in different areas of Pasco.

• Problems with waste treatment and final disposal. Junín

• Closure of landfill due to poor final disposal of waste and contamination. Cusco.

Conclusions

- Landfills have different advantages in countries such as Perú, where other techniques for treating solid waste have not yet been developed.
- Landfills help improve waste collection, as well as decrease the amount of greenhouse gases produced. Solid waste is a complex issue to solve, especially when there are different social problems that afflict the population.
- Landfills are still a valid and necessary strategy in countries such as Perú for the proper treatment of solid waste.
- EIAs can be aligned with the SDGs to be instruments that help achieve targets at the national level.
- Solid waste is an issue of socio-environmental conflicts that there are many aspects related to the issue that must be addressed.

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A just transition: for whom?

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Abstract

Critics often argue that sustainable development initiatives are overly fixated on climate mitigation, neglecting the broader spectrum of environmental protection and resource efficiency. Frequently, these efforts overlook the crucial social dimension. Failure to do so causes various social issues, including human displacement, increased social inequality, and impoverishment. More so than ever, the demand for clean energy production has placed socio-economic matters at odds with sound environmental practices, sometimes exacerbating social injustices. Instead of addressing the systemic inequalities built into our modern world, some policymakers still rely on an unbalanced approach to sustainable development by solely considering the environmental element. While cleaner energy production approaches would result in environmental gains, the socio-economic impact of mass retrenchments in, for example, the mining sector will have far-reaching consequences that are seemingly unaccounted for. An unfair transition to cleaner energy will put marginalised and vulnerable groups at risk of the increasing human consequences of climate change, mine closures, loss of livelihoods, and poverty. We have applied the lessons learned from within the mining industry, a sector at the center of the just transition debate, to propose potential approaches to building transformation into the very fabric of the transition to cleaner energy. Our experience in developing practical measures to assist mining communities in transitioning away from a socio-economic dependency on the mining sector can be widely applied.

1.0 Introduction

1.1 Defining "Just Transition"

The notion of a just transition was first introduced in the 1980s as part of a movement led by United States trade unions to safeguard workers affected by new environmental regulations targeting water and air pollution (United Nations Development Programme, 2024). Over time, it has become increasingly evident that shifting towards a low-carbon economy will significantly impact workers in carbon-intensive industries. The concept of achieving net-zero emissions has gained traction in recent times, particularly in the context of tackling climate change. There is a growing need to ensure the transition to a net-zero emissions future includes workers, communities, and social groups. The International Labour Organization (ILO) has expanded their understanding of a just transition to encompass the creation of a fair and inclusive green economy that generates high-quality job opportunities and doesn't marginalise anyone (United Nations Development Programme, 2024).

Although low-carbon initiatives offer significant environmental and economic benefits, their adoption does not guarantee a more equitable society. The current emphasis on low-carbon solutions may perpetuate injustices and vulnerabilities by overlooking underlying structural problems in energy markets and broader socio-economic systems (Wang & Lo, 2021). Perspectives on low-carbon transitions must extend beyond technology and include a more holistic understanding of social justice. According to Wang & Lo (2021), an unfair transition is inherently unsustainable.

1.2 A just transition in the Global South

Northern perspectives often dominate social research, which can lead to an incomplete understanding of the unique challenges and realities faced by countries in the Global South (Connell, 2007). An unbalanced focus on northern contexts risks overlooking distinct historical trajectories, economic structures, and cultural contexts. A one-size-fits-all approach to a just transition could exacerbate existing inequalities and, hinder efforts to address climate change and promote equitable development in these regions.

The Paris Agreement, adopted under the United Nations Framework Convention on Climate Change (UNFCCC), has recognised the importance of understanding local and regional dynamics in communities dependent on fossil fuel extraction and usage (Madzivhandila & Maserumule, 2023). However, moving towards cleaner energy generation is far more complex for countries in the Global South, where much of the labour is informal. This means they are unregistered, undocumented, unregulated, and unprotected and are often linked to vulnerable employment and unstable income. Informal workers normally do not pay official taxes, which also restricts the government's ability to provide social security support (Atteridge et al. , 2022).

Land rights in the Global South are often not formalised or clearly defined. Social norms and practices frequently preclude women or other marginalised groups from owning land. It is common for land to be regulated by a combination of traditional, customary, formal, and informal arrangements, which can result in legal ambiguity. Unclear or lack of tenure can mean some people are inadvertently locked out of support strategies, with the subsequent tenure insecurity affecting community livelihoods and land-related conflict (Atteridge et al. 2022).

Natural resources are not only a livelihood source, but for those living in the Global South, they are often a source of community identity and spirituality. When climate restricts access to natural resources, offering alternative livelihood strategies for affected communities is insufficient. It is vital to consult communities about the non-economic aspects of the transition, such as the potential psychological impacts. For example, mental health problems are common in major socio-economic transitions, most notably in mining communities, for instance, when mines close, and communities are left with few livelihood options (Atteridge et al. , 2022),

The journey to a just transition in the Global South is not straightforward and requires careful consideration of the unique challenges and opportunities present in the region. This paper, therefore, used South Africa, a country with a heavy dependence on coal, a strong union presence, a high unemployment rate and deep inequalities, as a reference point.

1.3 South Africa and the transition

South Africa is the biggest polluter in Africa and one of the top 15 greenhouse gas (GHG) emitters globally (USAID, 2023), which makes achieving its decarbonisation targets particularly challenging. For decades, most of the country's electricity was generated by coal-fired power plants due to the abundance of coal reserves, which have historically provided a cost-effective energy source. It is now under pressure to reduce its reliance on coal and diversify its energy mix in response to the increasing shift towards renewable energy. Despite the pressures, the coal industry continues to contribute significantly to the country's economy and energy security. As a result, policymakers face the complex challenge of balancing economic development with environmental sustainability.

As part of the just transition journey, the impact of job losses could be devastating in the Global South, especially in nations grappling with significant unemployment and poverty rates. While unions acknowledge the inevitability of job losses, they harbour scepticism regarding the fairness of this transition for workers (Konstant et al., 2021). A key role player in the South African context, is the

Congress of South African Trade Unions (COSATU). COSATU, initiated the just transition conversation as early as 2011, and the concept was subsequently included in key policy documents like the National Development Plan.

Unions have engaged in broader alliances with civil society groups to advocate for environmental equity and ensure that the shift towards clean energy doesn't unfairly impact workers and communities. One instance of this is the National Union of Metalworkers of South Africa (NUMSA), which has advocated for a renewable energy sector owned by society rather than driven solely by private gain. Additionally, unions have employed legal avenues and platforms for social dialogue, such as the National Economic Development and Labour Council (NEDLAC), to shape the nation's plans for a fair transition, as seen in the framework agreement regarding the transition of the state-owned utility Eskom (Connolly, 2022). Their engagement has been crucial in ensuring the transition is equitable and does not exacerbate existing socio-economic disparities. Understandably, doubts linger regarding the realisation of the promised "new green jobs," questioning whether these positions will match the quality, stability, and quantity of displaced people (Konstant et al., 2021).

In addressing the challenges that the Global South faced, a vast amount of literature exists around suggested principles to address some of these challenges (see Konstant et al., 2021; Gunningham & Sinclair, 2017; Abeysiriwardhana et al., 2021; UNDP, 2020; ILO, 2015). Consequently, the authors have identified the five most significant principles and action steps toward achieving a just transition. However, it's essential to recognise that each socio-economic context varies, requiring careful consideration and adaptation of principles and actions to effectively address each situation's unique challenges.

A South African area that represents challenges for the just transition movement is the Mpumalanga Province of South Africa. The area serves as a major coal mining and energy production hub. Also, the Mpumalanga Province holds substantial economic importance, contributing significantly to national energy security and regional livelihoods. However, workers reliant on coal mines and coal-fired power stations may be disproportionately affected when trying to balance the economic benefits of coal with the imperative of transitioning to cleaner energy sources (Nel et al., 2023). For that reason, the paper's authors have identified key principles and actions, using theoretical insight, that speak directly to a coal-dependent region with a strong coal mining workforce.

2.0 Principles for a societal just transition

Climate-aligned development has the potential to generate positive outcomes. However, unless conscious interventions are in place to ensure positive outcomes for the wider society, such benefits may not always be equitable. The socio-economic transformations must be fair, inclusive, and perceived, as failure to achieve social acceptance may lead to the reversal of already made gains.

2.1 Principle 1: Visioning and effective communication

A well-defined long-term plan with interim milestones and achievable goals is key to building resilience in both socio-economic and environmental aspects. Implementing monitoring systems and practical frameworks is crucial for guaranteeing the success of any transformative initiatives. By incorporating international business and human rights standards into policies and operations, we can effectively minimise negative impacts on human rights during transitions while prioritising environmental protection and societal welfare. Additionally, employing communication strategies that are tailored to regional needs is essential for fostering trust and encouraging stakeholder participation.

Practical actions:

- Develop a comprehensive long-term vision and set interim milestones and targets to track progress and maintain momentum towards the long-term vision.
- Foster inclusive dialogue among various stakeholders to identify concerns, opportunities, and pathways for a just transition (Gunningham & Sinclair, 2017).
- Promote transparency and establish mechanisms for accountability, such as regular reporting, to build credibility and trust among stakeholders (Business for Social Responsibility, 2023).

2.2 Principle 2: Inclusive planning

Creating inclusive plans can guide transformative actions, help acknowledge diverse rights and needs, consider long-term societal impacts, and strengthen partnerships with government and strategic allies. Historically disadvantaged communities, minorities, women, the elderly, people with disabilities, and youth require special attention, including capacity-building efforts for effective engagement. To ensure a fair transition, high-quality, independent socio-economic analyses can inform planning, social dialogue, stakeholder engagement, and social impact mitigation.

Practical actions:

- Conduct skills audits to align workforce capabilities with the demands of a net-zero world, facilitating smoother transitions. Reviewing policies on skill development can ensure alignment with environmental needs and promote sustainability.
- Invest in education, training, and skill-building programs to prepare workers for new job opportunities in sustainable sectors (Konstant et al., 2021).
- Align just transition policies and broader development objectives, including social protection measures to safeguard vulnerable populations. Integrate policies to address economic, social, and environmental dimensions of sustainability (Business for Social Responsibility, 2023).

2.3 Principle 3: Collaborating with social partners

Harness the role of social partners, including workers and their organisations, in facilitating social dialogue and collective bargaining. Key considerations include ensuring decent work, forecasting skill needs, addressing employment challenges, and improving working conditions. Adherence to the ILO Guidelines for a just transition fosters favourable conditions for businesses, workers, investors, and consumers in transitioning towards environmentally sustainable and inclusive economies.

Practical actions:

- Establish regular forums for social dialogue, bringing together workers, employers, and government representatives to discuss sustainable development priorities and challenges.
- Forecast skill needs and invest in training and reskilling programs to equip workers with the necessary competencies to transition to green and inclusive economies.
- Support employees' financial stability by providing advance notice of changes, offering personal finance training, and creating opportunities for reinvestment and passive income. These measures collectively foster equitable and sustainable transitions for all stakeholders involved.

2.4 Principle 4: Addressing inequalities

Inequalities in quality of life, environmental conditions, and access to opportunities should be acknowledged, as well as injustices stemming from climate change and its drivers. To address these

disparities, vulnerability assessments are recommended to tailor approaches and ensure inclusivity. Recognising the diversity of working conditions among those affected and extending the concept of 'tripartite dialogue' to include representation for all workers, irrespective of union membership. However, integrating marginalised groups into formal dialogues, especially in the Global South, where certain activities may be deemed illegal, presents challenges that necessitate relationship-building and trust development through informal dialogues.

Practical actions:

- Vulnerability assessments should be participatory and tailored to marginalised groups' specific needs and contexts to design effective adaptation and mitigation strategies (Konstant et al., 2021).
- Promote inclusive dialogue and representation that facilitate meaningful participation from marginalised groups, by identifying and actively engaging with marginalised groups such as women, youth, indigenous communities and low-income populations (Konstant et al., 2021).
- Facilitate relationship-building and trust development through informal dialogues and community engagement initiatives (Konstant et al., 2021).

2.5 Principle 5: Targeted social investment

Leverage and fairly reallocate financial resources to foster social-environmental resilience. Companies should promote and establish adequate social protection systems, which can take the form of Community Investment Policies and Plans. The ILO recommends integrating social protection into responses to environmental impacts and the transition challenges for those likely to be negatively affected, particularly workers largely dependent on natural resources or confronted with major structural changes (ILO, 2015).

Community Investment Plans should promote innovative social protection mechanisms that offset the challenges of the transition to livelihoods, incomes, and jobs. Before investing, companies should understand community assets to move away from a paternalistic culture of donating white elephant infrastructure or projects.

Practical actions:

- Use an appreciative inquiry approach to social development that views communities as partners in development with existing initiatives and projects already working. This approach stands directly opposite to the needs-based approach, where communities are viewed as the recipients of projects based on what they do not have.
- To offset challenges, design and implement innovative social protection mechanisms, such as income support, skills training, and access to healthcare and other essential services.
- Interact with the local community to assess their current assets, resources, and abilities, identifying strengths, skills, and social capital that can aid in facilitating the transition.

3.0 Moving from a just transition to a just transformation

A just transition to a cleaner economy should consider the impact on jobs and aim to create decent work opportunities that contribute to resilient communities (Robins et al., 2018). Without carefully considering the unique social, cultural, and political contexts of the Global South, any attempt at a just transition risks perpetuating existing inequalities and marginalising vulnerable communities.

No single actor can bring about a just transition; however, governments have a pivotal role in consolidating climate, macroeconomic, industrial, labour, and regional policies. Conversely, businesses

and trade unions directly influence the transition within the workplace, while civil society organisations contribute to the wider community. A successful and fair transition to a low-carbon and climate-resilient future requires careful planning and adequate time.

This means managing both the positive and negative social and employment implications of climate action across the whole economy. Effectively managing rapid and often disruptive change requires proactive thinking. It requires monitoring social impacts, recognising the significance of locality, and prioritising marginalised communities (Robins et al., 2018). This requires a holistic approach that prioritises the voices and needs of local communities, empowers marginalised groups, and ensures equitable distribution of the benefits and burdens of the transition. We can achieve a truly just and sustainable transformation in the Global South by centring on social justice and inclusive decision-making.

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Session: Just Transition and Transformation of the Coast and Maritime

Title Just transition and Stakeholder engagement, experience from Wind offshore planning in Italy.

The case of offshore wind in Italy and stakeholder engagement approach offers interesting food for thought ranging from the risk that the just transition turns being 'unjust' for the traditional marine space's stakeholders if not properly engaged in the stakeholder engagement process, to the lack of structured requirements for stakeholder engagement in the permitting process, to the capacity of some developers to anticipate trends and potential negative impacts, and the potential possible delays in the authorization process, by submitting social management plans to the competent authorities (ie. the submission of a SEP and a socio-economic analysis by Vestas in the scoping phase for 2 projects to Italian authorities) or appointing Stakeholder Engagement experts in the EIA phase preparation.

Back in 2021, the Italian Government launched a public notice to developers to submit their interest to develop wind offshore projects, recording the interest of 64 stakeholders to be involved in the wind offshore development roundtable. While 55 are private individual companies or association of companies, only 3 environmental NGOs expressed an interest to consultation together with 7 stakeholders from diverse domains (Universities and researchers' associations, 1 trade union, etc.)[1]. No traditional stakeholders of the marine space (fisher associations, above all) officially expressed an interest to the roundtable consultation on offshore wind. The approach of the Italian Government to offshore wind development is to be interpreted as an 'open-door policy' which means that developers can take the lead by proposing projects on site they have identified. This approach is opposite to the 'call for tender method', implying that governments perform the site selection process to release the tender to select the final developer.[1]

In the context of the energy transition and the necessity to 'securitize' national energy supply, national Governments are supporting developers' initiatives for offshore wind projects all over the world, including the European Union. The **2023 National Integrated Plan for Energy and Climate (PNIEC)** developed by the Italian Government considers offshore wind as an 'innovative technology' at national level thanks to their potential to minimize impacts related to environment and landscape, especially for floating solutions. Given the specificity of those infrastructures, the Plan stresses out the importance of proceeding in parallel with the development of the necessary infrastructures, in particular port ones, and coordinating with the regional land planning and the network development planning by the national grid provider, to balance wind conditions, impact on the electrical grid, local impact, and implications for the territories. [2] It is in this framework, that a National Public Notice was published to request that Italian Port Authorities express their interest to host the development of shipbuilding to establish the offshore wind technology supply chain as from 18/04/2024.[3]

As media articles had disclosed information and location of the proposed projects, some traditional stakeholders have expressed concerns related to conflicting interests with offshore developers (through press releases and yearly reports of fisher associations) thus increasing the level of attention of public authorities and civil society about the emerging conflicting interests with energy developers in the marine space.

As of April 2024, Italy's Ministry of Environment and Energy Security had received 3308 Environmental Impact Assessment requests for projects all over Italy of which the following are related to Offshore

[1] 'Recommendations for positive interactions between offshore wind farms and fisheries' by Clément Dupont, Frédérick Herpers and Christophe Le Visage, May 2020 available at https://op.europa.eu/en/publication-detail/-/publication/056c9ec0-d143-11ea-adf7-01aa75ed71a1/language-en

[2] Https://www.mase.gov.it/sites/default/files/PNIEC_2023.pdf

[3] https://www.mase.gov.it/comunicati/energia-mase-al-manifestazione-di-interesse-eolico-shore-nei-porti

Wind:

- **78 Scoping Requests** since 2019, of which 47 concluded with Scoping opinion.
- **20 EIA Studies**, of which 3 with positive opinion since 2006. It is important to note that only 9 of the 20 are dated from 2022 onwards, and only 1 obtained a positive EIA opinion.

Figure 1 is taken from the website of the Ministry of Environment and Energy Security of Italy, showing that most of the wind offshore projects are in Southern Italy, mainly in the marine area of the region of Sicily, the biggest Italian island, located in the Southern part of Italy).

Figure 1: EIA procedures ongoing (as of April 2024)

Source: https://va.mite.gov.it/it-IT/Procedure/ProcedureInCorso

Proposed wind offshore projects risks overlapping with the interests of the fisher industry. Data extracted from the database of the Italian fishing Industry show a concentration of the fisher fleet (in terms of individual harbours used) that are numerical higher in Southern Italy (Figure 2) and specifically in Sicily (Figure 3).

Figure 2: Number of Harbours used by the fishermen industry per Italian areas
Source : https://osservatoriopesca.shinyapps.io/registroFlotta/

Figure 3: Number of Harbours used by the fishermen industry in Italian areas, focus on Southern Italy Source : https://osservatoriopesca.shinyapps.io/registroFlotta/

Italian fishing category association have recently started lobbying to promote their interest and investigate the potential interactions with offshore wind parks. A study dated February 2024 by LegaCoop claims that the new offshore developments will take away to professional fishing about 13.000 sqm of marine surface (mainly due to bottom trawling use) with a negative impact on occupation in the professional fishing sector estimated to a loss of 4.000 workers, of which more than 2000 ones will be from the Sicily area. [4]
Interestingly, the potential temporary reduction/ displacement in fish and shellfish resources is not mentioned. However, some of them manifest a 'sense of ownership' of the marine space being the traditional users and having acknowledged by the local communities an important socio-cultural role.

As Figure 4 shows some areas potentially will host a concentration of wind offshore parks thus complicating interactions with the traditional marine space stakeholders for the use of trawling fishing.

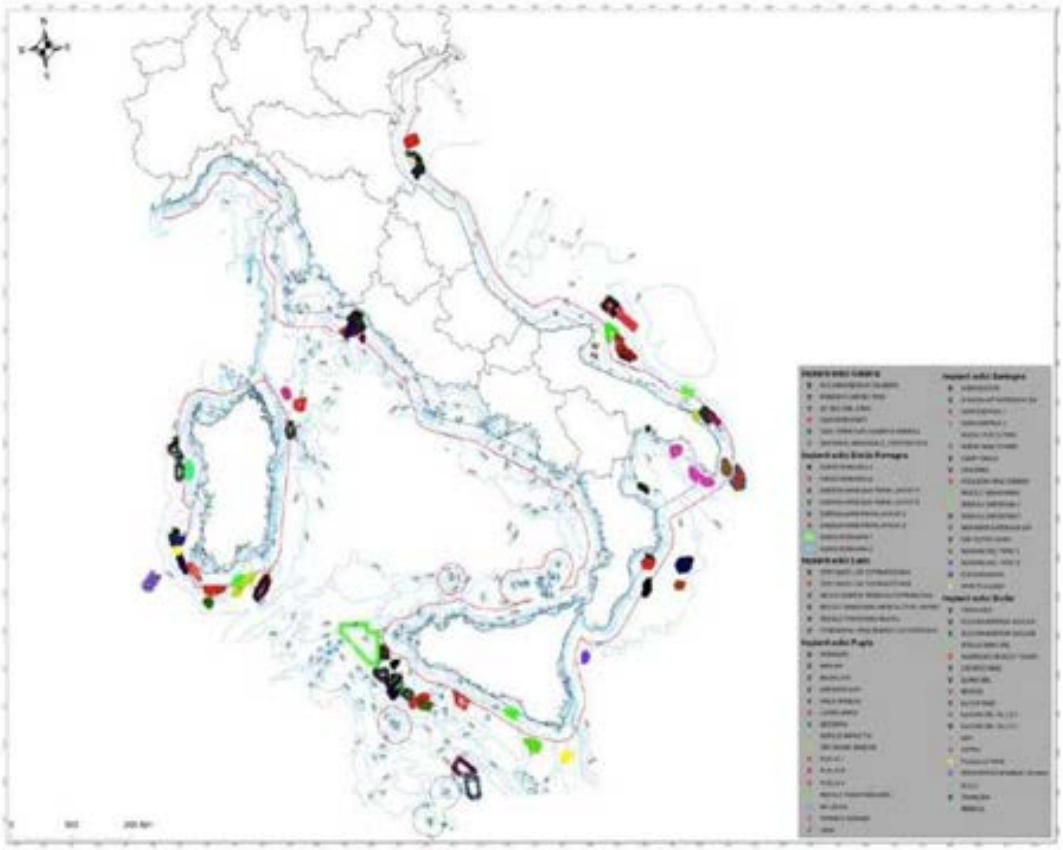

Figure 4: Geolocation of proposed Wind Offshore Parks

Interestingly, the awareness of the potential conflicting interest among the old and new category of the marine space has stimulated new trends in stakeholder engagement within the national permitting process:

1) Some developers have started to voluntarily include additional socio-economic studies and/or submit Stakeholder Engagement Plans to the authorities to publicly disclose a commitment to engage communities in a structured manner and make them part of the decisions on shared benefits.
2) The analysis of the prescriptions received by offshore wind developers in the framework of the scoping phase returns a trend by the Italian public authorities to request that the

[4] "Reconnaissance and in-depth study on the development of activities linked to alternative energy resources (off-shore wind farms) and interactions with fishing and aquaculture activities" , press release available at https://www.legacoop.coop/eolico-off-shore-lallarme-di-legacoop-agroalimentare-a-rischio-attivita-di-pesca/

Environmental Impact Assessment Study relates of the stakeholder engagement with <local communities and representatives of the impacted economic activities> and that a <contextual socio-economic analysis focused on potential impacts on landscape impacts, touristic activities and fishing ones> are provided.

As for the voluntary initiatives of some developers, socio-economic studies have been submitted in the framework of the permitting process and documented stakeholder engagement at national and local level has been put forward since the scoping phase.[5] This is a new approach for stakeholder engagement in Italy and could positively influence the readiness of public authorities to examine social management plans and socio context analysis with a view on benefits' sharing through a structured and transparent process of consultation.

In parallel, or maybe as a follow-up of some early-stage initiative from the past[6], the commission in charge of assessing environmental documentation for scoping phase is giving new 'prescriptions' requiring reporting of past engagement and knowledge of the socio-economic context. This is hopefully going to change the approach to stakeholder identification in early stages in Italy by authorities at national and local level so to achieve more proactive ways to engage stakeholders, assess potential impacts and offer effective management and mitigation measures to achieve a just transition.

As a closing remark, the increasing geopolitical tension in the Mediterranean Sea (and elsewhere) have brought some private developer companies of the oil & gas sector to map human rights risks at the ESIA phase related to migrants crossing the sea and the obligation to provide rescue to those under the maritime conventions. Hopefully the 'just transition' will accelerate the recognition of migrants as marine spaces' stakeholders also in the ESIA process and provide clear procedures to construction companies in charge of offshore works.

[5] See the Stakeholder Engagement Plans submitted by Vestas to the national authorities in the scoping phase: https://va.mite.gov.it/File/Documento/652468 and https://va.mite.gov.it/File/Documento/650660

[6] As an example, the stakeholder engagement efforts undertaken by the Trans Adriatic Pipeline to overcome local opposition in Italy, starting from local fishers https://www.tap-ag.it/notizie/nuove- storie/compensazioni-ai-pescatori-di-san-foca-firmati-gli-accordi

Careful Argument Can Improve Impact Assessment Processes[1]

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Abstract

Impact Assessment (IA) processes and documents have been criticized for being overly long, complex, unclear and expensive. Recently, additional challenges have been raised about such processes delaying renewable energy projects. Various efforts for 'streamlining' have been offered. Tools of argument have been developed over many years and in many disciplines. They are not a method of 'what' to do to improve IA processes, but they are tools for 'how' to make any chosen approach work better. Argument's many available tools, which can be used alone or together, offer steps to improve clarity, focus, brevity and communication. Thus, carefully using many tools of argument can improve the quality and reduce the size of both IA processes and related documents.

Introduction

There have long been complaints about the time and complexity involved in IA processes, from field work, to public participation, to review, to report writing and ultimately to policy-making. Efforts to shorten such processes have been made over the years, but special concern has been raised recently about delays for renewable energy projects. This presentation makes the case that adding well-tested but not well-known tools of argument, even without changes in rules or methods, can clarify and improve assessment and policy-making processes.

The text below first introduces key features of argument, then offers some examples of applications. It is important to note that the tools of argument address 'how' projects can be organized and communicated effectively. They are not about 'what' should be done. Thus, in the context of 'streamlining,' tools of argument can apply to almost any suggested procedure, to make it better. But even established practices can be improved with the tools of argument. Hence the title's message: Careful argument can improve Impact Assessment processes.

What is argument?

An argument is a set of reasons assembled to support a conclusion. Another meaning is equivalent to quarrel, implying hostility or confrontation. The first meaning is used here.

An argument is made to address some uncertain or unsettled matter. The IA process is about unsettled matters: What are the natural features or existing social circumstances? What will a project or policy do? The research and interpretations offered in response are arguments.

There are three kinds of argument, and each is found in the assessment process. They are named by the result of the final conclusion. There are different steps required to build each kind.

[1]IAIA24 Conference Proceedings
Impact Assessment for a Just Transformation
44th Annual Meeting of the International Association for Impact Assessment
24-27 April, 2024. Dublin, Ireland. https://www.iaia.org/annual-conference.php

Fact arguments end with a conclusion about a factual matter. In assessments, baseline studies and effects determinations are fact arguments.

Evaluation arguments offer as a conclusion a claim about merit, value, or importance. Significance determinations are evaluation arguments.

Recommendation arguments provide conclusions that some form of action should be taken. Scoping, mitigation and monitoring sections contain recommendation arguments.

Assessments, like other complex documents, build extended arguments from smaller ones in a step-by-step sequential process. For example, conclusions of a study identifying birds in a project's area can be input to a further argument about what the project's effects will be on those birds. A subsequent argument could identify whether the impact is significant or not. From there further arguments about mitigation or monitoring might follow.

Assembling tools of argument as "Organized Reasoning™"

Many practitioners may not realize that arguments are actually pervasive in assessments. How can we provide them access to tools to build stronger arguments? Ideas about argument have been discussed at least since the time of the ancient Greeks, where they were documented by Aristotle. Philosophers have adjusted those initial principles, some of which still apply, and added new perspectives, to build the contemporary field of Informal Logic. In the last half century cognitive psychologists have figured out many features of how people reason and reach decisions and how to help them do so. There are sound ideas from the fields of law, formal debate and composition about how to bring clear argument to an audience. However, the philosophers rarely follow psychology, the psychologists and composition experts rarely explore philosophy, nor know much about debate or law. As a result, there are good ideas about argument in many fields, but they are not all known to each other and are not all available in one place.

Therefore, I created a simplified compendium of ideas about argument from different sources, suitable for professional practice of research or analysis, which is called *Organized Reasoning™*. The ideas are assembled into two toolboxes. One is called *Strong Argument* and contains ideas and procedures to build arguments. The second, called *Effective Presentation*, addresses ideas and procedures to refine arguments and present them in writing. Although there are many different tools, they can be summarized as various different kinds. From the more abstract to the more concrete, they include:

Concepts
Guidelines
Procedures
Strategies
Tactics
Diagrams
Tables
Checklists

Most of them can be called procedures—steps to build or communicate arguments—and of those some are broader strategies and others are more specific tactics. Each of those tools can be used individually to assist different tasks of thinking or communications. However, they can also be combined in a more or less sequential process for larger projects, diagrammed in Figure 1.

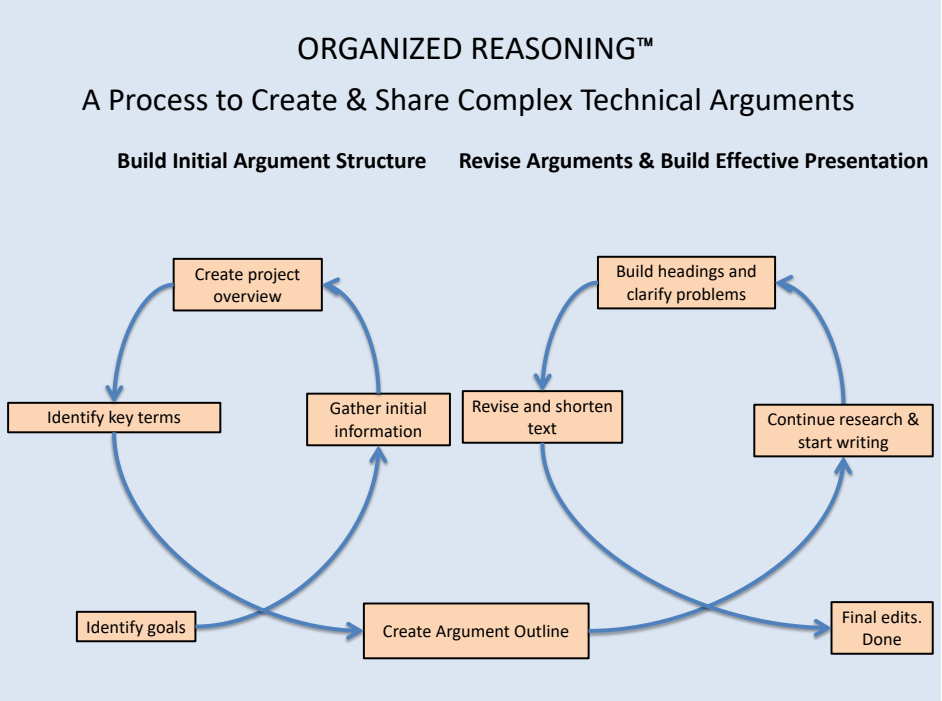


Figure 1. A simplified diagram showing main steps of the process of Organized Reasoning™ as applied in a research project or IA. The initial process of identifying the argument is on the left and the communication process of refining and writing the argument is on the right.

The details of how to accomplish those things are not the focus here. The results that follow are from people who have acquired the tools and skills from courses or workshops about *Organized Reasoning ™*.

Using tools of argument to benefit assessment practice

Tools of argument can be used to generate clarity and focus in various forms of planning and preparation as well as the composition of technical documents. People often start using their new skills with single tools and simpler efforts, and only later assemble them into a process for a whole project. People have reported successfully benefiting in different ways, including:

Composing succinct emails
Sharing understanding across teams
Planning document content
Writing clearer documents small and large
Organizing counterargument and rebuttal
Building more effective information requests

It is important to note that preparing strong, focused arguments and sharing them clearly also results in shorter documents. Focused arguments not only get their point across, but they permit practitioners to identify material which is 'true but not relevant' to the argument at hand. Much factually correct material, which might address the general topic of a required template title, is actually not relevant to the narrower and more focused reasoning and conclusions about that topic that result from careful argument. Such off-argument material makes documents

unnecessarily large and unwieldy. It can be left out (or shortened with clearer focus) when it is realized that it is not relevant to the arguments offered. That improved focus also contributes to more effective and expedient processes.

Example of one tool which can be used for both composition and analysis: Using hierarchy

One tool of argument is identifying and naming a hierarchy of roles that information can play in an argument. Distinguishing those features helps organize data into an argument and thus aids composition. The same lens can also help analyze the work of others. Examples of each follow.

Hierarchy of information organized to prepare a potential argument.

The table below explains the four categories of the hierarchy of roles that information can play in an argument. Below it is a real example of using those roles for building an argument.

Role	**Example**
Conclusion (Derived from reasons)	Soil fertility is declining.
Reason (Summary claim from evidence)	Regional samples show a decline in soil nitrogen over ten years.
Evidence (Numerous data)	Annual samples of soil nitrogen from 17 farms over ten years show nitrogen levels declining.
Support (Merit of evidence)	Samples were taken from the same locations by qualified technicians and analyzed by a specialist soil lab.

Example from JBS&G Consultants' team planning a chapter in an IA report about construction during an energy project

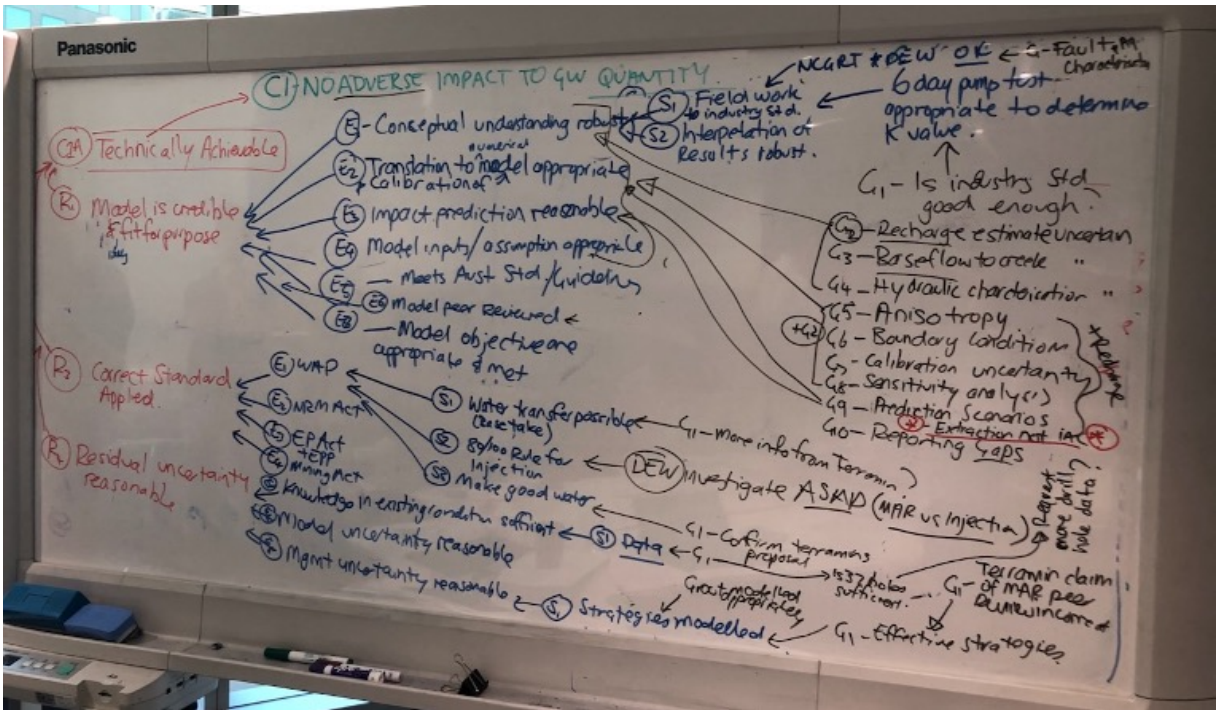
To plan their efforts the consulting team reviewed data from specialist sub-consultants. They separated the information into hierarchical categories in a team meeting, as shown in the table below. The table provided the logical outline for the chapter that was subsequently written.

Impact event	**Impact event conclusion**	**Reasons**	**Source of evidence**
Excavation of soil during construc-tion resulting in erosion of soils outside the construction area	Soil erosion is not expected to occur outside the construc-tion area	Small construction footprint Topography is generally undulating to flat Soils have low inherent erosion risk Proposed erosion control measures are well established for a range of construction activities and are considered standard practice.	Project description Topographical mapping Land systems mapping Soil sampling and testing Examples of use on other sites

Table summarizing planned approach to chapter writing

Hierarchy perspective used by a review team to interpret an IA submission

The South Australia Department for Energy and Mining had difficulty figuring out what the proponent's assessment report actually said about groundwater, one of the key issues for a potential gold mine. In response, the agency's team, with external experts, held a special review meeting at which they interpreted the report's content as shown in the photo below. The labels were: C-conclusion, R-reason, E-evidence, S-support and G-perceived gap in logic that they had to assume. The gaps formed the basis of requests for further information. Note that the final conclusion, no adverse impact to groundwater quantity, was well supported, once the review team had extracted and organized the information from the report. If the authors of the gold mine report had done advance planning like the JBS&G team did, using argument hierarchy, their report might have been clear enough understand without special analysis.



Whiteboard summarizing the analysis of groundwater information from a gold mine assessment

Tools of argument used together as an integrated process on a large project

The material above considered tools used one at a time. The many ways that the tools of argument can be combined within a process in a large project are too detailed to describe in writing here, although that is their most effective use. Two such projects are discussed on videos which can be found on the website: www.glennbrown.ca. Under 'Information Access,' IAIA Conference Materials' there are two videos. From the 2022 conference, Lachlan Wilkinson describes both the *Organized Reasoning™* training program as well as his company's experience with a large project. In the 2017 conference materials Alan Ehrlich describes his review agency's use of the tools in preparing an assessment of a diamond mine project.

A screen shot of conclusions from Ehrlich's video.

Conclusion

Clearer argument will not, by itself, solve all problems with slow and complex processes and unclear documents. However, the package of argumentation tools called *Organized Reasoning™* has as its main strength that the individual tools and practices are drawn from established practices, implemented and tested over decades to millennia. They are known to work. But they are not well known to technical professionals. Bringing these ideas into practice can make any process that assembles facts and generates conclusions more focused, more transparent, more efficient and more effective. Careful argument could improve assessment processes and documents. It would also contribute to efforts at streamlining.

Note. During the discussion at the conference after this paper was delivered, two interesting points were raised. Condensed, they were:

Question: There are people who do not trust the current IA processes. Will shorter IAs not make that situation worse?
Response: Not necessarily. Long documents which are not well written or understood, even if correct like the gold mine example, are not inherently supportive of trust. A clear step by step argument, where the reader can see and follow all the steps, supports understanding of and trust in the process even if the reader might not fully agree with the conclusions. Clear argument is not enough for trust though. Other steps, which are often recommended, like early engagement and careful public participation, are also needed and they are all complimentary.

Question. Indigenous issues are often short-changed as it is. How can argument deal with that situation?
Response. The tools of argument help make thinking clearer and understandable on the page. If a topic is not well addressed in the first place, clear argument will not make the situation better. But, if they are taken, efforts to address a topic more carefully and fairly can be improved with clear argument.

Resources / Referencs

These accessibly-published materials contain further information about argument and Organized Reasoning, and identify background references about original sources of central ideas. Additional papers and PowerPoint presentations, described on the website www.glennbrown.ca, are available upon request. The videos mentioned are also available there.

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Indigenous perspectives for a just transformation of the mining sector

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Abstract

This paper explores the role of Indigenous perspectives in achieving a just transformation of Suriname's mining sector. It utilizes a Strategic Environmental and Social Assessment (SESA) focused on the mining sector to underscore its environmental and social impacts on Indigenous and tribal communities. The analysis identifies shortcomings in the current regulatory framework concerning Indigenous land rights and public consultation mechanisms. The study highlights the SESA methodology, which integrates culturally appropriate consultations with Indigenous and tribal representatives using the Krutu model. It recommends legal and policy reforms aimed at acknowledging Indigenous land rights, implementing Free, Prior, and Informed Consent (FPIC) protocols, and enhancing public participation. The findings underscore that integrating Indigenous and tribal peoples into decision-making processes is essential for achieving a just transformation.

Keywords: Indigenous rights, Suriname, mining, public consultation, FPIC, SESA, Krutu model

Introduction

Public consultation and stakeholder engagement are critical for promoting sustainable development, especially in projects impacting Indigenous and tribal communities. In Suriname, a Strategic Environmental and Social Assessment (SESA) of the mining sector revealed critical gaps in regulations concerning land rights, public consultation mechanisms, and institutional capacity. Suriname characterized by dense forests covering 94% of its land (163,820 sq km), has a population estimated at 600,000 (2022), including Indigenous peoples of Amerindian descent (3-4%) and tribal populations of African descent (17-20%), collectively referred to as Indigenous and tribal peoples.

The study underscored the potential environmental and social impacts of mining on these communities, whose traditional way of life is directly or indirectly affected by mining activities. The findings emphasize that recognizing the participation of Indigenous and tribal peoples in decision-making processes is crucial for achieving a just transformation of Suriname's mining sector.

Development of the SESA

The SESA developed in Suriname served as a participatory tool aimed at integrating environmental and social considerations directly into policy, planning, and programmatic frameworks within the mining sector. This approach facilitates informed decision-making and fosters industry reform.

Conducted over an 18-month period by RINA Consulting Inc., commissioned by the Ministry of Natural Resources (MNR) and financed by the World Bank, the SESA process was pivotal. Key to its success was the active engagement of stakeholders, particularly Indigenous and tribal peoples, whose ongoing feedback provided essential guidance throughout the consultation phase. The SESA aims to ensure that future mining development proceeds sustainably, adhering to the highest international environmental and social standards and practices.

The involvement of Indigenous and tribal peoples in the SESA was of paramount importance. Indigenous and tribal communities are integral to Suriname, deeply intertwined with the environment. Their profound knowledge of ecological dynamics and traditional resource management practices is invaluable. Moreover, they possess a unique worldview that recognizes their interconnectedness with all life forms in these biodiverse ecosystems. Despite this, their established leadership structures, including tribe chiefs (Granman) and village captains, have yet to receive formal legal recognition.

Indigenous and tribal peoples' Consultation in Suriname

To ensure thorough and inclusive data collection, the SESA in Suriname implemented a multifaceted consultation strategy that prioritized the participation of Indigenous and tribal peoples. It is crucial to recognize the distinct roles of these groups within the mining sector. Indigenous peoples primarily sustain themselves through traditional practices such as hunting, fishing, and gathering, while also providing goods and services to miners and mining companies. They experience direct or indirect impacts from mining activities often conducted on their lands. In contrast, Maroon peoples are directly engaged in mining as employees of mining companies or as participants in Artisanal Small-Scale mining (ASM).

The SESA consultations with Indigenous and tribal representatives utilized the Krutu model, a culturally appropriate process deeply rooted in local traditions. The Krutu involves community members gathering to discuss and debate issues affecting their communities, make communal decisions, and resolve conflicts. This approach ensures that information exchanges are culturally appropriate and that the voices of all community members are heard.

Representatives from three of the five Indigenous populations—Wayana, Lokono, and Kaliña—directly participated in the SESA consultations. Additionally, consultations were conducted with the Association of Traditional Indigenous Leaders (VIDS), representing all Indigenous communities in Suriname. This comprehensive approach ensured a diverse range of perspectives were captured. Eight individuals served as direct community representatives, with an estimated 3,788 Indigenous individuals indirectly engaged. Through the Indigenous VIDS network, information dissemination efforts potentially reached all 20,344 Indigenous peoples in Suriname.

Similarly, Maroon communities were actively included in the consultation process. Four of the six Maroon tribes—Okanisi, Matawai, Paramaka, and Saramaka—were selected due to their proximity to mining activities and their direct involvement in the sector. Consultations also involved the Association of Saramacca Traditional Leaders (VSG), representing Maroon communities. The SESA engaged directly with 85 Maroon representatives, reaching an estimated 15,090 individuals indirectly through information dissemination efforts. This approach potentially reached the entire Maroon population in Suriname, estimated at 25,000 individuals, through the VSG network.

Notably, two smaller Indigenous and tribal communities were not consulted due to their lack of direct or indirect involvement in mining activities and their expressed disinterest in the study

Environmental and social impacts of mining on Indigenous and tribal communities

The SESA conducted on Suriname's mining sector revealed a range of environmental and social impacts associated with mining activities, particularly affecting Indigenous and tribal peoples residing in resource-rich territories. The following presents a review and summary of the findings:

Negative Impacts:

- **Land Displacement and Loss:** Mining operations can displace Indigenous and tribal peoples from their traditional territories, disrupting their livelihoods and access to lands used for agriculture, hunting, and gathering.
- **Environmental Degradation:** Activities like land clearing, tree cutting, road construction, and establishment of tailing ponds lead to deforestation, soil erosion, and habitat destruction. This results in biodiversity loss and depletion of natural resources.
- **Water Contamination:** The use of chemicals such as mercury, heavy metals, cyanide, and acids in mining processes can contaminate water sources. This contamination poses significant health, and social risks to Indigenous and tribal communities that rely on these waterways for drinking, cooking, and fishing. It can also impact their economy by making it increasingly challenging to sell fish.
- **Air Pollution:** Operations like open-pit mining and blasting contribute to air pollution, adversely affecting respiratory health within Indigenous and tribal communities.
- **Health Risks:** Exposure to hazardous substances used in mining, such as mercury, lead, arsenic, and cyanide, can lead to various health issues including neurological disorders, respiratory illnesses, reproductive health problems, and increased cancer rates.
- **Cultural Impacts:** Mining activities can disrupt or destroy sacred Indigenous and tribal sites and traditional knowledge systems, undermining cultural heritage and identity.

Positive Impacts

- **Infrastructure Development:** Mining projects may spur the development of essential infrastructure such as roads, electricity, water supply, sanitation systems, telecommunications networks, and internet access in Indigenous and tribal communities.
- **Improved Social Services:** Increased government revenue from mining activities has the potential to enhance social services such as schools and healthcare facilities in Indigenous and tribal communities.
- **Benefit Sharing:** Indigenous and tribal communities expect compensation or benefits from mining companies operating on their traditional

Broader issues to be considered

The SESA identified a range of indirect environmental and social impacts on Indigenous and tribal communities, highlighting broader considerations:

- **Economic Shifts:** Mining activities can bring both positive and negative economic changes to Indigenous and tribal peoples. These include inflation, fluctuations in employment opportunities (both creation and loss), and potential disruptions to traditional livelihoods.
- **Social Disruption:** The influx of migrant workers, contractors, and project personnel associated with mining projects can disrupt the social cohesion and traditional dynamics within Indigenous and tribal communities.
- **Cultural Change:** Exposure to new technologies, languages, customs, and social norms introduced by mining activities may lead to cultural shifts among Indigenous and tribal communities.
- **Land Tenure Issues**: Unresolved land tenure issues and the lack of recognition of Indigenous and tribal land rights can result in legal disputes and social unrest.
- **Gender Dynamics**: The introduction of mining activities can alter traditional gender roles. It may lead to the emergence of new services, including forms of exploitation such as prostitution, while also potentially offering new employment opportunities for women in the mining sector.
- **Environmental Migration**: Mining activities that disrupt fertile lands used for agriculture and hunting and fishing grounds can compel Indigenous and tribal peoples to migrate, impacting their traditional way of life and social structures.
- **Health Impacts:** Contamination of water sources and fish due to mining-related pollutants such as mercury can necessitate dietary changes and pose health risks to Indigenous and tribal communities.

Indigenous and tribal peoples' perspectives in public consultation and impact assessments

Recognition and engagement of Indigenous and tribal communities are pivotal for effective public consultation and environmental impact assessments in mining projects. These communities possess rich Traditional Ecological Knowledge (TEK) encompassing biodiversity, ecosystem functions, and resource management practices. Integrating TEK into impact assessments enhances accuracy and enables project designs that mitigate environmental and social disruptions.

Furthermore, meaningful engagement ensures that Indigenous and tribal concerns are heard and respected. This includes safeguarding cultural sites and sacred areas and minimizing impacts on their traditional way of life. Open and transparent communication fosters trust and bolsters the legitimacy of the entire consultation process.

Securing Free, Prior, and Informed Consent (FPIC) from Indigenous and tribal peoples, alongside respecting their land rights, is ethically imperative and should be enshrined in legislation. This not only upholds community rights but also reduces conflicts and promotes long-term sustainable development while respecting cultural heritage and autonomy. Addressing potential conflicts early in the consultation phase helps prevent disputes between mining companies and Indigenous and tribal communities, thereby enhancing the overall sustainability of mining operations.

Critical gaps identified

The SESA conducted on Suriname's mining sector identified critical gaps in the current regulatory framework:

- Suriname's legislation does not explicitly recognize Indigenous and tribal authorities and their land rights, undermining the legal protection afforded by documented land titles.
- Suriname remains one of the few countries in the Americas that has not ratified the ILO Convention 169, which sets international standards for Indigenous and tribal rights.
- Free, Prior, and Informed Consent (FPIC) is not yet regulated, leading to instances where mining projects commence without community knowledge or consent.
- Public consultation is not mandatory in Suriname, potentially excluding communities from decision-making processes.
- Resettlement policies are not yet formalized, posing risks to affected communities during project implementation.

- There is a need for government officials to enhance their capacity in project management and in effectively engaging Indigenous and tribal communities.

Addressing these gaps is essential to ensure that mining activities in Suriname respect Indigenous and tribal rights, foster sustainable development, and minimize social and environmental impacts.

Conclusion

Suriname's mining sector presents a multifaceted challenge, balancing potential economic benefits with significant environmental and social risks for Indigenous and tribal peoples residing in these regions. The SESA study underscores the importance of adopting practices that minimize adverse impacts and promote sustainable development.

To achieve this, the study advocates for genuine collaboration that goes beyond mere acknowledgment of Indigenous and tribal communities. It emphasizes active engagement throughout the mining lifecycle, empowering these communities while honoring traditional governance and integrating customary law into decision-making processes affecting their land and livelihoods.

Central to sustainable development in mining is the establishment of robust legal frameworks aligned with international standards. Meaningful consultation with Indigenous and tribal communities from exploration to mine closure is critical. This approach builds trust, facilitates conflict resolution, and ensures mining companies are held accountable for environmental and social responsibilities.

The SESA highlights the value of combining traditional ecological knowledge with modern development practices. Indigenous and tribal peoples possess profound insights into local ecosystems and sustainable resource management. Integrating this knowledge into project planning and impact assessments enhances the effectiveness of mitigation measures aimed at protecting environmental and community resources.

Adopting holistic approaches that integrate community engagement, participatory decision-making, and respect for Indigenous rights and knowledge systems fosters a balance between environmental conservation, social justice, and equitable distribution of benefits. Incorporating Indigenous and tribal perspectives into decision-making processes and impact assessments is pivotal for fostering a future where development harmonizes with environmental preservation and the well-being of Indigenous Peoples, thereby ensuring a just transformation of the mining sector.

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This Other Eden - Assessing a myth?

John Mabbitt, June 2024

This paper draws on my professional practice in the historic environment, and my past academic research into the mythic nature of the English historic environment. It is a personal view, but one that offers a cautionary tale in how the mythic interacts with policy and impact assessment, how this mythic retelling of the past can reinforce a dominant narrative of the historic environment or heritage that affects our ability to understand and protect the past.

Cultural meaning can be ascribed through interaction of people with the past environment. These are as often mundane, everyday interactions that shape culture on almost unconscious level as much as they are deliberate grand gestures. Actions as simple as the inclusion of a place in an artwork such as a painting or a film can shape how we understand and experience that location or imagine its place in the past. Centuries of tradition, reminiscence, mythmaking, and remembrance provide multiple layers of meaning and connections that selectively emphasise and elide cultural change, providing a sense of belonging and connection while obscuring the depth of cultural change. The English landscape is a case in point; it is at once an entirely anthropogenic creation, shaped by human action over millennia that has defined cultural actions to the point that English identities are fundamentally tied to landscape.

While the link to place is cast as a deep connection, forged over generations, these narratives are often recent and mythical. Sycamore Gap is a dramatic opening in the whin crags at Walltown on Hadrian's Wall. It was occupied by a solitary sycamore tree, which was felled in an apparent act of deliberate vandalism in September 2023, to enormous public outrage[i]. The tree was a landmark and a commonplace of films and artworks, most famously the 1991 film Robin Hood: Prince of Thieves. The tree was the focal point in a meeting of narratives of empire, frontier, remoteness, and connections that have shaped popular understandings of Empire as well as the role and importance of the Wall, but which have arguably never been fully explored. Similarly, the Lake District World Heritage Site bid, which was approved by UNESCO in 2017, was critiqued by the environmental journalist George Monbiot. It was, Monbiot argued, based on a myth that concealed the ecological degradation and social exclusion that resulted from intensive sheep farming and the tourism industry in the Lake District, instead, the bid's narrative should better reflect the diverse and contested histories and ecologies of the Lake District, to address current and future environmental issues and opportunities[ii].

In the context of a Just Transformation that seeks to protect the rights and interests of communities, and which acknowledges that the causes and effects of the climate crisis are rooted in historical and structural inequalities and injustices, this presents something of a dilemma. Cultural meaning derives from and rests on narratives of power and resistance and these mythic narratives are problematic in they are so fundamental to cultural identity; should we privilege a narrative that is untrue and potentially damaging? How can we assess and protect something that does not exist? In addressing any sense of loss that may be experienced by change to this historic landscape, impact assessors also need to understand the mythic dimension of these meanings and navigate the difficulties they present for impact assessment. This is particularly important in a spatial planning system that is predicated on placing development in the ‘right place.’

While most heritage specialists would see the time-depth of the historic landscape in terms of layers, or palimpsest, where the process of erasure of past landscape is only partial, leaving visible elements

of the past landscape to a viewer with sufficient understanding to 'read' that past. It is a commonplace of cultural heritage impact assessment in England that local landscape has power as a constant; as a somehow unchanging world in which past and present co-exist, and in which change can only be negative. Examples taken from recent consultations from different parts of England and spanning national and local technical consultees and third-party objectors include statements such as,

> '…the landscape is of special character… where the views over wide and open landscapes are of historic and cultural importance and *have not changed for hundreds of years*…' (arable farmland with significant loss of hedgerow and woodland associated with mechanisation of farming recorded since the mid C19th)[iii]
>
> '…this area, which is known for its quiet, tranquil, *timeless and unspoiled* settings.' (late parliamentary enclosure, 500m from mainline railway and dual carriageway trunk road, within 600m of mid-20st century 'New Town')[iv]
>
> '…It is very special… to be able to enjoy this space *as it was laid out and enjoyed* 400 years ago…' (Elite formal garden, remodelled repeatedly from the turn of the 17th century onwards)[v]
>
> 'The landscape under threat has an entirely unspoiled rural character *which has remained unchanged for generations*.' (intensive arable cultivation in drained fenland)[vi]

This conception closely matches narratives of stability taken both from a deeply conservative view of the landscape as somewhere quintessentially English; the 'green and pleasant land' of Blake's Jerusalem and from more radical imaginations, of the ancient rights usurped by landowners at enclosure. In either case, any new development is necessarily a harmful modern intrusion, rather than an interaction with a lengthy process of change. In rare cases where this illusory nature was recognised, it could be justified by a statement that the apparent absence of modern built development would leave a viewer feeling that the setting was appropriate to a historic site. The lack of challenge to a mythical conception of the historic environment became a key element in the effective removal of a key element of the just transformation away from carbon-based electricity generation.

An illusory stability is compounded by a tendency in assessment to assume that in the absence of development, that the baseline will remain stable. Heritage assets tend not to breed, or migrate or recolonise new areas, but there are external pressures on the historic landscape. Arguably, all heritage assets are on a trajectory to destruction, and pressures of intensive cultivation or climate change is the biggest threat to the historic landscape. Changes to patterns and types of agricultural use through climatic change coupled with sea level change and coastal erosion, or increased colluviation or erosion from flood events mean that the very fabric of the English historic landscape is irreversibly changing; yet the unchanging nature of that historic landscape is used as an argument to prevent or disrupt the delivery of infrastructure development that offers the only chance of its survival in a recognisable form.

This situation reached a peak during the period to 2014, when many new onshore wind farms were proposed in England. New guidance from Historic England effectively meant that anything visible from a heritage asset was a change to setting[vii]. Despite the use of significance-based assessment approaches, most assessors found that they could not robustly argue that this change would be

anything but adverse. Or in policy terms, 'harmful.' In effect something that a viewer felt 'shouldn't' be there could only be harmful. With a government who were openly hostile to onshore wind energy development, the Barnwell Manor and Bradford test cases allowed the weighting of even minor harms to be such that effects considered to be non-significant could lead to a refusal[viii]. A sample of such a judgement from the Dorcas Lane Wind Farm appeal decision shows this logic in the words of the Planning Inspector.

> '…This would cause a *small amount of harm* to the heritage significance of All Saints Church in Soulbury… a *very small amount of harm* to the heritage significance of St Luke's Church in Stoke Hammond, to Hollingdon Grange, and to the Church of the Holy Trinity and the Old Rectory in Drayton Parslow… I attach *considerable weight overall* to the fact that the proposed development would fail to preserve the settings of five Listed Buildings…' [emphasis added][ix]

This rebalancing was part of a hostile series of measures, including removal of onshore wind from the Nationally Significant Infrastructure Project planning regime and the 'ministerial statement,' which became footnote 58 to NPPF[x], effectively giving individuals within a community a veto over onshore wind energy. Similarly, recent projects aimed at reconfiguring England's electricity transmission grid to better reflect the changing location and nature of generation, have seen the historic landscape becoming a central focus in consenting.

> 'East Anglia's landscapes are full of churches, castles and country houses with wonderful gardens which should be treasured… It is outrageous that the Government's latest energy policy consultation seeks to prioritise the delivery of offshore wind and associated onshore infrastructure…'[xi]

The challenge is to move forward from this situation and address this sense of loss in Impact Assessment, and balance what is necessarily and 'objective,' 'professional' view with the more visceral community responses.

The critical point is to understand and appreciate the power of the past in the present. The past is not, a 'foreign country;' it lives and resonates into the present. It is a fundamental element of identity, and the materiality of the historic landscape offers tangible connections that are particularly sensitive.

That these connections are frequently mythical or fictitious does nothing to reduce their power and is often the source of that power. These myths have grown up and become reified by their utility, whether in supporting claims to ownership and rights, or in developing a sense of cohesion within a community. It is important to acknowledge, the power of these myths. It is, however, important to understand them for what they are and contextualise how or when they arose, and what purpose they served. These are as much part of the past as any objective past; it is the record of how communities have engaged with their past and identity, and how that engagement has changed over time. There is a parallel with the principle of 'retain and explain', developed by the Conservative government to address the issue of contentious memorials in public spaces, although the circumstances in which that policy principle was developed have led to criticism that its effect is to allow the retention of memorials that selectively reveal elements of the past rather than providing an opportunity to engage with communities. While an understanding of the past is important to advocate for, and achieve a Just Transformation, that understanding must consider what of the past really matters to those communities and how best to address it in the present.

Dealing with the mythical past offers an opportunity to develop awareness of the past. This requires a step change in how we view heritage outreach and engagement; it is not a neutral process of presenting the findings of archaeological work, nor of adding 'interpretation' materials that are rarely accessed. It is, rather, the process of bringing communities to an understanding of how their environment come to be as it is and why we value it. This understanding is a key element in empowering communities to make decisions on how to treat the material remains of the past which continue to provide meaning.

It is also important to understand the future baseline just as we seek to understand the past. It is simply no longer acceptable to cling onto a naïve sense that the historic landscape will not change. It is, rather, essential to understand just how far it might change and use this understanding to contextualise the impacts that we assess, and to shape that change for the better.

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Synergies of Blue Economy and Circular Economy for IA in Tourism Sector

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Abstract

The concept of blue economy has been incorporated into new tourism practices, which describe the sustainable development of marine and coastal resources. The study reference to tourism, the study focuses on sustainable tourism and how the blue economy can promote the conservation and sustainable use of marine environments and species. The circular economy approach creates a cycle of waste, energy, resources, and innovative design for closed loops. In essence, the connection between the circular economy and the tourism sector is about transforming the traditional linear model of "take-make-dispose" into a more sustainable and circular model that benefits the environment, local communities, and the long-term health of the tourism industry. In tourism, this can translate to promoting local tourism and sourcing products and services from nearby businesses, thereby reducing the carbon footprint associated with travel. This can generate income for local communities (thus alleviating poverty), maintain and respect local cultures, traditions, and heritage without harming the environment. This research explores the synergies between the Blue Economy and Circular Economy in the context of the tourism sector. It highlights the potential for sustainable practices that benefit both the environment and the tourism industry, emphasizing the significance of impact assessments. This study was conducted on Sichang Island, Thailand, as a case study. It aims to assess the impact of tourism growth in the area and the potential for blue economy development concerning the economy and environment. From a social perspective, the sustainable management of island resources requires collaboration across nation-states and the public-private sectors.

Introductions

The concept of Circular Economy (CE) has evolved from various economic theories such as steady-state economy, ecological economics, general systems theory, and industrial ecology. It views the global ecosystem as a closed resource system, with no exchange of matter with the external environment, and considers the economy as a subsystem of this closed system. CE aims to understand the intricacies of product life cycles across the entire economy and promotes the creation of new value cycles through resource recovery, regeneration, and reuse, within the boundaries of the planet and society. This involves implementing new business models that involve active user and consumer participation. However, CE is crucial for reducing natural resource usage and decoupling economic growth from continuous resource consumption. Although the precise definition of CE is debated, it can be described as an economic system that operates at micro, meso, and macro levels, focusing on sustainable development for the benefit of current and future generations.

In summary, CE emphasizes sustainability as the goal and circularity as the means to achieve it. It starts outside the tourism realm, focusing on material production, and aims to eliminate resource wastage through circular resource flows. Ultimately, CE requires new resource configurations at the location/destination level, and it may help address limitations of the

Sustainable Tourism concept by conceptualizing tourism as a platform for transformative learning within broader supply-chain perspectives.

Active collaboration and co-creation of value among stakeholders in the tourism value chain are crucial for successful circular and sustainability initiatives. This collaboration should be the default relationship setting for tourism, both public and private, aiming to optimize the direct and indirect value chains within the travel ecosystem. Especially in destination markets, proactive discussions between local communities, trade bodies, Destination Management Organizations (DMOs), and inbound tour operators are essential. These discussions should focus on exploring product development opportunities while considering the destination's social and environmental carrying capacity. The goal is to diversify and strengthen travel products while minimizing negative social and environmental impacts, thereby preserving the long-term environmental, societal, and cultural attractiveness of the destination, and protecting its asset value.

Sustainable Tourism management in coastal zones: Blue Economy development in Sichang Island

The Blue Economy refers to the sustainable utilization of ocean resources to foster economic growth, enhance livelihoods, and create employment opportunities, all while safeguarding the health of marine and coastal ecosystems. It encompasses various economic sectors such as fisheries, aquaculture, tourism, marine renewable energy, maritime transportation, and coastal infrastructure development. Recognizing the pivotal role oceans play in the global economy and society, the Blue Economy acknowledges their significance. According to the OECD, the ocean economy contributed USD 1.5 trillion to the global economy in 2010 and is expected to double by 2030. However, unsustainable practices and overexploitation of ocean resources pose threats to environmental degradation and can adversely impact the long-term sustainability of the ocean economy. The Blue Economy aims to foster economic development while ensuring the sustainable use of ocean resources and the preservation of marine ecosystems. This is accomplished through sustainable management practices such as

fisheries and aquaculture management plans, the establishment of marine protected areas, and the implementation of renewable energy projects. Moreover, the Blue Economy acknowledges the importance of addressing climate change, reducing marine pollution, and enhancing ocean resilience to safeguard marine ecosystems and ensure their sustainability.

The Blue Economy is a concept focused on sustainable use of marine and coastal resources, with responsible environmental practices and societal benefits. Key principles and backgrounds of the Blue Economy include *Sustainability* Emphasizes responsible utilization of marine and coastal resources to ensure sustainable economic development without compromising environmental integrity. *Resource Utilization*: Prioritizes efficient utilization of marine resources, including fisheries, coastal tourism, and coastal area development, among others. *Innovation and Technology*: Promotes innovation and technology to enhance the efficiency of resource utilization, such as advancements in fisheries technology, coastal agriculture techniques, and information technology for resource management. *International Cooperation*: Encourages cooperation among nations for the development of an interconnected economy linked to marine resources, fostering economic partnerships, and sharing of technology and knowledge. *Community Strengthening*: Aims to build resilient communities capable of effectively

collaborating in the development of a Blue Economy, emphasizing social inclusion and local empowerment. Overall, the Blue Economy emphasizes collaborative efforts to harness the full potential of marine and coastal resources through knowledge and technology, with a focus on sustainable economic development, international cooperation, and community well-being.

The transition to the "New Normal" presents an opportunity for society to leverage the benefits of the digital era. A noticeable decrease in tourism activities, this decline in tourist numbers has facilitated the recovery of marine ecosystems due to improved seawater quality and reduced sea-related activities. Consequently, the concept of Blue Economy has emerged, promoting sustainable management of marine and coastal resources alongside tourism. Various measures have been implemented, including limiting tourist numbers to preserve natural carrying capacities, regulating beachfront trading activities, and zoning coastal areas for different activities such as agriculture, food vending, and accommodation. Additionally, the establishment of opening and closing seasons for sea tourism aims to facilitate resource restoration. Setting entrance fees for both Thai and foreign tourists ensure economic activity while promoting the sustainability of marine and coastal resources. Koh Sichang, a popular tourist destination in Chonburi province, has experienced increased popularity among both locals and tourists. Surrounded by the sea and featuring numerous beautiful attractions, its proximity to Bangkok, only a 2-hour travel time, makes it a convenient and safe destination for day trips or overnight stays. As a result, Koh Sichang has become increasingly favored, particularly during holidays and festivals. In 2023, there was a significant surge in tourist numbers visiting Chonburi province, reaching 23.26 million tourists compared to 13.8 million in 2022, representing a 59.32% increase. This upward trend aligns with the growth in tourism revenue. (Montrithiti. 2021, Ministry of Tourism & Sports 2565 -2566)

The municipal government of Koh Sichang faces challenges in waste management, with 12 tons of garbage collected on regular days and 15-17 tons on holidays. Additionally, waste from boats within the municipal maritime jurisdiction amounts to 1.5 tons per day within the zone and 6 tons per day outside the zone. Despite employing a separation method for organic waste disposal, the two available incinerators are insufficient to handle the increasing waste,

leading to a worsening waste problem on the island. Meanwhile, in 2015 and 2016, Chonburi province experienced a nearly 50% increase in visitors, reaching 8,153,960 people. The total expenditure on island tourism in 2016 amounted to 58,487 million baht. Si Chang Island is a significant attraction, accounting for about 0.35% of the tourist population in the province. However, the island grapples with the growing Municipal Solid Waste (MSW) generation, reaching 10-12 tons per day, with a 19% increase over the last decade. Common disposal methods include open burning at dumpsites (88%), recycling (10%), and composting (2%). Without effective management measures, this waste influx could adversely affect the environment and residents' quality of life. (Pasicha Chaikaew. 2018)

About 80% of global tourism takes place in coastal destinations; Tourism represents 40% of the blue economy. At the same time, coastal ecosystems are impacted by tourism development. Tourism sector embraces more low carbon operations, investments in blue carbon markets can support mitigating residual emissions, while unlocking opportunities and finance to further support conservation, creating a virtuous circle for tourism destinations, and leading the way to Net Zero. Koh Sichang is a popular tourist destination among tourists. The travel route can be chosen to travel both in the form of a one-day trip. Or stay overnight, which has accommodations, restaurants, and cafes to adequately accommodate the number of tourists traveling to Koh Sichang. Tourist attractions that are popular tourist spots such as the Khao Yai Shrine Atsadang Bridge Phra Chuttharajthan Museum, Tha Yai Thim, Laem Ngu, and Chong Khao Khat, etc. For traveling to Koh Sichang, you can travel by ferry at Koh Loi Pier. There is a boat crossing to Koh Sichang Pier (Lang Pier) from 7:00 a.m. to 8:00 p.m. The fare is 60 baht per person. It takes 45 minutes to get to Koh Sichang. You can also rent a speed boat that seats about 5-10 people, priced at 2,000 baht per trip. 30 minutes for traveling within the island. You can rent a motorcycle. Song-Taews (minibus) for hire and Sky lap buses. Table 1 showed that waste generated from travelling caused highest GHGs emissions per person as tourist produced untreated waste. Tourists practice circular economy towards a circular mindset which can be integrating to enhance blue economy in coastal area.


Route 1
1 Day Trip
Koh Sichang
1 Khao Yai Chao Por Shrine
2 Replica of the Buddha's footprint
3 Islandish Café
4 Phra Chudadhujrajthan
5 Pra ong leang


Route 2
1 Day Trip
Koh Sichang
1 Tha Yai Tim
2 Laem Ngu
3 Jay Moi Restaurant, Tha Lang
4 Tham Phang Beach
5 Khao Thalu Cave
6 Khao Khat Pass


Route 3
2 Days 1 Night Trip
Koh Sichang
1 Somewhere Koh Sichang accommodation
2 Pla Chinda Raft.
3 Khang khaw Koh
4 Pah Noi Grilled Seafood
5 Atsadang Bridge
6 Phra Chudadhujrajthan
7 Flower Blue Coffee & Bistro
8 Blue Swimming Crab Bank Learning Center

Table 1. Greenhouse gas emssions for travel routes along Sichang

Route	Activity													
	Crossing the strait by passenger ferry		Crossing the strait by high-speed ferry		Food and beverages[1]		Accommodation arrangements[2]		Waste management[3]		Tourism activities[4]		Total	
	kg CO_2e	kg CO_2e /person	kg CO_2e	kg CO_2e /person	kg CO_2e	kg CO_2e /person	kg CO_2e	kg CO_2e /person	kg CO_2e	kg CO_2e /person	kg CO_2e	kg CO_2e /person	kg CO_2e	kg CO_2e /person
Route 1	152.16	3.28	69.92	5.10	1.65	1.65	-	-	2.32	5.80	2.29	0.31	**228.35**	**16.13**
Route 2	152.85	3.96	70.61	5.76	1.65	1.65	-	-	2.32	5.80	1.14	-	**228.56**	**17.19**
Route 3	152.69	3.67	70.45	5.49	3.92	8.87	6.26	6.26	2.32	11.60	1.14	0.40	**236.79**	**36.29**

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Gap Analysis of Biodiversity Management Legal Framework of Kyrgyz Republic

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Abstract. Biodiversity is critical for the sustainable development of the Kyrgyz Republic due to its vital resources and impacts on people's welfare and quality of life. The World Bank Environmental and Social Framework (ESF) sets out its broad commitment to sustainable development and incorporates a safeguard standard (ESS6) for biodiversity conservation and sustainable management of living natural resources. To understand how effectively the country's regulatory framework and related institutional capacity operate to manage risks related to the *Biodiversity Conservation and Sustainable Management of Living Natural Resources standard (ESS6)* in the Kyrgyz Republic, a gap analysis was carried out. The analysis focused on reviewing the policy and legal framework at the national and sub-national levels relating to biodiversity management, the institutional structures, capacity, and track record for implementing the legislation, and a comparison against the standard requirements. Data gathering was through consultation with key stakeholders involved in biodiversity management, including authorities, academics, and NGOs. The analysis revealed that the legal instruments provide a sound basis for biodiversity management within the Kyrgyz Republic and cover most aspects of the ESS6. However, some gaps were identified, and related recommendations for improvement were consolidated into nine themes. These include legislative development, conservation planning, financial investment, capacity building of the civil service, biodiversity management, monitoring and enforcement, management of protected areas, ecosystem restoration, public awareness, education, and research. The findings and recommendations should help enhance the current legislative framework, particularly the update of the protected area law, and inform and support the development of future projects by the World Bank and other development partners in this area.

1. Introduction

The Kyrgyz Republic is a landlocked country in Central Asia with a rugged mountainous landscape and endowed with rich and unique biodiversity resources, including 2% of the world's known flora and 3% of the world's known fauna. Among its ecological resources are the unique walnut forests and the large Issyk-Kul Lake, both critical for biodiversity and ecosystem services. Yet, these natural resources face threats from unsustainable human practices and climate change.

To counter these threats, the Government of the Kyrgyz Republic has set strategic priorities for biodiversity conservation for the decade 2014-2024. These priorities include 1) integrating conservation issues into the mandates and activities of state agencies and public organizations by 2020; 2) mitigating impacts on biodiversity and promoting its sustainable use; 3) enhancing the protection and monitoring of ecosystem and species diversity; and 4) elevating the societal value of biodiversity and ecosystem services, thereby increasing the benefits from sustainable ecosystem services and traditional practices.

In support of these goals, the World Bank, alongside other international partners, committed to support strengthening the Kyrgyz Republic's capacity, including its national environmental and social frameworks, to manage and sustain its biodiversity and ecosystem services. An important step in this process was conducting a gap analysis to evaluate the Kyrgyz legislative framework in relation to the

World Bank's biodiversity standard, ESS6, a component of the ESF. This analysis examined the capabilities and historical performance of concerned Kyrgyz institutions in applying their legislative framework, with the aim of recommending strategic interventions to help the country achieve its biodiversity conservation objectives.

2. Gap Analysis Scope and Approach

The scope and approach of the assessment is guided by the below four ESS6 objectives:

- To protect and conserve biodiversity and habitats.
- To apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity.
- To promote the sustainable management of living natural resources.
- To support livelihoods of local communities, including Indigenous Peoples, and inclusive economic development, through the adoption of practices that integrate conservation needs and development priorities.

The assessment also takes into account the provisions of Environmental and Social Standard 1 (ESS1)[1] as relates to ecosystem services and biodiversity management. The study followed the World Bank's guidance document for conducting an overview assessment which outlines four key areas for evaluation: (i) the legislative framework, (ii) relevant institutions, (iii) institutional capacity, and (iv) historical performance. The process involved reviewing available information and data, as well as gathering insights from concerned stakeholders through interviews and questionnaires. The primary objective of the overview assessment is to understand how the relevant national systems in KR work together, and how effectively they operate to identify, assess, manage, and regulate specific environmental and social risks and impacts related to biodiversity. The ultimate goal is to guide revisions to existing national legislation and to enhance institutional capacities to better achieve conservation objectives.

This study was informed by and builds on initiatives spearheaded by international partners, particularly the Convention on Biological Diversity (CBD), which partners with the KR to develop the National Biodiversity Strategic Action Plan and projects of the GIZ.

3. Main Findings

The legal and regulatory framework governing biodiversity conservation and the management of living natural resources in the Kyrgyz Republic is rooted in the Constitution, which declares: 'The land, subsoil, airspace, water, forests, flora, fauna, and other natural resources are the exclusive property of the Kyrgyz Republic. These are used to maintain a unified ecological system, essential for the Biodiversity Conservation and Sustainable Management of Living Natural Resources life and activities of the people of Kyrgyzstan and receive special state protection' (Article 12.5). The legislative framework encompasses a comprehensive set of instruments (including documents, codes, and laws) that, along with accompanying regulations, provide for the conservation and management of biodiversity and living natural resources. Nine principal instruments constitute the foundation of the

[1] ESS6 does not provide guidance for assessing the ecosystem services, these are defined within ESS1 but are frequently associated with biodiversity and are therefore considered here.

Kyrgyz Republic's legal framework for biological conservation and management, specifically the Forest Code, Land Code, Water Code, Law on Environmental Protection, Law on Flora Protection and Use, Law on Fauna, Law on Protected Areas, Law on Biosphere Territories, and Law on Environmental Examination. These documents provided the basis for the assessment conducted.

The institutional framework for managing natural resources in the Kyrgyz Republic is led by the Ministry of Natural Resources, Environment & Technical Supervision (MNRETS). This ministry is tasked with the development, implementation, and coordination of policies related to the environment, climate, geology, subsoil use, and the protection of natural resources. Within MNRETS, the Department for Biodiversity Conservation and Protected Areas is charged with ensuring the conservation and sustainable use of biological diversity, the effective management of protected natural areas, and the protection, utilization, and reproduction of flora and fauna. Key functions of this department include (i) organizing and maintaining the national Red Data Book, (ii) managing the state cadaster of flora and fauna, and (iii) documenting natural objects and complexes under state protection. Additionally, the Forestry Service, which falls under the Ministry of Agriculture, is responsible for the management and conservation of forest resources. The service's duties typically include developing and enforcing sustainable forest management plans, reforestation and afforestation initiatives, forest protection measures, compliance monitoring, and public education, as well as research and data collection on forest ecosystems and resources. Other stakeholders include ‘Gareev’ Botanical Garden/Research Institute, and Forest Research Center under National Academy of Science, among others.

The legal framework for biodiversity management within the Kyrgyz Republic is generally well-developed and addresses many aspects of the ESS6. Nevertheless, gaps have been identified, particularly concerning the implementation and enforcement of this framework. The subsequent sections will discuss these gaps in detail and offer recommendations for their resolution and enhancement.

Gaps Identified in the KR Biodiversity Legal Framework

The study identified some key gaps within the legal framework of the Kyrgyz Republic pertaining to biodiversity management, which include:

- Compliance with the mitigation hierarchy is not a primary objective of Environmental Impact Assessments, nor is there an emphasis on a precautionary approach to protect biodiversity, although the concept is incorporated into various legislative instruments."
- The framework lacks definitions for key concepts such as 'no net loss' or 'net gain' of biodiversity, as well as 'offsets,' which are compensatory measures designed to achieve measurable, additional, and long-term conservation outcomes for sensitive biodiversity.
- The biodiversity legislation does not address the concept of critical habitat; however, the concept is acknowledged via the Red Data Book, first published in 1978. This instrument does not offer a structured analysis of threatened status, necessitating adaptations for its use in determinations of critical habitat aligned with ESS6, which calls for the use of national red list assessments.
- Legislation concerning specially protected areas is well developed, with no notable legislative deficiencies pertaining to legally protected and internationally recognized regions of significant biodiversity value. However, gaps exist in the track record and capacity for effective implementation. This is similar to the case with the management of invasive alien species."

- Extensive legislation regulates the utilization of living natural resources; however, it lacks a focus on the sustainable use of these resources.
- Issues pertaining to primary suppliers are not included in biodiversity-relevant legislation.

4. Recommendations Resulting from the Study

Based on the outcomes of the gap assessment and consultations with relevant stakeholders, key issues were identified, many of which were accompanied by specific recommendations. A summary of these is provided below.

Legislative Frameworks: Old legislation governing environmental protection and biodiversity conservation needs updating to align with current challenges and to eliminate inconsistencies across various legal instruments. More critically, the enforcement of existing laws, particularly those regulating livestock grazing, must be significantly improved. Government agencies should face increased accountability for their role in ensuring compliance with biodiversity conservation and environmental protection mandates. Additionally, it is vital to promote increased collaboration and engagement with leading global conservation entities.

Development of In-country Biodiversity Expertise: The Ministry of Finance is urged to reassess the financial support provided to government departments and academic institutions, with the intention of boosting funds for human resources and research. It is imperative to devise a comprehensive recruitment and capacity-building strategy for the MNRETS. The private and nonprofit sectors should be motivated to play a larger role in biodiversity conservation, management, and monitoring. The collaboration between academia and conservation authorities at both national and local levels requires enhancement. Academic institutions should contribute to graduate vocational training for authorities and biodiversity professionals. Environmental Science faculties need to teach international best practices in biodiversity management, including the principles of no net loss and net gain as highlighted in ESS6 of the Environmental and Social Framework. Law schools should integrate environmental law into their programs. Furthermore, investment in scholarships for undergraduate and postgraduate studies is essential to cultivate future careers in biodiversity conservation.

Management of Threatened Ecosystems and Species: A comprehensive conservation planning program is needed to establish national conservation targets and to create a strategic roadmap for the enhanced protection and sustainable management of biodiversity across the country. This includes broadening the scope of the Protected Area network. It is also critical to update the national Red Data Book to reflect the IUCN Red List categories for species that are critically endangered, endangered, and vulnerable, ensuring alignment is based on rigorous scientific analysis. This update should be accompanied by robust conservation programs tailored for endangered, rare, and endemic species. Furthermore, local conservation initiatives specifically designed for threatened and endemic species must be identified and developed to support the findings and objectives set forth in the Red Data Book.

Management of Specially Protected Areas (SPA): Each SPA has its regulations, but many of these regulations need updating. The boundaries of some SPAs need physical demarcation, along with the completion of state cadastral data. A capacity-building analysis for SPA management authority is needed to guide the development of a plan to enhance rangers' skills. An overview of donor and international financing support to SPAs would be beneficial to identify funding gaps. There are efforts

to boost ecotourism, but this could impact some SPAs. A national tourism management plan, based on an assessment of the ecological carrying capacity of each SPA and monitoring of the human influence, is needed. This plan should identify stress points, infrastructure and capacity gaps to manage tourism sustainability within SPAs. Additionally, involving and building the capacity of local communities near SPAs to monitor and regulate activities is crucial for the protection of SPAs and their associated biodiversity.

Forest Management and Restoration: Focused efforts for the conservation and sustainable management of walnut forests in the Kyrgyz Republic's southern region are essential. Restoring degraded lands is a priority to reverse the loss of forests and enhance the livelihoods of the local population. Research into the ecological functions of these forests is necessary to inform effective restoration strategies. It is important to initiate both large and small-scale native tree planting programs, prioritizing species with significant commercial and conservation value. The Forestry Service, under the Ministry of Agriculture, and the Forest Research Centre, part of the National Academy of Sciences, should strengthen their horticultural capabilities. Additionally, establishing botanical reserves will be crucial for cultivating a variety of indigenous trees, including those species that are endangered, to facilitate large-scale forest restoration efforts.

Sustainable Management of Living Natural Resources: Raising awareness about the value of ecosystem services and the sustainable management of living natural resources is needed. To enhance the sustainability of harvesting practices in the remaining walnut forests, specialized programs should be developed. These programs should also encourage the reforestation of walnuts and other tree species on a large scale, particularly in areas where the land has been degraded. It is important to note that GIZ is already actively involved in this area.

Control of Invasive Alien Species (IAS): The delineation of responsibilities for the enforcement of regulations and the control of IAS must be made clear at both national and local levels. The Department of Plant Quarantine and Protection, which falls under the Ministry for Agriculture, requires enhanced capacity and improved coordination with other governmental agencies to effectively manage IAS across various sectors beyond agriculture.

5. Conclusions

The legal framework in Kyrgyzstan is continuously evolving, with amendments and additions to existing laws and regulations. To ensure compliance with international standards for environmental protection, biodiversity conservation, and sustainable management of living natural resources, it is essential to harmonize national legislation with international legal instruments and standards. Such harmonization, coupled with the enhancement of national institutions' capacities, will lead to more consistent and effective governance for both government-funded investments and those supported by International Financial Institutions or the private sector. This will, in turn, improve the management of biodiversity and related developmental outcomes. The findings and recommendations from this study could be used to guide the development of future biodiversity-related investments and initiatives by the World Bank and other development partners in Kyrgyzstan. These efforts would aim to ensure alignment with international biodiversity standards, including environmental and social safeguards, and best practices for the conservation and sustainable management of living natural resources.

6. Acknowledgement

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Data Governance as the Cornerstone of Good Governance in Mega Projects

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Abstract

This paper explores the critical role of data governance in supporting good governance in mega projects, using the conceptual framework of a mega-infrastructure project. The research highlights the importance of establishing a robust data governance plan as a prerequisite for developing an effective and reliable data system. The paper delves into the three pillars of data governance—data quality management, data privacy and security, and regulatory compliance—and examines how they contribute to achieving transparency, accountability, and informed decision-making in mega projects. Through the analysis of these pillars, the paper emphasizes the need for a comprehensive and strategic approach to data governance that lays the foundation for a data system aligned with the principles of good governance. A practical application of the principles, ANDANTE, will be presented.

Summary Statement

This paper explores the critical role of data governance in supporting good governance in mega projects, using the conceptual framework of a mega-infrastructure project.

1. Introduction

Data governance is an evolving concept, driven by rapid developments in information and communication technologies. It is especially critical in mega projects where diverse stakeholders play various roles in the collection, storage, control, processing, use, and dissemination of data. Moreover, ensuring data privacy, security, and compliance with regulations is paramount to protect data integrity and to facilitate proper data use and analysis.

Historically, mega project proponents and their consultants would conceive projects, prepare detailed proposals, and develop tender documents with contributions from sub-consultants and specialists. Such teams might devise data management plans to organize and continuously monitor project progress using collected data. Typically, these teams adopted a traditional governance approach, characterized by a hierarchical, top-down perspective (Sweeney, 2022). This approach can convey “value perceptions” of project proponents and their consultants about what data should be captured and how data should be utilized. However, it often overlooks the broader needs for data management and usage from construction and operational perspectives and does not accommodate new methods for collecting, storing, analyzing, using, and disseminating data from other stakeholders’ perspectives. This article offers a brief review of data governance development using a bibliometric approach. It proposes a comprehensive definition of data governance, introduces a robust governance plan, and outlines three key pillars: data quality management, data privacy and security, and regulatory compliance. It concludes with a proposed framework for data governance and the Automatic Noise Data Management E-system (ANDANTE), which integrates web-based noise and weather monitoring with a CCTV network, ending with some final remarks.

2. Data Governance

Understanding an evolving concept such as data governance from a holistic perspective is challenging. Nevertheless, with the advent of bibliometric science—particularly its methodologies, data sources, and tools—researchers can obtain a panoramic view of specific research topics quickly and objectively (Donthu et al., 2021; To, 2022; Yan et al., 2022). Moreover, bibliometric studies can illuminate trends on research topics, identify the most productive authors, institutions, and countries, and highlight the initial publications and their core themes, as well as the evolution of underlying concepts over time (Chung and To, 2023; To and Chung, 2023; To et al., 2023).

On January 3, 2024, a search was conducted using the term "data governance" in "Article Title, Abstract, Keywords" on Scopus—one of the largest academic indexing databases. This search yielded 2,354 documents, including journal articles, reviews, conference papers, book chapters, books, conference reviews, notes, editorials, short surveys, and others. After excluding 50 conference reviews, 24 notes, 9 editorials, 8 errata, 5 short surveys, and 1 letter, 2,257 documents remained. These included 1,140 journal articles, 132 reviews in journals, 756 conference papers, 45 books, and 184 book chapters. The earliest academic article on “data governance” appeared in year 2005 (Trope and Power, 2005). The number of publications increased to 15 in year 2010, 96 in year 2017, and 484 in year 2023, as illustrated in Figure 1(a).

According to Scopus, the most productive author was Rob Brennan from the School of Computer Science

at University College Dublin, with 17 data governance publications. Boris Otto from the Fraunhofer Institute for Software and Systems Engineering ISST in Germany was the second most productive author, with 14 publications. In terms of institutional affiliations, the University of Oxford led with 37 publications, followed by Delft University of Technology with 29, and the University of Toronto with 28. In a geographic distribution, U.S.-affiliated authors produced 466 data governance publications, Chinese-affiliated authors 323, and UK-affiliated authors 320. Figure 1(b) shows that U.S. and UK authors were most prolific before 2019; however, publications from Chinese authors have surged in recent years (To and Yu, 2020).

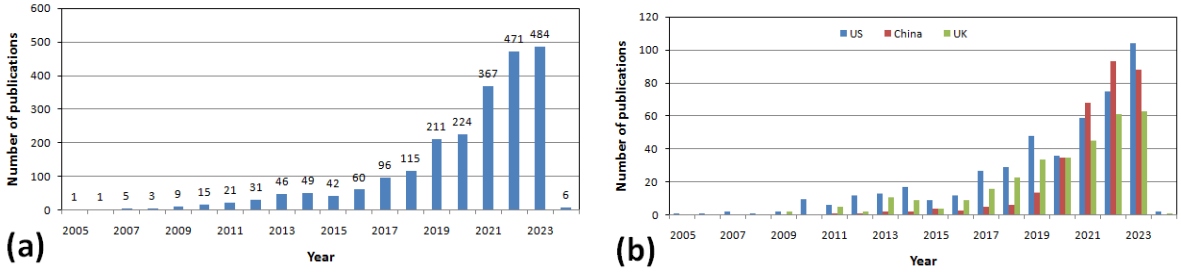

Figure 1. The number of data governance publications from 2005 to 2023 (a) total, and (b) by US, Chinese, and UK authors.

Scopus revealed that the first three articles on data governance, authored by Roland L. Trope, E. Michael Power, and their associates in 2005, 2006, and 2007, approached the subject from a legal, i.e., compliance perspective. Specifically, Trope et al. (2007) highlighted that an organization's data should be actively managed, especially in terms of data security in an increasingly technology-intense environment. Organizations should develop coherent information management strategies, incorporating inputs from business alliances, to meet regulatory requirements. A review of the first ten data governance publications identified by Scopus showed a focus on data quality management, privacy, and information security.

A keyword co-occurrence analysis of the 2,257 selected publications was conducted using VOSviewer (Van Eck and Waltman, 2010). Setting the minimum occurrence of a keyword at 25, 104 out of the 10,718 keywords met this threshold, resulting in three clusters as illustrated in Figure 2. The largest cluster (colored red) included 46 keywords with 'data governance' as the core keyword, encompassing terms like big data, information management, artificial intelligence, decision making, data quality, and data management. The second largest cluster (colored green) included 38 keywords with 'human' as the core keyword, involving terms such as article, adult, data sharing, privacy, ethics, and medical research. The third cluster (colored blue) focused on 'data privacy' and included keywords such as governance, data protection, blockchain, security, and laws and legislation. Notably, the second largest cluster primarily discussed data governance concerning personal medical data.

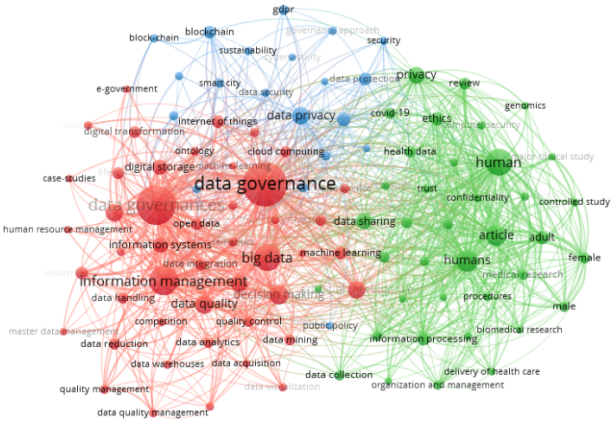

Figure 2. Co-occurrences of keywords using the 2,257 data governance publications.

Through meticulous bibliometric analysis, data governance can be defined as a holistic approach encompassing strategies, policies, structures, processes, procedures, and practices that assist organizations in planning, budgeting, collecting, organizing, storing, retrieving, analyzing, processing, presenting, reporting, and disseminating data and outcomes effectively and efficiently. Moreover, data governance must address data quality management, data privacy and security, and adherence to national and international regulations.

A comprehensive data governance plan involves several steps: (i) assessing data needs from various stakeholders, (ii) defining roles, rights, responsibilities, and obligations for key parties, including different stakeholders involved in data collection, management, control, use, and disposal, and (iii) establishing data policies and standards that dictate how data are to be handled and shared. These policies and standards must comply with regulatory requirements, such as data privacy and protection. Furthermore, a data governance plan should cover its implementation, including the evaluation of different data platforms (and/or databases), applications, analytics, and tools, assessing potential issues and risks. Implementation should be followed by measurement, analysis, and improvement of data governance, using the well-established Deming Plan-Do-Check-Act cycle (Carretero et al., 2016) as depicted in Figure 3.

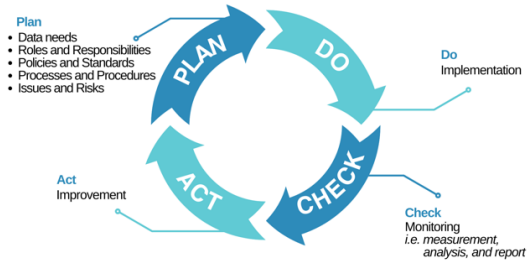

Figure 3. A data governance plan based on Deming Plan-Do-Check-Act cycle.

2.1. Data quality management

As a key pillar of data governance, data quality management ensures that collected data possesses desirable characteristics such as usability and usefulness to data consumers and is free of defects (Fürber, 2016; Redman, 2001). More specifically, data quality measures the extent to which a dataset meets criteria in terms of accuracy, completeness, consistency, uniqueness, validity, and timeliness (IBM, 2023). According to IBM, these dimensions include:

- Accuracy: Characterizes the correctness of data values and the importance of identifying a "source of truth"—acting as a primary data source while other data sources can be used to confirm the agreed value(s).
- Completeness: Reflects the usefulness of the collected data; a high percentage of missing values may lead to misleading or biased analyses.
- Consistency: Evaluates data records from two or more different datasets to ensure that the same or similar conclusions can be obtained without contradictory evidence.
- Uniqueness: Means that duplicate data should be processed and eliminated.
- Validity: Measures the extent to which data meets the required formats established by the organization (or project proponent).
- Timeliness: Characterizes the readiness of data within an expected timeframe. High-quality data is essential for effective evidence-based decision-making to achieve an organization's (or a project's) goals.

Only when high quality of data is available, effective evidence-based decision making can be made in order to achieve an organization's (or a project's) goals.

2.2. Data privacy and security

Data privacy and data security are closely related concepts. Data privacy involves the collection, control, and protection of personal information, focusing on lawful and informed collection, proper handling, storage, processing, usage, and disposal of personal data. Privacy is considered an individual's human right and should not be compromised without knowledge or consent (De Hert and Gutwirth, 2006).

Data security primarily focuses on protecting data from unauthorized third-party access, malicious attacks, and improper exploitation. It encompasses organizational (or project) policies, programs, practices, and processes established to protect data, including personal data. Data security practices may include network security, access control, breach response, encryption, multi-factor authentication, and activity monitoring. In 2019, the International Organization for Standardization (ISO) released ISO/IEC 27701 outlining a privacy information management system for privacy information security (ISO, 2019). This standard assists organizations to establish management systems that support data privacy requirements, particularly for compliance of the European Union General Data Protection Regulation (GDPR).

2.3. Regulatory compliance

Data are important organizational assets. As data often includes personal data, various national, regional, and

international laws govern the collection, storage, management, control, usage, and disposal of personal data. The GDPR, a regional regulation about data protection, covers data privacy and security, imposing obligations on any organization that handles data related to EU citizens or residents (European Union, 2023). Effective since 25 May 2018, the GDPR mandates that organizations consider data protection "by design and by default."

In the US, while there is no federal data privacy law, approximately one-third of the states have begun to pass or enact data privacy legislation. For example, the California Consumer Privacy Act (CCPA) took effect in January 2020, granting individuals the rights to opt-out of data collection, and to access and delete their data, similar to the GDPR (dfinsolutions.com, 2023). Across the Pacific, China's Personal Information Protection Law (PIPL) became effective on 1 November 2021 (Hong Kong's Privacy Commissioner for Personal Data, 2023). Like the GDPR, the PIPL regulates the collection and processing of data from individuals in China, regardless of whether the organizations are based in China.

3. A Proposed Framework and ANDANTE

Figure 4 shows a proposed data governance framework. It demonstrates that data lifecycle begins with a data needs analysis. An organization (or a project proponent) must sit down with its stakeholders to identify what data are required, where and when data are collected, who collect and take charge of the storage, management and control of data, how data are processed and analyzed, how processed data are presented (and disseminated), and how and when data are disposed of (if necessary). Once a data needs analysis is thoroughly conducted with inputs from different stakeholders and a consensus is reached, the organization (or project proponent) shall consider the appointment of people who are responsible for the collection, storage, management and control, processing, analyzing, disseminating, and disposal of data and provide appropriate technical and compliance-related training.

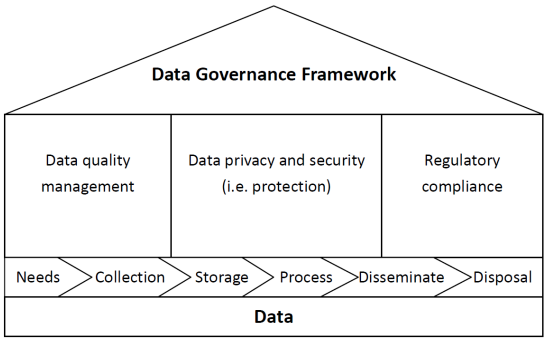

Figure 4. A proposed data governance framework

ANDANTE, a past project in Hong Kong, stands as a testament to the practical application of this framework.

In Hong Kong, mass transportation is critical because it serves about 4 millions passenger journeys a day including millions of residents and travelers (To, 2015). Additionally, mass transit railway is relatively more environmental-friendly than other modes of transport such as public buses and private cars (To et al., 2020). Thus, Hong Kong's mass transit railway has kept expanding over the decades (To, 2015; To et al., 2020). During the construction or extension of rail lines, noise monitoring with timely alerts and the resolution of noise exceedances are crucial for regulatory compliance. An automatic noise data management e-system, namely ANDANTE, has been deployed to meet such requirements (Chung et al., 2012). ANDANTE is a cloud-based online platform that collects noise, visual, and weather data along the construction and extension of rail lines. It consists of noise monitoring stations, CCTV cameras, and weather stations (Chung et al., 2012). Figure 5 shows a screen-shot of ANDANTE and its associated equipment. One of its added features is the enhancement of stakeholders' engagement. ANDANTE enables real-time notifications to all concerned parties when a noise exceedance or noise complaint occurs.

The implementation of ANDANTE's data governance framework not only enhanced operational transparency but also bolstered public trust by providing stakeholders with real-time access to environmental monitoring data.

Figure 5. Screen-shot and associated equipment of ANDANTE

4. Conclusion

Data governance is vital for an organization's survival and prosperity, as it hinges on effective data collection and capturing "the value" of data while accommodating the needs and requirements of various stakeholders. Similarly, the success of a mega project relies on its data management and governance aligning with stakeholder and regulatory expectations. This paper has provided an overview of the evolution of data governance through bibliometric analysis, introduced a robust data governance plan, and described the characteristics of its three main pillars: data quality management, data privacy and security, and regulatory compliance. Additionally, the paper briefly introduces a practical system, ANDANTE, which exemplifies effective data governance.

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New EIA regulation in Portugal: a stepbackwards

Paper presented at the 43rd Annual Conference of the International Association for Impact Assessment, 24-27 April 2024, Dublin, Ireland

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Abstract

Following an international trend, Portugal adopted in 2023 changes to the EIA regulations, with the aim of simplifying and reducing bureaucracy, avoiding repetition of licensing processes. The main driver of this change is the massive investment in renewable energies (particularly solar power plants). The paper presents the main changes, both in terms of thresholds, deadlines, and procedures. It highlights the non-compliance with obligations arising from the European Union's EIA directive, particularly regarding the generalization of a tacit approval mechanism. The paper also addresses the limited reactions from society, NGOs, and the IA community of practice.

European Union regulatory framework

The Charter of Fundamental Rights of the European Union (2012/C 326/02), states, on article 37 (Environmental protection) that "*[a] high level of environmental protection and the improvement of the quality of the environment must be integrated into the policies of the Union and ensured in accordance with the principle of sustainable development*."

In 2020 emerges the EU Regulation 2020/852 of the European Parliament and of the Council, of 18 June 2020, on the establishment of a framework to facilitate sustainable investment. Its article 9 states the environmental objectives, them being:

> *(a) climate change mitigation;*
>
> *(b) climate change adaptation;*
>
> *(c) the sustainable use and protection of water and marine resources;*
>
> *(d) the transition to a circular economy;*
>
> *(e) pollution prevention and control;*
>
> *(f) the protection and restoration of biodiversity and ecosystems.*

Two years later, in 2022, the Council Regulation (EU) 2022/2577, came into being as a result of socio-economic pressures, the main reason being Russia's invasion of Ukraine. The aim of this regulation is to lay down a framework to accelerate the deployment of renewable energy.

In the context of this presentation, it is important to mention the articles 3 and 4 relating to the overriding public interest and to the acceleration of the permit-granting process for the installation of solar energy power plans, respectively.

Article 3, concerning the overriding public interest, states the following:

"1. The planning, construction and operation of plants and installations for the production of energy from renewable sources, and their connection to the grid, the related grid itself and storage assets shall be presumed as being in the overriding public interest and serving public health and safety when balancing legal interests in the individual case, for the purposes of Article 6(4) and Article 16(1)(c) of Council Directive 92/43/EEC(5), Article 4(7) of Directive 2000/60/EC of the European Parliament and of the Council(6)and Article 9(1)(a) of Directive 2009/147/EC of the European Parliament and of the Council(7). Member States may restrict the application of those provisions to certain parts of their territory as well as to certain types of technologies or to projects with certain technical characteristics in accordance with the priorities set in their integrated national energy and climate plans.

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2. Member States shall ensure, at least for projects which are recognised as being of overriding public interest, that in the planning and permit-granting process, the construction and operation of plants and installations for the production of energy from renewable sources and the related grid infrastructure development are given priority when balancing legal interests in the individual case. Concerning species protection, the preceding sentence shall only apply if and to the extent that appropriate species conservation measures contributing to the maintenance or restoration of the populations of the species at a favourable conservation status are undertaken and sufficient financial resources as well as areas are made available for that purpose."

Article 4, concerning the acceleration of the permit-granting process for the installation of solar energy equipment, states:

"1. The permit-granting process for the installation of solar energy equipment and co-located energy storage assets, including building-integrated solar installations and rooftop solar energy equipment, in existing or future artificial structures, with the exclusion of artificial water surfaces, shall not exceed 3 months, provided that the primary aim of such structures is not solar energy production. By way of derogation from Article 4(2) of Directive 2011/92/EU, and Annex II, points 3(a) and (b), read alone or in conjunction with point 13(a) of Annex II to that Directive, such installations of solar energy equipment shall be exempted from the requirement, if applicable, of being subjected to a determination whether the project requires an environmental impact assessment, or from the requirement to carry out a dedicated environmental impact assessment.

2. Member States may exclude certain areas or structures from the provisions of paragraph 1, due to reasons of cultural or historical heritage protection, or for reasons related to national defence interests or safety.

3. For the permit-granting process regarding the installation of solar energy equipment, including for renewables self- consumers, with a capacity of 50 kW or less, the absence of a reply by the relevant authorities or entities within 1 month following the application shall result in the permit being considered as granted, provided that the capacity of the solar energy equipment does not exceed the existing capacity of the connection to the distribution grid.

4. Where the application of the capacity threshold referred to in paragraph 3 of this Article leads to a significant administrative burden or constraints to the operation of the electricity grid, Member States may apply a lower threshold provided that it remains above 10,8 kW.

5. All decisions resulting from the permit-granting processes referred to in paragraph 1 of this Article shall be made public in accordance with existing obligations."

Decree-Law no. 11/2023, also known as the "Environmental Simplex"

In a context of energy crisis, drought and the fight against climate change, there is a need to speed up the realisation of the changes that need to be made.

Decree-Law no. 11/2023, also known as the "Environmental Simplex", came into force in Portugal with the aim of "initiating a reform to simplify existing licensing simplifying companies' activities without compromising environmental protection." The objectives of the changes in the Decree-Law are mainly:

- To make a general simplification for the Public Administration resulting in greater celerity by avoiding the suspension of decision deadlines and preventing opinions from being issued after the deadline.
- To reduce bureaucracy by: reducing the obligation to carry out EIAs; reducing or eliminating duplication of procedures, authorisations and opinions and eliminating the need to renew environmental licences.
- To attract investment
- To reduce costs for the industry.

But what exactly are the main changes of this regulation and how do they come to play with EU regulations?

The main changes of this regulation apply to:

- EIA exclusions and waivers
- Elimination of certain procedures
- Transfer of responsibility
- Non-suspension of deadlines
- Tacit approval
- Presumptions of public interest

This paper highlights the following: (1) exclusions; (2) thresholds; (3) urban development projects and (4) tacit approval.

Exclusions

Simplex introduced the exclusion from the application of the EIA for some types of Annex II projects, outside designated areas (Natura 2000, protected areas and cultural heritage sites), in particular **intensive fish farming** and the **production of hydrogen from renewable sources or electrolysis of water**. Designated areas cover approximately 30% of the territory.

Thresholds

The Simplex introduced a change in the thresholds for compulsory submission to EIA for some types of Annex II categories:

- Agriculture, livestock farming and aquaculture.
- Extractive industry.
- Energy industries.
- Textile, leather, wood and paper industries.
- infrastructure projects.
- Other projects.

It is worth highlighting that in the previous legislation, regarding the energy industry, an EIA was mandatory when the installed power was greater than or equal to 50 MW.

With the new regulations, projects of solar renewable electricity are subject to a mandatory EIA only when the total surface of the solar panels and inverters are equal to or greater than 100 ha, irrespective of the total area of the plot of land.

Urban development projects

The EIA Directive Annex II category "Urban developments" was translated as "Urban allotments operations + shopping malls"**.** This means that all urban developments (except shopping malls), regardless of their size or location, when they do not involve a formal allotment operation are never subject to EIA.

Tacit approval

The altered act provides tacit approval for everything in the EIA procedure, including the opinions of the competent authorities and the final decision.

There is already an electronic platform that allows to issue tacit approval certificates within 8 days.

Conclusions

There is a great deal of pressure to speed up the licensing of renewable energy projects, with a focus on solar energy. But the main concern is that these new regulations could put environment at risk and infringe the EU EIA Diretive and other EU regulations.

Simplifying licensing processes is and should be a positive thing. However, the simplification brought about by the new EIA regulation comes at the expenses of

- The possible decrease of the quality of the EIA studies.
- The burden on human resources, requiring greater efforts in a less amount of time.
- The increase of the responsibility of the licensing authorities, deciding on a case-by-case basis if a project should be subject to EIA.
- The mitigation of negative environmental and social impacts.
- The relevance of public participation.

The public reaction to the new legislation has been limited, not only from professionals but also from the media and NGOs.

The Portuguese Environmental Agency (*APA – Agência Portuguesa do Ambiente*) organised in February 2024, one year after the entry into force of the new EIA regulations, a discussion forum on the changes and the practice during that year. A large majority of the stakeholders (environmental authorities, EIA consultants, developers) agreed that the changes raised many doubts and could jeopardize the environment. One of the conclusions of that forum was the need, after one year of enforcement, to weight if the EIA Simplex is a progress in simplification or a regulatory step backwards.

Shared value towards SLO: engagement and growth, approaching Communities.

Climate change adaptation has been demand-full of a holistic vision towards population: There won't be a netzero World if People aren't aligned and trustfull of business and politicians.

There won't be a climate balance if the Greater South doesn't have the tools and incentives to follow the greater North onto transitioning – and until then, we can't really say that we're Leaving No One Behind.

So how can we make it Work, respecting Human Rights and Local Communities?

Enhancing people's rights and a social license to operate, the energy transition @EDP is focusing on local communities. Projects enhance the respect needed, with a shared value perspective.

to move forward promoting identity needs, reskilling and restoring assets to move ahead, through innovation.

EDP set to be coal free by 2025, all green by 2030 and net zero by 2040, engaging onto the process of Respecting Community while growing (RE) and decommissioning from CO2: in Sines (Portugal)2021, and now enduring Spain, where all Coal Power Plants are being shut down. But besides the social challenge while decommissioning, there's also the challenge of "invasion" while deploying new renewable Energies.

Communities fear the unknown: *what are these aliens coming into our landscape?* We are now identifying risks as the path to prevent crisis, thus enhancing profit.

A Local Engagement Policy was enforced. Its procedures imply an HR assessment; map our local stakeholders and early engaging with their leaders, as with their culture, struggles, sacred grounds. Listen.

The shared value approach is crucial to avoid business' obstacles: at EDPR NA, the **Community Relations Coordinator** is someone from the community who is enthusiastic about the RES projects and has a familiarity with their hometown;

@ LatAm and Spain, Keep It Local empowers for green jobs, qualifying abandoned areas; Closer2You and EDPR Rural rebuild deprived areas, empowering farming communities.

Leaving coal behind, Spain created ENTAMA to foster business entrepreneurship and reskill.

In Portugal, the Sines Coal Power Plant shut down was known 6 months before its closing. An against-time action plan was set: A consortium of 2 Univ. studied the Local Economy: future jobs, cultural outlines, reskill. With the City Hall and the National Employment Institute, we created a local cabinet, with job training, psychological support and social rescue for the population. An entrepreneurship program at the local tech school empowered local businesses, and a Social Fund gave back to the community social responses through ONG. FAS was a measurable awarded plan, consulting with community and sharing Data achieved. A case study at the WEF toolkit for the ET.

To map our local stakeholders and early engaging with them, means getting to know your terrain and its identity: what are its characteristics, how does that population act, what fears do we raise ahead of construction…

And getting to know them is not just identifying its leaders, but rather knowing its culture and History: what are their struggles, their historical pain points, their sacred grounds in all areas?

Getting to know them is to really engage. Listen. Further listen – and apply what we listen to, to what and how we plan on doing there.

While building new technology Renewable Energy projects throughout 30 countries, what emissions, hurting sounds, behavior challenges do they bring along? *How exactly are we* (the community) *going to be engaged OR exploited through the process of these aliens coming in, taking what's ours and getting their gains with no sharing?*

All those questions are natural and will only be avoided if prevented: Communication Channels, trustful ones, need to be deployed in early stages of development, having the local populations be the first to know that we're coming and what are we coming for – with them, for them.

But also the supply chain needs to be involved – from procurement stages, suppliers need to meet sustainability standards in order to be contracted, further taking our commitments to Scope3, and making sure that they are aligned with who we are contracting locally. EDP developed a Sustainability Path with different level classifications for its value-chain: all companies are evaluated and rated. If their sustainable standards are low, they'll know what we identified as lacking or wrongly addressed – and we'll show them the step-by-step suggested in order to go up our classification. Suppliers are contracted depending on this rating, and we'll then be able to measure their impact while representing EDP at our deployments/ developments.

It really has to go up to a 360º engagement from C-Level to very local relations, and it has to be driven by purpose in order to be applicable throughout the 30 countries where we operate, so…a lot to be done, but we're on our way.

We Chose Earth really means that We Chose People!

AUTHOR BIO

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ADAPTIVE COASTAL DEVELOPMENT MANAGEMENT

Introduction

In 2016, the Kingdom of Saudi Arabia (KSA) commenced implementation of ambitious and far-reaching plans to diversify the national economy in line with the national strategy, Vision 2030. A key tenet of the national strategy is to substantially increase the volume of non-pilgrimage tourists travelling to KSA. The development of key destinations along KSA's Red Sea coastline was identified as a key driver that would allow for this objective to be realized. To facilitate this vision, The Red Sea Development Company (TRSDC), now Red Sea Global (RSG), was established in 2018 by KSA's Public Investment Fund (PIF), with a remit to develop The Red Sea tourism destination. The Red Sea aims to develop luxury tourism and residential facilities based predominantly around the archipelago of islands within a natural lagoon referred to as the Al Wajh Bank and beyond.

The Al Wajh Bank and the surrounding lagoon ecosystem is a particularly sensitive natural location with a high-quality marine environment. The lagoon, comprising 92 islands, supports regionally significant aggregations of nesting Hawksbill (*Eretmochelys imbricata*) and Green turtles (*Chelonia mydas*). In 2018, RSG undertook a Marine Spatial Planning (MSP) process (Chalastani, et al., 2020). Taking into account the outcomes of the MSP process, the Red Sea Concept Masterplan (CMP) has targeted development of seven of the largest islands in the lagoon and 24 of the smaller islands for development through a phased development approach. Phase 1 of the development is nearing completion, with the first project of The Red Sea opening to the public in 2023.

A Biodiversity Action Plan (BAP) developed for RSG has established a target of enhancing the population status to achieve net gain in absolute numbers ≥10% across past and present three-year averages, and to maintain the current genetic diversity of marine turtles in the project area. To help achieve this, RSG have initiated programmes to enhance understanding of the marine turtle distribution and population dynamics with a view to developing and implementing informed management and conservation strategies.

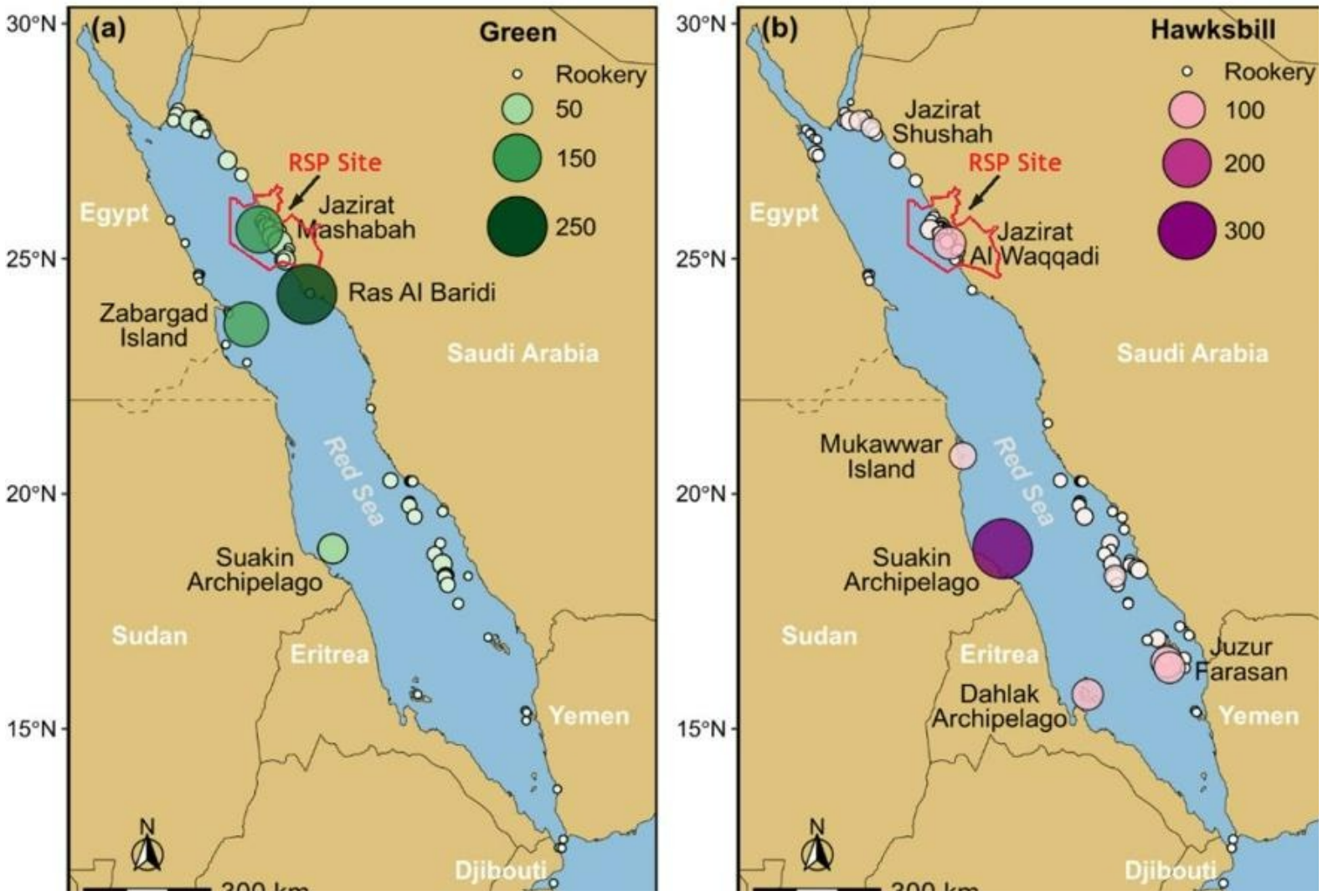
The initial MSP and CMP exercise was conducted soon after The Red Sea was initiated and while the understanding of the ecology of the Al Wajh lagoon was still developing. As the project has progressed and understanding of the system has improved, challenges with reconciling the needs of the development with conservation objectives have been identified. This paper aims to highlight the approaches that have been taken to embed conservation measures that safeguard turtle-nesting habitat into the planning process and mitigate these conflicts as they arise at the project level. There is a need to ensure that conservation and planning can be optimized through adaptive management approaches that are science-based and are reviewed and updated as the project progresses. This paper also identifies initiatives that can be applied by RSG at varying scales to further strengthen the planning efforts.

Turtle Breeding at the Red Sea

Of the five species of turtle recorded in the Red Sea, two are commonly recorded at The Red Sea project area. Hawksbill turtles are globally listed as critically endangered on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, while the Green turtle is listed as endangered globally (Meylan & Donnelly, 1999; Miller, 2018; Seminoff, 2004; Seminoff & Shanker, 2008). The Red Sea is recognized as one of the most important zones within the Red Sea geographic region in terms of Green turtle and Hawksbill turtle nesting

distribution, abundance, and rookery size (Figure 1) (Al Ameri, et al., 2022; Shimada, et al., 2021).

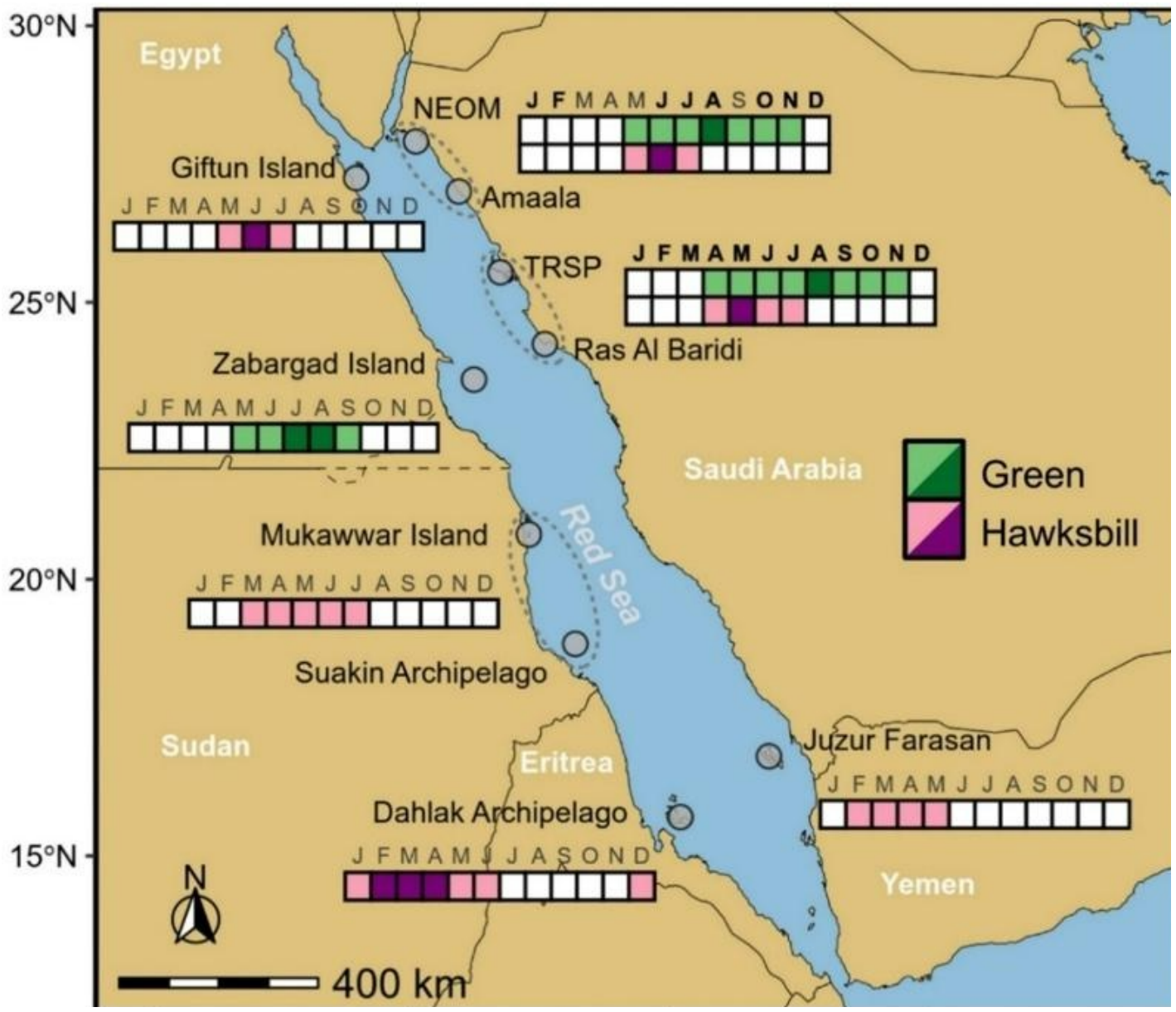
Figure 1 Distribution and Estimated Abundance of Nesting Green and Hawksbill Turtles in the Red Sea



Source: Adapted from Shimada et al. (2021)

The reproductive periods of both green and hawksbill turtles in the Red Sea are seasonal. In the northern Red Sea, Hawksbill turtles have traditionally been understood to breed and nest between April and July, with a peak in May. Green turtles have been recorded nesting between April and November, with peak activity in August (Figure 2) (Shimada, et al., 2021).

Figure 2 Nesting Season of Green and Hawksbill Turtles in the Red Sea (Shimada, et al., 2021)



Lighter colours indicate nesting activities in each month (shown by a capital letter above each box) with darker colours denoting the peak periods.

Source: Shimada et al. (2021)

Understanding of nesting seasonality continues to develop. In February 2024, RSG and KAUST field survey personnel identified female hawksbill turtles exhibiting nesting approach behaviour at two islands in The Red Sea. This is the earliest month for recorded evidence of nesting behaviour in the lagoon and suggests that there may be low levels of Hawksbill nesting activity in the Al Wajh lagoon throughout a larger proportion of the year than previously thought (Barrios-Garrido, H. *pers comm*).

A high proportion of the nesting recorded within the Red Sea area is focussed on specific islands. Shimada et al. (2021) found that approximately 61% of nesting events in 2018 and 2019 were on Breem Island, and the remaining nestings reported on 16 other islands (Figure 3). Hawksbill turtle nesting was more dispersed, with records from 2018 on 37 islands showing 43% of the nests on Al Waqqadi island (

Figure 4). Based on RSG survey data, there were an estimated 173 nesting female Greens and 69 nesting female Hawksbills in The Red Sea area in 2022 (RSG, 2023).

Figure 3 Main Green Turtle Nesting Sites in Red Sea

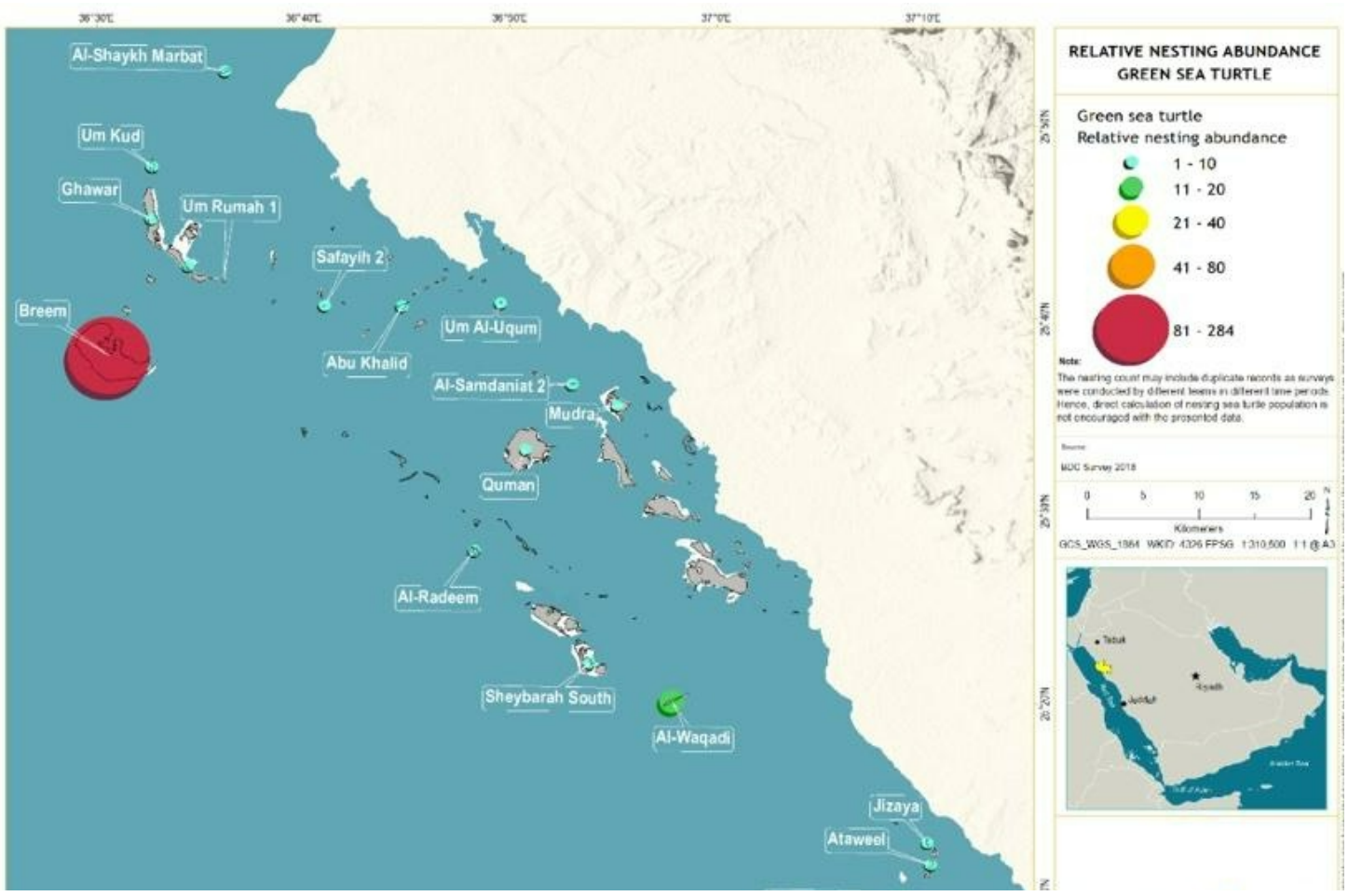
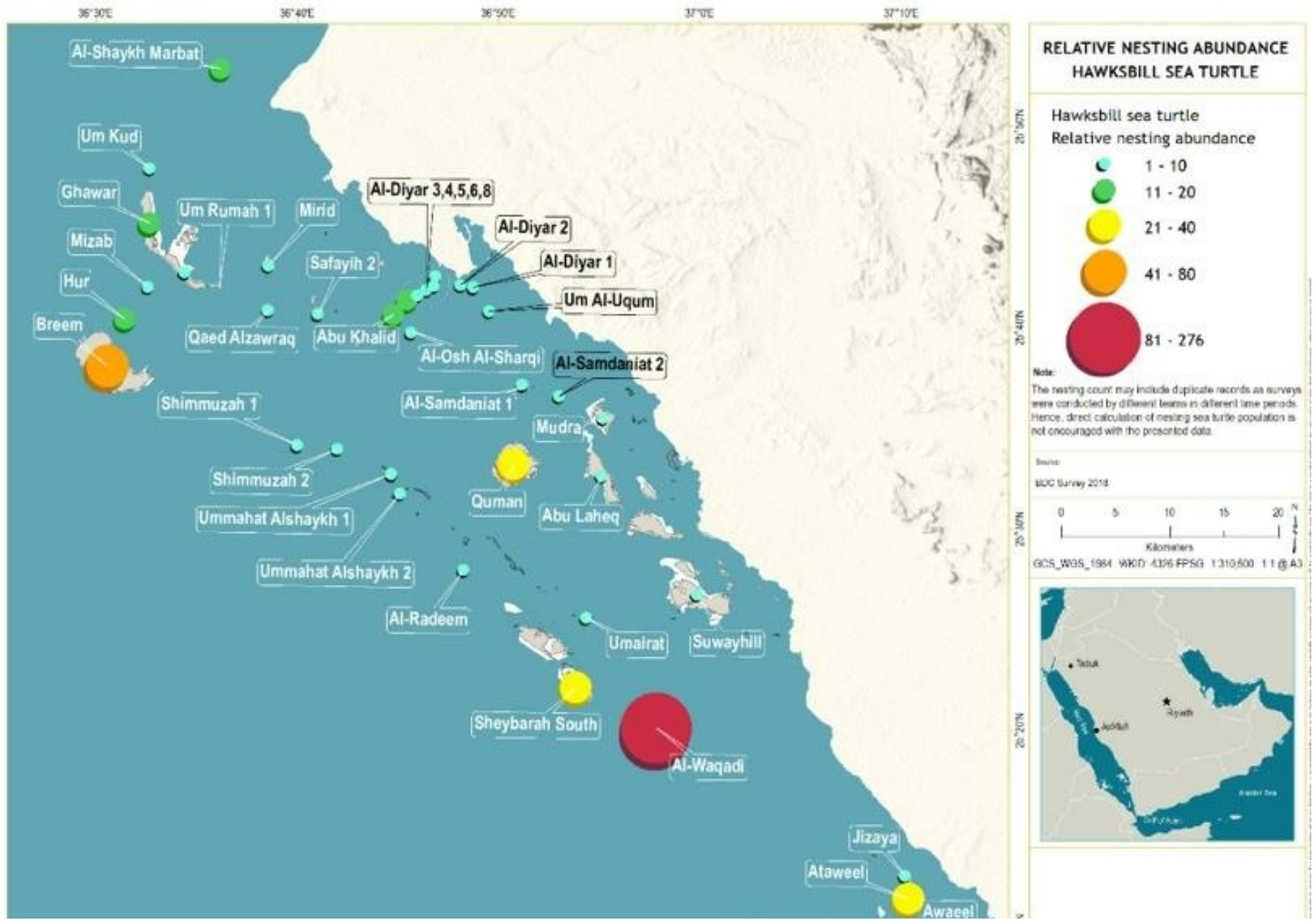


Figure 4 Main Hawksbill Nesting Sites in Red Sea



Studies Initiated by RSG

Effective management requires high-quality data. At the initiation of The Red Sea in 2017, the understanding of turtle populations was limited, with no studies having been undertaken. Between 2018 and 2020 Shimada et al (2021) undertook field studies across numerous islands and coastal areas in the northern Red Sea. RSG subsequently initiated a series of studies aimed at improving understanding of turtle populations within their areas of management to guide conservation and development planning. These studies, listed in Table 1, were undertaken by KBD on behalf of RSG, working in partnership with Five Oceans Environmental Services LLC and Pendoley Environmental.

Table 1 List of Studies Commissioned by RSG to Inform Conservation and Planning Initiatives

Study Type	Project Type	Description
Survey	Turtle Nesting Beach Surveys	Site walkover surveys on potential nesting beaches were carried out over 54 nights from 2019 to 2022. The RSG's regulatory entity, the Red Sea Zone Authority (RSZA), has also been conducting surveys of turtle nesting beaches between 2021 and 2023
	Satellite Tracking of Nesting Females	Satellite tracking of 50 Green turtles and 10 Hawksbill turtles between 2019 and 2022 using Platform Terminal Transmitter (PTT) tracking equipment. The data collected from the satellite tracking has helped reveal valuable information on distribution of key foraging and inter-nesting habitat, nesting success rates, and migration routes and behaviour during migration, both within The Red Sea project area and regionally within the wider Red Sea.
	Impact of Climate Change on Hatchling Survival	Eleven nests were assessed to estimate their hatching success values, with data loggers installed at nests to track temperature during egg incubation. Data from the studies helps inform research into the relationship between temperature and hatchling success.
	Hatchling Arena Trials (Lighting Response and Survey)	Two hatchling arena trials were undertaken to help understand the sensitivity of hatchlings to artificial light at key locations in The Red Sea area. The specific objectives were to collect hatchlings emerging from nests and subject them to *in situ* experimentation to help determine the effects of artificial lighting on orientation post-emergence.
Development of Design Guidelines	Development of Design Guidance for Mitigating Lighting Impacts on Turtle-Nesting Beaches	Design guidance aimed specifically at mitigating impacts associated with artificial lighting during masterplan design.
	Development of Design Guidance for Suitable Planting Palette on Turtle-Nesting Beaches	Guidance document aimed at providing advice on the plants that can be used to enhance turtle-nesting beaches and to shield beaches from the potential effect of artificial lighting associated with development.

Conflicts Between Coastal Development and Turtle Conservation

The Red Sea CMP established a development framework that designated development areas and established both the land use and the intensity of use within each of the areas. On this basis, the islands that are scheduled for development are largely fixed. While an environmental planning approach was applied in the development of The Red Sea CMP, turtle-nesting activity or important turtle-feeding habitat is present in the majority of development zones and conflicts between development and conservation objectives at the project level.

The risks to turtle populations associated with coastal development have been well-documented. Marine turtle-nesting beaches constitute a conservation controlling factor as they are the one habitat that cannot be replaced. Marine turtles need clear, unobstructed, and suitable beaches within which to lay their eggs. Long-term beach loss can lead to sometimes catastrophic declines in marine turtle populations as the animals are not evolutionarily adapted to settling alternate nesting sites over short-term (decadal) periods. The beach zone typically provides the central zone of conflict between the needs of breeding turtle populations and development planning. Turtles typically favour beaches that are also preferentially targeted by masterplanning teams. This may be in the form of coastal real-estate development of hotels and private residences, with associated infrastructure and hard and soft landscaping. In some instances, shoreline modifications may also be proposed to extend or realign shorelines to increase capacity or meet aesthetic objectives.

Artificial lighting on or near beaches has been shown to deter females from nesting and to disrupt nesting behaviour. On beaches exposed to light, females will nest in higher numbers in areas that are shadowed. Moving sources of artificial light may also deter nesting or cause disturbance to nesting females. Offshore lighting sources have been shown to act as an attractant to hatchlings, causing aggregation and increased risk of predation. Similarly, offshore infrastructure such as jetties act as fish aggregation devices, attracting predatory species and increasing risk of hatchling predation. Changes to local hydrodynamics can also significantly impact upon the survival rates of hatchlings.

Specific risks to turtle-nesting habitat and feeding grounds in the Red Sea that have been identified during masterplan review include proposed dredging and land reclamation, island raising to safeguard against future sea-level rise, the installation of utilities and transport infrastructure (with associated increases in maritime traffic), and construction of assets on or in close proximity to turtle-nesting beaches. Typically, the conflicts occur because the architectural firms developing the project designs are not appropriately sensitized to the ecological sensitivities of a given project site.

Design Interventions and Guidance

Capturing potential risks to turtle populations as early as possible in the design process is key as changes can be most easily effected, and negative impacts designed out, during the early pre-concept and concept design phases. To facilitate this, RSG have developed a structured approach to environmental planning that allows for robust interventions in the pre-concept design phase. The environmental design approach seeks to identify key environmental constraints and opportunities at project inception and, by working regularly with design teams to review design iterations, embed inherent protection measures into the design. The approach relies on site-

specific data and adopts the typical mitigation hierarchy, deployed from the project visioning and continued throughout the design process.

Data and guidance derived from the studies listed in Table 1 are utilized to inform and guide the masterplan design. At the pre-CMP development phase, RSG design teams and architects are informed of sensitivities associated with turtles through stage-gate workshops and iterative environmental design feedback. As the project development site is fixed, guidance aims at avoidance of impacts to the nesting beaches through modification of design, focusing on impacts associated with habitat loss and light spill.

Guidance to designers includes, but is not limited to, the following:

1. Maximise the setback distance from the back of the sandy beach, with buffers to be site-specific based on local topography and landform. A setback of minimum 50m to 100m (depending on the site requirements) for confirmed nest sites is recommended;

2. Maintain the beach and associated dunes in their natural condition such that they are not encroached upon or modified to a practicable extent. Natural vegetation to be retained;

3. Site proposed development behind topographic features that provide natural shielding so that direct visibility of lights will be obscured from view from the sea and nesting beach;

4. Install artificial shielding (such as dunes, berms, banks, vegetation, walls) or mass buildings to screen development lighting impacts at the beach; and

5. Offshore infrastructure or lighting sources (e.g. jetties, artificial islands, marinas) should not be sited on or offshore of turtle nesting beaches.

Adherence to the above covers two of the most important and effective approaches for management of light near turtle-nesting beaches:

1. To ensure there is a tall dark horizon behind the beach, and

2. To ensure there is no point sources of light visible from the beach, or on the water through which hatchlings disperse.

In addition to the above setback considerations, specific turtle-aware lighting is incorporated into design. This follows international best practice and is based on the National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (Commonwealth of Australia, 2020) as adopted by the Convention on the Conservation of Migratory Species of Wild Animals (CMS), of which KSA is a signatory.

Design modifications based on these guidelines have included:

- Provision of setbacks and screening to ensure protection of turtle-nesting sites;

- Designation of protection zones on development islands, where no development is permitted, specifically to ensure protection of turtle-nesting beaches;

- Implementation of protection zones restricting development offshore from turtle nesting beaches;

- Reorientation of proposed dredged channels to minimise impacts on reefs and avoid turtle-nesting habitat; and

- Elimination of design components that presented a significant risk to beach integrity and the integrity of coral reef and seagrass habitat that are located around development islands.

Recommendations for Future Management

RSG have employed a systematic planning approach that ensures key ecological data is provided to designers at the start of the project design process. This aims to ensure that inherent mitigation is embedded in the masterplan design and to avoid impacts that can most easily be accommodated through design modifications. As the design progresses, designs are updated and subject to on-going review and feedback to strengthen protections for habitat of critical importance to turtle populations.

In an area such as The Red Sea, which has until recently been data deficient, management efforts and planning guidance should employ the precautionary principle and target protection of all turtle-nesting habitat and associated feeding grounds. As has been detailed in previous sections, by engaging with designers and sensitizing them to specific risks, significant protections can be implemented on a project-by-project basis.

RSG have made efforts to enhance understanding of turtle ecology in the lagoon since project inception. For species such as turtles, where it can take many years of monitoring to understand interannual variation in population dynamics, long-term monitoring is required to build improved understanding. It is imperative that data deficiency is tackled proactively. RSG projects and any other associated developments in the area should augment turtle investigations within various project developments, collect data on key parameters (nesting ecology, immediate threats, change in territorial behaviour of turtles), and coordinate the findings of the field data with RSZA so a coherent information base/data base is established to improve the management and conservation of sea turtles.

It will be critical that RSG continue to employ a proactive approach to developing this understanding by buildin on the work already conducted and implementing sitewide monitoring and post-construction surveys at completed project sites. Maintaining the collaborative approach with open data-sharing between stakeholders will also be critical to ensure that conservation objectives can be achieved. With this in mind, a number of recommendations for future management are detailed in Table 2.

Table 2 Recommendations for Future Management

#	Description
1	Continuation of on-going monitoring of nesting beaches is critical throughout the calendar year. Nesting trends will only be determined after five to six years of continued monitoring. To improve coverage and efficiency of beach monitoring efforts across the 92 islands in the lagoon, use of unmanned aerial vehicles (UAVs) to capture data and artificial intelligence (AI) to process imagery should be trialed in monitoring activities.

#	Description
2	Ensure on-going monitoring of Phase 1 assets that are coming online through 2024. Data collected on turtle behaviour and nesting activity and success/failure should be collated and distributed to key stakeholders to inform development of later phases of the development.
3	Develop plans for the inventory and protection of nesting beaches, foraging areas, and inter-nesting/migratory habitat. The well-reasoned Australian Marine turtle Recovery Plan 2017-2027 suggests that protecting a minimum of 70% of habitat is essential for marine turtle survival - but cautions that this might not lead to population recovery. An analysis should be conducted to determine percentage loss at the end of Phase 1 and identify sites that warrant protection throughout the lagoon to meet this objective.
4	Ensure lighting design strategies are developed from the start of the project design process.
5	Where artificial beaches are created, these should be designed to mimic the physical characteristics and vegetation community structure on islands in the lagoon that support successful turtle nesting.

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Is the clean energy transition a just transition?

Introduction

In the move away from reliance on fossil fuels the development of renewable energy is a key factor in the transition to cleaner energy. This paper looks at how 'just' that cleaner energy future currently is. Drawing on our experience from supporting developers and financial investors, we explore with practical illustrations what a just transition could look like. We provide a brief overview of the role of renewable energy in the clean energy transition and the evolution of the requirements of businesses to uphold human rights – from voluntary agreements to increasingly prescriptive and stringent regulations. We summarise known risks to human rights from the renewable energy sector and how the energy sector has sought to address these risks. We conclude by identifying successes, lessons learnt and how priorities have changed over time.

The role of renewable energy in the clean energy transition

In 2015, the United Nations Climate Change conference (COP 21) led to the Paris agreement which was adopted by 196 parties and is a legally binding international treaty on climate change. The Paris Agreement is considered a pivotal point in the climate change process as it is the first time that a binding international treaty has brought nations together to combat climate change and attempt to mitigate its effects. At the 2018 UN Climate change conference, Heads of State and Governments adopted the Solidarity and Just Transition Silesia Declaration, highlighting the importance of just transition as mentioned in the Paris Agreement, the International Labour Organisation (ILO's) Guidelines, and the United Nations 2030 Agenda for Sustainable Development.[1] This declaration emphasised the impact of climate change and climate change policy on workers and communities.

Renewable energy, such as wind, solar and hydropower, has a role to play in the low carbon transition due to lower emissions of greenhouse gases.[2] Investment in renewable energy projects has increased significantly e.g. from $62 billion in 2004 to $287 billion in 2016.[3] In 2023, renewable energy sources accounted for approximately one-seventh of the total primary energy supply worldwide.[4] Although the renewable energy share of global energy consumption is still relatively small, it is increasing with the emphasis on using energy transition to achieve climate targets.

The evolution of the requirements of businesses to uphold human rights

Initial grass roots social movements demanding that businesses take responsibility for environmental destruction and erosion of the livelihoods of local people began in the 1970s. A rise in multinational corporations and a decrease in government regulation/control culminated in the need for corporate accountability for human rights violations. In 1976, the launch of the Organisation for Economic Co-Operation and Development (OECD) Guidelines for Multinational Enterprises (MNE) which included a paragraph on the human rights responsibilities of corporations encapsulated the beginning of this new era.

[1] A just green transition: concepts and practice so far (un.org)
[2] Transitioning to Renewable Energy: 3 Governance Approaches That Can Drive Change | World Economic Forum (weforum.org)
[3] Investor_briefing_-_Renewable_energy_-_Apr_2017.pdf (business-humanrights.org)
[4] Renewable Energy - Our World in Data

The OECD Guidelines for Multinational Enterprises (MNE) on Responsible Business Conduct aim to improve business' contributions to sustainable development and to address the adverse impacts arising as a result of business activities. This has had various implications for the financial sector. The OECD MNE guidelines form part of the minimum safeguards under the EU Taxonomy Regulation and the Sustainable Finance Disclosure Regulation to ensure that companies engaging in sustainable activities meet certain standards including in relation to human rights and workers' rights. The OECD MNE Guidelines were most recently updated in June 2023 to include recommendations on how businesses should conduct due diligence on impacts and business relationships related to the use of their products and services.

The United Nations Global Compact (UNGC) launched in 2000 to bring business, labour, and civil society together around ethical principles and standards.[5] The UNGC emphasizes the importance of corporate sustainability defined as a company's value system and principles-based approach to doing business. The UNGC states that companies must operate in ways that meet fundamental responsibilities to human rights, labour rights, the environment, and anti-corruption. The UNGC advocates for the same values and principles wherever a business has a presence. It clearly stipulates that good practice in one area of the business cannot offset harm in another area. The Ten Principles of the UNGC are derived from the Universal Declaration of Human Rights, the ILO's Declaration on Fundamental Principles and Rights at Work, the Rio Declaration on Environment and Development, and the United Nations Convention Against Corruption.

In 2003 the Equator Principles were created to be a baseline and risk management framework for financial institutions to identify, assess and manage environmental and social risks when financing a project.[6] In 2006, the IFC created bespoke Environmental & Social Performance Standards (PS) that project developers must comply with to manage environmental and social risks in their investments and projects.[7] These PSs are embedded in the Equator Principles and define responsibilities in topics relevant to human rights, including risk management, labour, community, land resettlement, Indigenous Peoples, and cultural heritage.

Pivotal guidance that emerged in 2011 was the United Nations Guiding Principles on Business and Human Rights (UNGPs), a key instrument providing guidance on what laws apply to businesses and how they should be interpreted. These rights are interrelated, interdependent, and indivisible. Since the establishment of the UNGPs, the expectation that businesses should exercise human rights due diligence is becoming enshrined in law in many European countries e.g. the European Union Corporate Sustainability Due Diligence Directive (proposed in 2022) which led to the German Supply Chain Due Diligence Act which came into force in January 2023. The evolution of corporate responsibility for human rights signifies a shift from voluntary requirements of businesses to uphold human rights to increasingly prescriptive and stringent requirements. It is within this context that the clean energy transition, which has already been plagued with multiple human rights violations including child and forced labour, is taking place.

Known risks to human rights from the renewable energy sector

[5] Global Compact | UN Sustainability Goals & Corporate Responsibility | Britannica

[6] The Equator Principles - Equator Principles (equator-principles.com). The Equator Principles are revised periodically to reflect changes in the operating environment, and emerging good practice. The most recent revision (EP4) took place in 2020 and included the update that developers seeking international financing from IFIs were required to complete a human rights assessment to be published alongside other key assessment documentation such as the environmental and social impact assessment (ESIA). The assessment could be an 'initial scan' or a full impact assessment depending on the severity of human rights risks identified during an initial screening. The language of human rights assessments and the approach is different to that of impact assessments. Key differences include consideration of rights-holders and duty bearers rather than stakeholders.

[7] https://documents1.worldbank.org/curated/en/719051468155983382/pdf/502400BR0Box3413020090CODE200910061.pdf

The move to clean energy poses challenges relating to human rights with known or alleged risks to human rights from the renewable energy sector. For example, allegations have been made about the use of forced labour in mining raw materials required for wind turbine and battery manufacture, and mining of silicon which is a key component in solar panels.[8] Confrontations have been reported between energy projects and Indigenous Peoples over the use of customary/tribal land or land with special meaning to Indigenous Peoples/ethnic groups (e.g. sacred land).[9] Sometimes large scale involuntary physical and/or economic displacements are associated with hydropower plants due to the creation of reservoirs, and subsequent loss of biodiversity.[10] Several energy projects have been accused of illegally re-settling communities or failing to inform communities about their rights and options pertaining to resettlement.[11]

Looking more closely at wind power generation, wind turbines rely on several critical minerals, including cobalt, copper, manganese, and nickel with demand expected to grow as wind energy investment continues to rise. A single 3 MW wind turbine contains approximately 4.7 tons of copper. The World Bank estimates that the world will need about 550 million tons of copper over the next 25 years to meet global demand, which is nearly the same quantity produced over the past 5000 years[12]. According to the Business and Human Rights Resource Centre, copper is associated with 69% of all allegations of human rights violations with many of these allegations linked to a limited number of companies.[13] In addition, there have been reports of health and safety issues for workers and the community as well as increased incidents of armed conflict and violence.[14]

Allegations regarding use of child labour in artisanal mines for materials such as cobalt that are used in wind turbine components and batteries (e.g. used in smartphones and electric vehicles) have been gaining international attention.[15] The ILO estimates that 168 million children worldwide are engaged in child labour, including about one million children in the mining and quarrying sector.[16] Mining is cited as one of the industries that is most at risk for modern slavery, in particular, artisanal mining which lacks any formal regulation. More than 70% of the world's cobalt is produced in the DRC with 15-30% of Congolese cobalt produced in artisanal and small-scale mines.[17] Public concern and negative publicity about the ongoing human rights violations associated with the mining of minerals vital to the renewable energy sector have led to a concerted effort from the international community to address these risks including through legislation and lender requirements.

How the energy sector has sought to address these risks

The renewable energy sector has acknowledged and attempted to address human rights risks in several ways. Relating to supply chain risks, lenders and sponsors have increased requirements for supply chain due diligence (vetting potential suppliers). Supply chain due diligence is frequently required by financial institutions prior to lending, requiring supply chain mapping beyond the primary or first tier of suppliers and in some case down to suppliers of raw materials such as silicon used in components for solar equipment. Supply chain due diligence is also being driven by regulatory changes such as the European Union Corporate Sustainability Due Diligence Directive and

[8] https://www.bbc.com/news/world-asia-china-57124636#:~:text=The%20global%20production%20of%20solar%20panels%20is%20using,research%20by%20the%20UK%27s%20Sheffield%20Hallam%20University%20says.
[9] Navigating Land Rights in the Transition to Green Energy | United States Institute of Peace (usip.org)
[10] Hydropower | WWF
[11] The energy injustice of hydropower: Development, resettlement, and social exclusion at the Hongjiang and Wanmipo hydropower stations in China - ScienceDirect
[12] New Roadmap from IFC and Partners Outlines Net-Zero Pathways for Mining Green Tech Metals
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[16] Guidelines for MNEs - Organisation for Economic Co-operation and Development (oecd.org)
[17] Why Cobalt Mining in the DRC Needs Urgent Attention (cfr.org)

the German Supply Chain Due Diligence Act which require developers to demonstrate traceability in their procurement process.

Displacement is a common impact in many renewable energy projects. Standard mitigation measures where avoiding displacement is not possible have included development of resettlement action plans or livelihood restoration plans (aligned with international standards). Wind farms have been able to allow continuation of grazing activities once operational but now we are also seeing developers successfully piloting schemes that allow animals to graze under solar panels. This mitigation measure is still in the trial phase and will need to balance the needs for biodiversity conservation however, it represents an opportunity to minimise the loss of traditional grazing land where previously the loss of pastureland would have been permanent.

Finding alternative solutions to displacement is significantly more challenging for hydropower projects or projects located on land with customary rights held by Indigenous Peoples. For these projects, time and commitment for a long-term investment in relationship building and benefits sharing are key to sustainable success. For example, instead of looking to minimise staff during construction and operations phases, projects can work with local communities and invest in the long-term development of local people's skills. We worked on a wind farm project in Africa which now has 80% local people during operations in a remote area with significant levels of illiteracy. Key elements of success have been the company's long term commitment to maximise local employment. Training during construction commenced at a basic level e.g. working with people who had never worn shoes and therefore did not want to wear safety boots or use personal protective equipment. Skills training was then designed to recognize that the project needed locally based staff to manage and maintain the technology and controls once operations began. It is vital to look for alternative solutions and tools to ensure sustainable project success in challenging circumstances.

Development of livelihood restoration plans or Indigenous People's plans with benefit sharing agreements are also commonly used tools. Such plans and agreements are mandatory requirements for many financial institutions, especially those following the Equator Principles or the IFC PS. The World Bank and others also attempt to balance the needs of a project with the needs of local people. As part of the wider stakeholder engagement process that informs the development of these plans, there are opportunities to foster innovation.

Conclusion

Before receiving a commitment for financing, renewable energy developers are increasingly expected to conduct a supply chain review and undertake a human rights due diligence in line with the UNGPs. The financial agreement negotiation phase is when investors have the most leverage to ensure compliance with standards and encourage change in the sector. We see human rights due diligence increasingly used as a condition by investors prior to disbursement. Developers are expected to engage with their suppliers. They are also expected to verify supply chain information and promote best practices that respect human rights. In addition, as part of the loan agreement there is greater emphasis on internal and external monitoring of human rights performance during construction and operation phases. The transition to clean energy sources is vital to our ecosystem, however, the human rights risks associated with this transition are clear. Ensuring a more just transition is not only a moral imperative, but a key component of a project's success and sustainability.

BIODIVERSITY BENEFITS? NO NET LOSS & NET GAIN APPROACHES IN PERU & THE UK

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Abstract

Peru and the UK present contrasting contexts for biodiversity and approaches to protecting it. Peru, which ranks seventh out of 201 in the Global Biodiversity Index (GBI), has a biodiversity No Net Loss (NNL) approach to offsetting, applicable only to significant negative effects that cannot be avoided, mitigated, or rehabilitated. Meanwhile, the UK ranks 142 in the GBI: one of the most nature-depleted countries in the world. However, Biodiversity Net Gain (BNG) is an increasingly common practice in the UK and has recently become mandatory in England.

We flag the urgency of applying BNG approaches worldwide, considering global declining trends and the need for these to change to a Nature Positive trajectory. We will compare AtkinsRéalis' experience using NNL and BNG in Peru and the UK.

This presentation explores opportunities and challenges faced while applying these concepts, such as the need for robust legal and policy systems for their effective implementation, challenges of introducing the NNL or BNG approaches and adapting to new frameworks. Reflections on Peru and the UK will be valuable for other countries.

1. Introduction

Land-use change, habitat degradation and fragmentation, deforestation, spreading of invasive species and pollution are key drivers for biodiversity loss (Arlidge et al., 2018). All industries contribute to one or more of these drivers, yet global and national economies and societies are nature-dependent (Dasgupta, 2021).

The concept of No Net Loss (NNL) of biodiversity arose within a United States policy in 1990 (Abe & Tanaka, 2021). NNL requires compensation for adverse development impacts, balancing project-generated losses with compensation gains. Since 1990, the concept has spread to many countries, and in 2006 it was included in IFC's Performance Standard 6 (PS6) (IFC, 2006, 2012). Later, in 2012, PS6 introduced the requirement to achieve Biodiversity Net Gain (BNG) for critical habitats[1] (IFC, 2012; de Silva et al., 2019).

BNG is a superior goal to NNL (Bull & Brownlie, 2015), aiming 'to leave the natural environment in a measurably better state than beforehand' (Natural England, 2021). In the biodiversity loss emergency, there has been a greater focus on such net positive outcomes (Maron et al., 2019; Obura et al., 2023).

[1] Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes (IFC, 2012).

This is reflected in the Nature Positive concept[2] and the Kunming-Montreal Global Biodiversity Framework Goal A[3] (CBD, 2023).

This paper compares experiences in Peru and the UK, which have contrasting biodiversity and legal frameworks.

2. The Mitigation Hierarchy, NNL and BNG

The mitigation hierarchy should help limit the negative impacts of development on biodiversity (CSBI, 2015). It has become a widely used framework to manage biodiversity impacts from businesses (BBOP, 2010). The sequence of actions (Figure 1) aims at managing negative impacts to reach NNL or, ideally, BNG.

NNL and BNG are ecological mitigation and compensation policies, offsetting any residual impacts from development projects to achieve a balance between losses and gains (NNL) or to achieve more gains than losses (BNG) (Bull et al., 2013; IUCN, 2017).

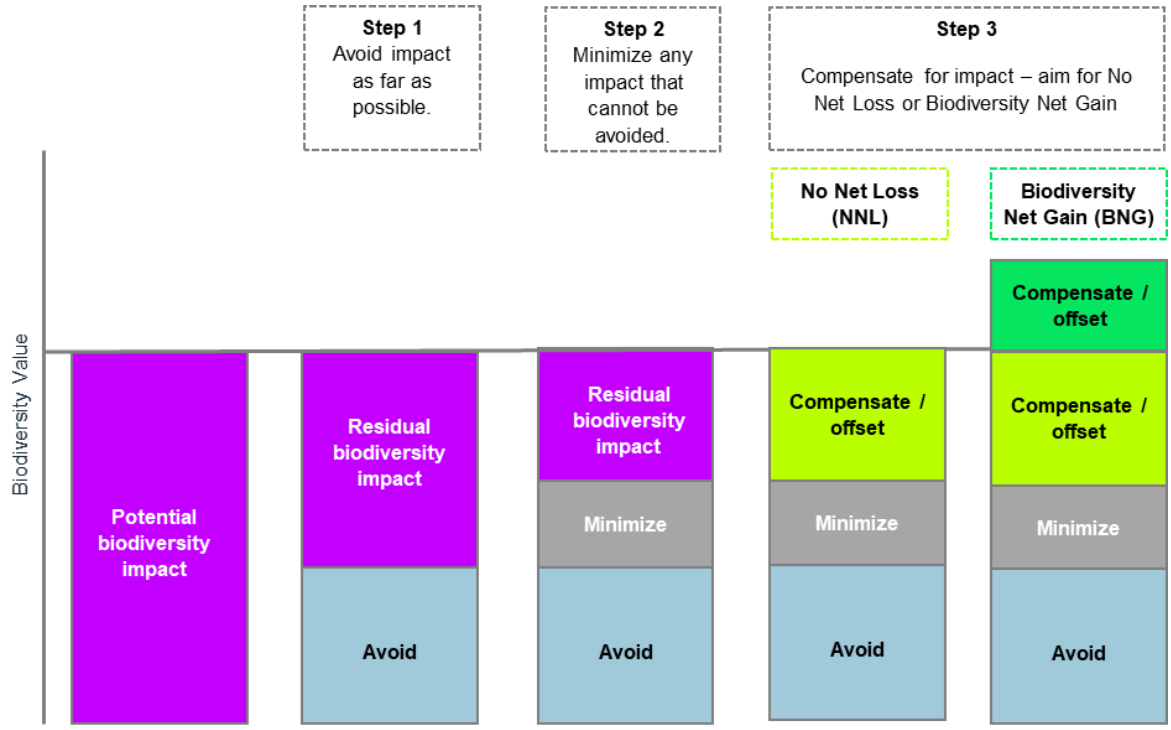

Figure 1: Mitigation hierarchy – linked to the concepts of NNL and BNG. Source: AtkinsRéalis, after BBOP, 2012.

3. NNL and BNG: legal framework and applications in Peru and UK

While the NNL and BNG approaches have been implemented for over two decades, their application has varied significantly. This is evidenced in the "global north" and "global south", with the former having a longer history of environmental legislation and policies, and more stringent law enforcement. Peru

[2] A global societal goal defined as 'Halt and Reverse Nature Loss by 2030 on a 2020 baseline and achieve full recovery by 2050.' (Nature Positive, 2024).

[3] Goal A: Protect and Restore - The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050; Human induced extinction of known threatened species is halted, and, by 2050, the extinction rate and risk of all species are reduced tenfold and the abundance of native wild species is increased to healthy and resilient levels; The genetic diversity within populations of wild and domesticated species, is maintained, safeguarding their adaptive potential.

and the UK will be used as references in this analysis to compare the implementation process of NNL and BNG.

Peru is the third largest country in South America and categorized as mega-diverse, ranking at seven (out of 201) in the Global Biodiversity Index (GBI). Most of Peru still comprises natural ecosystems. The latest trends indicate that Peruvian biodiversity is increasing, but there is also an increase in threatened species (CBD, 2024).

Peru became a party of the Convention on Biological Diversity in 1993, and has had biodiversity protection legislation ever since, but the mitigation hierarchy only became a legal requirement in 2014, through the first Guidelines for Environmental Compensation (MINAM, 2014). This introduced the NNL concept. In 2016, two complementary guidelines were published, (MINAM, 2016). However, these concepts are not evenly understood or applied, including sometimes being confused with "economic compensation", whose benefits are far from BNG.

The Peruvian Ministry of Environment (MINAM) is publishing ecosystem-specific guidelines on "ecological value", letting users calculate the habitat-hectares required to compensate for any losses. With 36 official ecosystems recognized in Peru (MINAM, 2018), such guidelines are essential as ecosystems vary greatly, so generic rules would mean important features could be overlooked, leading to inadequate offsets. Ones published so far only cover 13 ecosystems, leaving many still vulnerable as no offsets are being actively required due to a lack of specific legislation. Compensation measures typically focus on "fragile ecosystems", with rare exceptions, and only to produce NNL. "Fragile ecosystems" is a legal term for certain important, unique and/or vulnerable ecosystems the Government deems as conservation priorities. Those ecosystems that do not currently have a specific guideline remain in a grey area, making implementing proper compensation a significant challenge for developers.

The biodiversity context in the UK contrasts strongly with Peru: it is one of the most nature-depleted countries, ranking 142 in the GBI. Despite ambitious goals and legislation, the UK's nature continues to decline (State of Nature Partnership, 2023).

On 12 February 2024, BNG became mandatory in England (DEFRA, 2024) under new regulations resulting from the Environment Act (HM Government, 2021). According to this pioneering law, developers requiring planning permission must deliver a minimum of 10% BNG. This is hoped to be a significant legislative step towards biodiversity recovery in the UK.

To calculate BNG requirements, the Statutory Biodiversity Metric (SBM)[4] is used. This calculation tool accounts for biodiversity value in a standardized way by calculating biodiversity units, based on habitat type, size, condition, and strategic significance. It compares baseline and post-development habitats to quantify changes. It is too early to predict the new law's results. However, the metric has been developed over a decade of piloting and testing. The SBM is purely habitat-based. For the most distinctive habitat and those deemed irreplaceable, the SBM's guidance states that the tool-based calculation is insufficient and that a bespoke compensation is required where loss cannot be avoided.

In Scotland and Wales, BNG is not mandated, but net biodiversity benefits are policy aspirations under the National Planning Framework 4 (Scottish Government, 2023) and the updated Planning Policy Wales (Welsh Government, 2024), respectively. Northern Ireland has no formal legislation or policy regarding BNG (CIEEM, 2023).

Nature can also be articulated regarding the benefits it provides to our society and economy in terms of natural capital value. The UK government also encourages 'natural capital' approaches to support decisions (HM Government, 2018), and some organizations have chosen to implement these along with BNG.

[4] Statutory biodiversity metric tools and guides - GOV.UK (www.gov.uk)

4. Project approaches

In recent years, several mine developers in Peru have been requested to apply the mitigation hierarchy to modifications or expansions. Most Peruvian mines are in the Andes mountains, where rich metal ore bodies and many natural ecosystems occur, including “bofedales” or highland wetlands. Affecting bofedales often require compensation plans, as they are legally “fragile ecosystems”, and because they are difficult to restore, they almost always require the last step of the mitigation hierarchy.

As described above, the official guideline aims for NNL. Indeed, the current formulas and their stringent application allow little room for proponents to aim for more gains, meaning BNG is not expected. This "minimum" approach is based on the misconception that in offsetting, larger areas are best. However, habitat quality is a crucial factor that is often overlooked in this approach. Prioritizing surface area over habitat quality can lead to suboptimal results. It should be noted that current guidelines do not include specific requirements for stakeholder engagement, which could lead to conflicts, as international experience shows effective participation is critical for successful and fair biodiversity offsets (BBOP, 2009). Results from the current legislation remain to be seen, as no recent compensation plans have been implemented yet, with most still under authority evaluation.

By contrast, in the UK, different drivers have increased private and public organizations’ interest in BNG. Some organizations have been proactive in implementing net gain, making commitments that surpassed the legislation at that time.

AtkinsRéalis has supported pioneering developers seeking BNG. The best and most cost-effective way to achieve a net gain is through its consideration from the outset. This requires additional early ecology input and collaboration of all design disciplines. Habitat creation or enhancement may often be required. These costs should be accounted for in the project’s budget.

The SBM is not a perfect tool, but it has facilitated the practical implementation of BNG. Moreover, it ‘rewards’ on-site compensation or compensation close to the development site by giving higher biodiversity units than offsetting losses at a distance. Offsetting costs encourages using the mitigation hierarchy, as minimizing losses in the first place is the cheapest way to deliver BNG. Nonetheless, using the tool correctly cannot only be a matter of maths; for example, the tool is habitat-based and doesn’t consider species. Therefore, the tool must be applied with expert knowledge.

5. Discussion

In a global biodiversity loss emergency, NNL is insufficient. BNG is a better goal, particularly where it quantifies losses and gains using science-based evidence, supporting stronger data-driven decision-making. It could also accelerate local biodiversity recovery. Although it has the potential of becoming a standardized method globally, current metrics such as those of the UK’s must be tailored to local needs in countries like Peru that are nature-rich but data-poor.

There are still many challenges to be addressed, including: delivering and demonstrating actual biodiversity gains; establishing suitable gain targets; meeting the additionality principle (Gonçalves et al., 2015); and avoiding choosing offsets rather than a proper mitigation hierarchy implementation (Gardner et al., 2013). There is also a need to consider all dimensions of biodiversity, such as species richness or ecosystem function, and have strong governance, including timely stakeholder engagement (Goncalves et al., 2015). Concerns have also arisen regarding resources (Gardner et al., 2013), with a very limited number of BNG experts available, most of whom are from the global north. In the UK, BNG implementation on projects depend on local planning authorities, which have limited resources. In Peru, compensation plans are an EIA commitment, delivered through the environmental management plan, without any aims to achieve BNG and with no room for adaptive management due to legislation stringency.

At a global scale, urgent action is needed to achieve Nature Positive. BNG can only be one contributor to this, not the whole solution, but it will be a key to positively impacting development projects.

6. Conclusions

The NNL and BNG approaches have grown worldwide over two decades, but their applications vary, and authorities have been slow in making them mandatory for development projects. While NNL targets are more widespread, BNG contributes better towards achieving Nature Positive. Despite this, BNG is rarely mandatory. In the UK, England is starting a country-wide experiment with BNG. In Peru, BNG is mentioned in legislation as a desirable outcome, but no steps have been made to produce biodiversity gains. Furthermore, until recently in Peru, even NNL was only required for fragile ecosystems, leaving all other habitats with negative balances, contributing to negative global trends.

NNL and BNG are substantive changes from the net losses caused by "business as usual". Despite the challenges, BNG should be favored whenever possible to achieve a Nature Positive future.

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Serbski Sorbisches institut Institut

Towards a minority-adjust Cultural Impact Assessment in Germany

Conference Paper

by Dr Jenny Hagemann, Dr Fabian Jacobs, and Dr Lutz Laschewski

Introduction and research context

In 2009, Kupferschiefer Lausitz GmbH planned to construct a copper mine in the settlement area of Sorbs, an autochthonous Slavic minority in Germany, between the small cities of Spremberg/Grodk and Schleife/Slěpo.[1] In 2023, the related spacial planning procedure was resumed. As a part of that, local stakeholders – such as the DOMOWINA as the Sorbian umbrella organisation and the main point of contact – were invited to inspect the relevant documents and submit their comments. This was the first time within German mining or spacial planning, that a cultural impact assessment (CIA) was requested (Domowina, 2023).

With those developments in view, the following paper merely marks a starting point for CIA research in Germany, which is still lacking within the frameworks of spatial and/or regional planning. Germany has four legally acknowledged minorities, each influenced by planning processes in specific ways. Therefore, CIA can be utilized as a tool for a Just Transformation. To explore its potentials and challenges, we will keep our focus on the example of Lusatia/Łužyca, which is also one of the three main German lignite mining regions (next to the Rhenish and the Central German mining districts). For the last about 160 years, mining in Lusatia/Łužyca took mainly place within the historically grown and now legally institutionalised Sorbian settlement area.

Despite the German federal government's decision in 2019 to phase-out lignite mining, economic and political actions aim at maintaining it the region's role as an energy hub. Economic and political actors are actively pursuing this goal by intensifying the expansion of renewable energies in post-mining areas, preparing the existing energy network for the production and usage of "green" hydrogen, and investing in the establishment of companies in the field of energy storage. These actions are imperative to ensure the region's continued contribution to the energy sector (Matern et al., 2023). A total of 40 billion euros have been earmarked to support all lignite mining regions, with 17,2 billion reserved for Lusatia/Łužyca.[2] As Zeissig et. al. (2023) and Schuster et. al. (2023) have shown recently, the distribution of these financial resources is not yet matching procedural or distributional justice as two of the three (resp. four) pillars of energy justice (Jenkins et al., 2016).

These developments raise the question, what kind of understanding of justice is needed to achieve a Just Transformation from fossil to post-fossil energy production. Since the transformation process in our region

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[1] Following Sarah McMonagle (2020), the term autochthony, or more precisely, autochthonous minorities, refers to the "long-established" inhabitants of an area who were minoritised by processes of colonialism and/or standardization processes in the course of the emergence of nation states in the 19th century. Autochthonous minorities use criteria such as their own languages, cultural practices and a shared sense of belonging for collective identification as a separate community, but do not represent the majority in the state in which they live. This applies to the Sorbs living in Germany. To stress out this aspect, all place names within the settlement area are written both in German and Sorbian as well.

[2] Structural Strengthening Act for Coal Regions ("Strukturstärkungsgesetz"), August 8, 2020. See also: https://medienservice.sachsen.de/medien/news/1048202.

of interest is mostly based on fundamental changes within its energy sector and is also contextualised within a historically grown, complex relationship between industry and minority, the ultimate goal of CIA for Lusatian contexts should combine energy justice (McCauley et al., 2013) and restorative justice (Johnstone & Ness, 2013) to enable a Just Transformation about Sorbian interests, resp. minority rights. As Heffron and McCauley (2017, p. 660) write: "Restorative justice aims to repair the harm done to people […] and also [defines] what injustices society should give attention to in the first place." This aim can easily be applied to the situation in Lusatia/Łužyca: Until today, 137 Lusatian villages have been devastated for lignite mining, with Neu-Laubusch/Nowy Lubuš being the first one in 1924 and Mühlrose/Miłoraz being the last one in 2023/2024. In 96 of them, 50 up to 100 percent spoke Sorbian in the 19th century (Muka, 2019). In many of them, the Sorbian languages and/or cultural practices were carried out until the devastation, but in less they "survived" the resettlement. First ethnologic, sociologic, and historical studies on single villages or subregions were already carried out to reflect on the impacts of mining (Elle & Mai, 1996; Förster, 1998; F. Jacobs, 2020; Ratajczak, 2004; Tschernokoshewa et al., 2011), yet due to their differing disciplinary approaches and the spacial limits we are not yet able to create a big picture. Of course, local sources are hinting on the development of Sorbian cultural practices (communication in local press, chronicles, club registers and so on), but ultimately, a systematic approach is still needed.

To support and accompany Sorbian stakeholders within the current transformation process, the Sorbian Institute / Serbski institut founded a new department for regional development and minority protection in 2022. The department itself is founded with resources of the Structural Strengthening Act for Coal Regions ("Strukturstärkungsgesetz") and is a direct result of the Institute's continuous engagement within the these processes since 2018. In our work within the department, we combine research within the field of social, political, and cultural studies to support the revitalization of one of the two main Sorbian languages, the Lower Sorbian, as well as the valorisation of Sorbian culture within the local economy and politics.

As a part of that, we aim to develop an adapted concept for a minority-adjust CIA (MACIA) that enables us to measure the impact mining already had on Sorbian culture on the one hand, and that can be used, on the other hand, as a tool to strengthen minority protection within current and upcoming planning processes. Before we discuss this in the third section of the paper, the following section will summarise main aspects of mining planning, minority rights and IA within the region.

Legal framework

Three main aspects form and influence the legal framework of our research, each on the national and regional level: (1) mining planning, (2) minority rights, and (3) impact assessment. Each of these topics is highly complex and can only be mentioned shortly at this point. In addition to the broader historical developments such as industrialization and the emergence of nationalisms during the "long 19th century" (Hobsbawm, 2017), a crucial factor for the compensation mechanisms, as well as the scope for action and organization of those affected, was the respective mining laws of the Weimar Republic, the German Democratic Republic (until 1989), and the Federal Republic of Germany (Berkner & Gesprächskreis Braunkohlenplanung, 2000; Förster, 2014; F. Jacobs, 2020; Kotsch, 2000; Otto & Pinkepank, 2022; Reichenbacher & Sedmak, 2008).

The legal framework for minority rights in Lusatia/Łužyca are, on a national level, the Framework Convention for the Protection of National Minorities (FCNM), 1998 and the European Charter for Regional or Minority Languages (Language Charter) from 1999, each adapted at federal states level in Saxony and Brandenburg (Elle, 2004, 2005). Germany also ratified the International Labour Organisation's Indigenous and Tribal Peoples Convention from 1989 in 2021, but did not acknowledge Sorbs as Indigenous Peoples,

since they are not matching the ILO's definition of indigeneity (Deutscher Bundestag (Wissenschaftliche Dienste), 2020). This also calls for a context-based adaptation of current CIA practices (Piňosová, 2022).

As mentioned, regional and/or mining planning in Germany does not yet provide for a CIA, but for an EIA and SEA based on a definition of protected assets and the methodology for measuring the potential impact of regional planning projects on these protected assets (Weiland, 2010).

Guidelines for MACIA in Lusatia/Łužyca

Our concept for MACIA stems from an analytical comparison of guidelines and best practices in all kinds of IA: EIA, as it is the most established form of IA within German contexts and therefore provides decades of practical experiences (Senécal et al., 1999). Together with SIA (Mancini & Sala, 2018; The Interorganizational Committee on Guidelines and Principles for Social Impact Assessment, 1994), those are the two forms of IA in which questions of minority rights are negotiated in international contexts if there is no separate CIA. This is, for example, the case in Swedish or Norwegian settlement areas of the Sami (Larsen, 2018). In human rights impact assessment (HRIA), the European approach of minority rights is well implemented. Also, methods and guidelines for HRIA aim for a special sensibility towards vulnerable groups and an intense self-reflection of practitioners (Götzmann, 2019; The Danish Institute for Human Rights, 2020). All these aspects aim to minimise negative impacts of the assessment itself and to maximise positive outcomes for already minoritised groups, which serves our goal of a Just Transformation.

As Partal & Dunphy (2016) pointed out in their systematic literature review, specific CIA is gaining in importance, yet, methods and definitions, such as "culture", remain often unclear. Nevertheless, CIA concepts are developed and carried out in indigenous or minoritised contexts – and, more importantly, in exchange with the affected groups – much more often than other forms of IA (Mackenzie Valley Review Board, 2009; Secretariat of the Convention on Biological Diversity, 2004; Watson et al., 2023). This makes CIA especially fruitful for a suiting concept for Lusatia/Łužyca. In terms of the process, this also leads to a specifically high focus on participatory possibilities, fairness, and neutrality. In terms of the content, CIAs tend to highlight the value of (traditional) knowledge and the conditions of its maintenance, as well as rights on or access to land (Croal & Tetreault, 2012; Watson et al., 2023).

Our understanding of a CIA can be summarised as a process of assessing the likely impact of a proposed development on the way of life of a particular group or community of minoritized people, with the full involvement of that group and possibly carried out by that group. It generally addresses the positive and negative impacts of a proposed development that may affect, for example, people's values, belief systems, customs, and traditions. Its goal is to minimize negative effects, to prepare the community for the planned change and to ensure that the project fits into existing structures. Ultimately, MACIA should serve the self-empowerment of the affected groups in the way they define it themselves. To do so, the involved industrial and political stakeholders provide financial and/or other resources to ensure these goals.

In addition to the general principles of good evaluation – usefulness, practicability, fairness, and accuracy (DeGEval – Gesellschaft für Evaluation e.V., 2016) –, MACIA is based on the following six principles adapted from existing CIA guidelines (such as: Porou, 2008; Secretariat of the Convention on Biological Diversity, 2004):

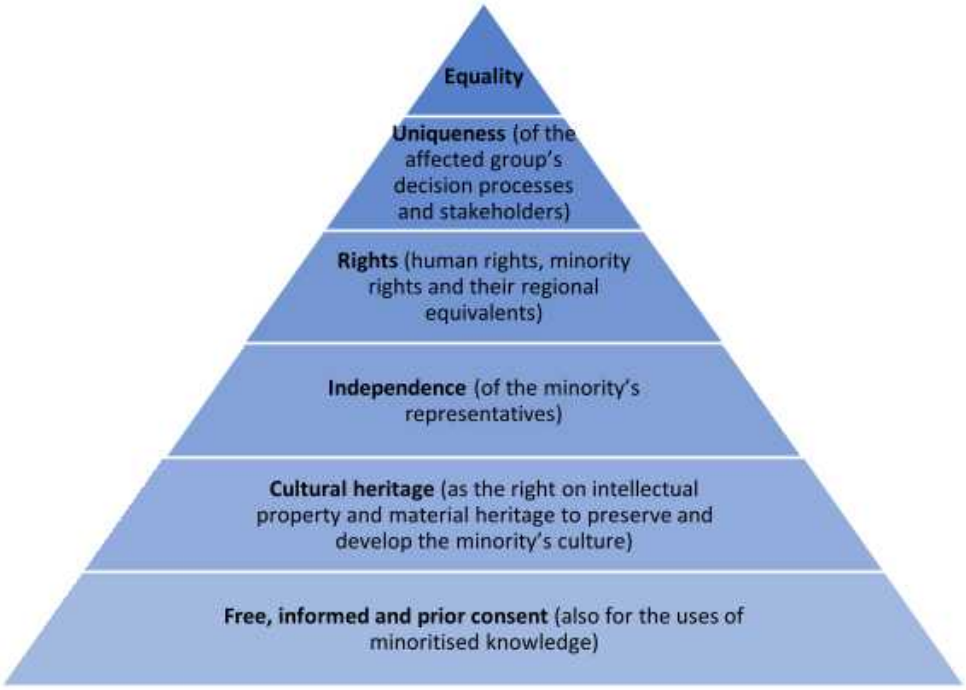

Figure 1: Six guidelines for MACIA.

Steps and methods

But how to measure impacts on minority culture? First of all, if we consider "culture" as a practice of ascribing meaning and of wrestling with the validity of shared interpretations (Hall, 2013), then culture enables and conditions how people interpret their world. In this sense, culture is a resource to understand and implement certain practices in a certain way – speaking a language, for example (Laschewski, 2023). For a minoritised group such as the Sorbs, the mitigation of negative impacts on their culture becomes especially crucial. Measuring culture here, means measuring socio-cultural interactions – both quantitatively and qualitatively.

To do so, MACIA follows the basic structure of general IA, with specifications within the following steps or research fields:

Table 1: General steps of MACIA and their specifications.

screening	▪ Establishing an advisory board consisting of 50 % local Sorbian stakeholders and public institutions ▪ Terms of reference formulated by advisory board ▪ Identification of possible conflicts of interest and ethic questions ▪ Agreement on suiting form for knowledge transfer
description of the planned project and its alternatives	▪ conditions of the current environmental and regional planning ▪ use of language or working language of the employer ▪ involvement of the affected community ▪ Cultural sensibility of the employer[3]
baseline-study analysing the initial situation	▪ customs and traditions as well as other commemorative culture in the surrounding area ▪ Associations ▪ Informal community structures and events ▪ Personnel continuities/discontinuities ▪ Conventional land use ▪ Field names, street names, place names ▪ sites used for socio-cultural activities / land utilisation ▪ Building methods ▪ Language use ▪ linguistic landscape ▪ Local actors in the Sorbian cultural sector (economics, leisure) ▪ Historical context ▪ Political and social structures ▪ Conditions of the respective environmental and regional planning ▪ Education, school system and teaching practices
scoping-phase with the central assessment of identified impacts	No specifications
report	No specifications
decision-making based on the IA	No specifications
follow-up to ensure the realization of the IA results	▪ Meta-evaluation via matching with terms of reference ▪ Evaluation through

One of the challenges of MACIA is the definition of affected areas, respective, the research field. Within the framework of so-called "complex research" (Komplexforschung), there have already been initial approaches to this at the Sorbian Institute / Serbski institut, which, however, need to be continued and adapted (T. Jacobs, 2015; T. Jacobs & Keller, 2020). With an additional view to the general globalisation and de-spatialisation of the working and social world, we come back to our understanding of culture: If culture is defined as shared practices based on shared knowledge, and we want to understand industrial effects on culture, the area of research for MACIA is defined by the physical placing, networks and movement of the practitioners of this culture – the effected "community of practice" (COFP) (Wenger et al., 2002). MACIA should therefore include all areas, where the COFP works: places of residence, work places, and locations of clubs or other collective activities such as traditional and memorial sites.

[3] E.g.: Are customers allowed to take days off for (traditional) cultural practices? Are there concepts or positions intended for representatives/contact persons in the context of social justice and cultural diversity (e.g. multilingualism coordinators, or specifically minority representatives)?

Since MACIA is not yet realized in Lusatia/Łužyca, suiting methods for assessing culture still must be adapted and tried out. In existing CIA within minoritised or indigenous contexts, the following methods were carried out:

- Oral history
- Focus group interviews
- Statistical analysis
- Surveys
- Field research (site visits)
- Expert interviews
- Consultation with the community's own administrative and decision-making structures

Assessment scholars such as Hanna et al. (2016) have already stressed out the importance of cultural aspects and ethnographic fieldwork for IA, especially in indigenous or minoritized contexts. Building on that and from our current point of view, we suggest the following additions: literature analysis and archival research to trace down continuities and discontinuities within cultural practices and ethnographical photography as well as videography to record interdependences between practices and places.

Also, if MACIA will be carried out in an area affected by lignite mining, and since lignite mining already took place in Lusatia/Łužyca for so long, MACIA here should also combine sociological, anthropological, and historical approaches, such as historical comparison (Haupt & Kocka, 2009), case studies, and the general intersection of different layers of comparison: before, during, and after mining, within the changing political contexts before as well as after the Inner-German Reunification.

Indicators for minority culture and industrial effects – an outlook

There are a couple of methodological challenges that are related to the time scale of the developments and the retrospective nature of our assessment. For instance, about language loss, we lack reliable historical data. The same applies to cultural data. The process of language loss is usually multi-generational. While in historical terms it can take place rather rapidly within just a few decades. However, such durations go far beyond the time horizon of conventional impact assessments. Therefore, a long-term monitoring approach is required.

A further issue is the separation of the effects of mining from other social causes that contribute to language loss and cultural assimilation, such as political pressure and immigration, since, at least in lower Lusatia, mining has transformed the landscape and the whole settlement structure of the region. Thus, a separation of mining/non-mining is not so clear-cut.

A useful adaptation of further concepts such as indigenous-led impact assessment (Hanna et al., 2022; Nishima-Miller et al., 2024) also marks a challenge, since those concepts and their implementations are based on highly specific livelihoods of indigenous peoples, which are only to a certain degree comparable with the situation of the Sorbs – legal frameworks even aside. Sorbian economy, e.g., does not differ from German economy. To frame the Sorbian-German relationship with colonialism would be historically highly debatable, due to the complex developments throughout the centuries. Nevertheless, those developments lead to a highly minoritized position of Sorbian cultural practices and self-understandings, which ultimately calls for tools of civic participation, such as MACIA.

Furthermore, the ultimate goal of a Just Transformation in minority-based regions is not only (restorative) justice itself or the fulfilment of legal framework conditions, but to ensure a good way of living (Acosta Espinosa, 2008) for every inhabitant of the region, regardless of their ethnic belonging. We therefore suggest, that the compilation of indicators for a MACIA should combine the focus on minority-specifics –

in general (Biagini et al., 2015), as well as within the region (Häfner & Schürmann, forthcoming) – with a focus on future-orientated and sustainable well-being within this region (Laschewski et al., 2020). Those include indicators in the field of work, education, income and living, digitalisation, health and care, mobility, culture, language, community and participation, demography, environment, and climate protection as well as perspectives within regional development (for a complete list of indicators, see table 2 in annex).

By combining and adapting both approaches, MACIA can play a significant role in achieving a fair and equitable transformation within Lusatia/Łužyca. However, the specific steps needed for its implementation are still to be determined. While the spatial planning procedures for copper mining in Brandenburg and Saxony have come to an end without a positive decision for the company KSL in March 2024, it is only one example of the current and future industrial settlements in the region that will influence the socio-cultural structures of Lusatia/Łužyca.

Annex

Table 2: Indicators for the Good Living in Lusatia/Łužyca (Laschewski et al., 2020) and for assessing the implementation of Sorbian interests within the region's transformation process (Häfner & Schürmann, forthcoming), combined. Translation by the authors.

Indicator categories	Indicators
1. Work	▪ Unemployment rate ▪ Satisfaction with own work ▪ Median gross monthly salary of full-time employees subject to social security contributions ▪ Poverty risk rate of employed persons ▪ Desired, agreed, and actual working hours ▪ Entrepreneurship indicator(s)
2. Education	▪ Proportion of pupils with a school-leaving certificate ▪ Early school leaver rate: proportion of pupils without a school-leaving certificate ▪ Proportion of highly qualified people ▪ Number of students/inhabitants ▪ Childcare rate for small children
3. income and living	▪ Disposable income per inhabitant ▪ At-risk-of-poverty rate ▪ Proportion of households suffering from (significant) material deprivation ▪ Satisfaction with own housing situation
4. digitalisation	▪ Broadband connection ▪ Online contacts with authorities ▪ Use of online courses for further training ▪ Employees in the ICT sector
5. health and care	▪ Healthy Life Years ▪ Number of inhabitants per GP ▪ Travelling time to the GP ▪ Accessibility with the ambulance service ▪ Care rate ▪ Emissions of air pollutants (index of 5 parameters)
6. mobility	▪ Modal split of public transport ▪ Distance to public transport stop

	▪ Population potential reachable within 45 minutes by public transport or car ▪ Functional areas: Number of cities reachable within 1, 2.5 or 5 hours by car and public transport ▪ Commuting time or commuting distance ▪ E-cars per charging station ▪ "Equal access": travelling time to the nearest school facility
7. culture	▪ Persons employed in the cultural and creative industries ▪ Public expenditure for cultural policy measures ▪ Density of cultural institutions and events ▪ Surveys on external and self-perception ▪ Number of pupils learning Sorbian ▪ Members of the Domowina ▪ Sorbian/Wendish cultural events ▪ Project applications Foundation for the Sorbian people ▪ Perception of discrimination ▪ Number of publications at the Sorbian Institute ▪ Members of the Maśica a Maćica Serbska (Sorbian Research Association) ▪ Social media (number of channels) ▪ Media lendings of the Lower Sorbian library ▪ Access to Sorbian radio programmes online ▪ Edition of Sorbian Newspapers ▪ Members of the Sorbian Cultural Tourism Association (SKT) + Sorbian Craftsmen's Association ▪ Proportional economic performance in tourism ▪ Employees in Sorbian cultural institutions ▪ Number of Sorbian (short) films ▪ Visitors to museums with Sorbian focus
8. Language	▪ Transitions to secondary schools after the 6th grade ▪ Use of online translations ▪ Language certificates A1+A2 ▪ Kindergartens participating in the Witaj programme ▪ Participants in online language courses in the Sorbian/Wendish language ▪ Participants in VHS courses for the acquisition of the Sorbian/Wendish language ▪ Proportion of the population who speak Sorbian on a daily basis ▪ Percentage of the population who understand/speak Sorbian/Wendish ▪ Use of online translations ▪ Participants in Wendish church services
9. participation	▪ Engagement rate (only through survey) ▪ Acceptance of diversity (survey only) ▪ Tax revenue of the municipality ▪ Pay gap between women and men ▪ Proportion of barrier-free railway stations (including infrastructure facilities) ▪ Participation in elections Council for Sorbian/Wendish Affairs ▪ Sorbian-speaking employees in public administration ▪ Sorbian/Wendish minority statutes ▪ Specific committees/boards/advisory boards for Sorbian/Wendish affairs
10. demography	▪ Total population ▪ Old-age dependency ratio (population aged 65 and over in relation to the population aged 15-64) ▪ Net migration ▪ Gender ratio

	▪ Fertility rate / birth rate
11. environment & climate protection	▪ Resource efficiency / total raw material productivity ▪ Emissions of greenhouse gases (in CO2 equivalents) ▪ Valuable cultural and natural landscapes: Total number and area ▪ Sustainability indicator for biodiversity and landscape quality ▪ Lusatia's natural capital - shares of the respective ecosystems in per cent (and later option of calculating "natural capital" in monetary terms)
12. perspectives within regional development	▪ Number of services of general interest accessible within a certain travelling time ▪ Facilities of general interest available locally ▪ Commuter balance ▪ Employees in tourism ▪ Number of farms with direct marketing ▪ Organic farming

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Paper Topic – Employing Environmental Data to Inform Planning of Infrastructure Projects

Session – Ensuring Just Transformation of Infrastructure Projects

Summary Statement:
RSG applies an environmental design approach to planning, using environmental data, habitat mapping and modelling to guide infrastructure planning on offshore islands in sensitive coastal habitats.

Proposed Presenting Author: Rand Al Sultan (RSG)
Co-authors: David McGrath (KBD), Abdurrahim Basit Khan (RSG)

Abstract:

Red Sea Global (RSG) is developing regenerative tourism destinations on an archipelago in the Al Wajh Lagoon on Saudi Arabia's Red Sea coastline. The area is characterized by complex marine and terrestrial ecosystems that support a range of high-conservation-priority species. Development islands are greenfield sites with no existing utilities or infrastructure. Several islands support critical habitats, including coral reefs, seagrass, and mangroves, that provide a range of important ecological and ecosystem services. Species of global and regional conservation importance, including Hawksbill turtle, Green turtle and Sooty falcon, periodically utilize the islands for breeding and nesting. The islands require utilities to operate including power, potable water, district cooling, sewage and wastewater treatment, and telecommunications. Some facilities will be installed on the islands, while other utilities will be supplied to the islands via corridors connected to the mainland facilities. RSG has implemented an environmental design approach, whereby environmental conditions and sensitive receptors are identified early in the design process. This information is utilized to inform the strategy for servicing the islands and the associated siting of utilities and associated infrastructure. This focus on avoidance and zoning at the visioning and planning phase aims to avoid and reduce impacts, thus minimizing the need for mitigation and/or compensatory offsets and promoting sustainable development in a sensitive coastal environment.

Employing Environmental Data to Inform Planning of Infrastructure Projects

Rand Al Sultan - David McGrath - Abdurrahim Basit Khan

Red Sea Global – King Abdullah University of Science and Technology (KAUST-BD, KBD)

A draft paper submission for the International Association for Impact Assessment (IAIA) 2024. IMPACT ASSESSMENT FOR A JUST TRANSFORMATION, held in Dublin, Ireland.

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Introduction

In 2016, the Kingdom of Saudi Arabia (KSA) began implementing ambitious and far-reaching plans to diversify the economy in line with the national strategy, Vision 2030. The development of key destinations along KSA's Red Sea coastline were identified as a key driver that would allow for this objective to be realized. The Red Sea Development Company (TRSDC), now Red Sea Global (RSG), was established in 2018 by KSA's Public Investment Fund (PIF) with a remit to develop the Red Sea Project aiming to introduce luxury tourism and residential facilities based around an archipelago of islands within a natural lagoon referred to as the Al Wajh Bank.

RSG is one of the most ambitious tourism and hospitality projects that has set itself the objective of establishing new benchmarks in sustainable development, ensuring the preservation, protection, and enhancement of the environments surrounding its assets, while creating socio-economic benefits for the region. RSG's principles focus on enhancing habitats in ways that continually renew the environment by adopting and developing pioneering technologies to optimize operational efficiencies and using scientific research, data, and technology to make informed decisions on par with international standards and best practices.

The Red Sea Project Concept Masterplan (CMP) has targeted development of multiple islands in the lagoon through a phased development approach. All these islands are greenfield sites with no connection to existing transport infrastructure or utilities. RSG has developed an Infrastructure Concept Masterplan (ICMP) in response to the CMP that enables provision of key aspects of the project that will be required to make its developments function. These include utilities (power and water generation/supply, waste management, communications), transportation (roads and airport), and other supporting elements. Some facilities will be installed on the islands, while other utilities will be supplied via corridors connected to new mainland networks.

Since the inception of The Red Sea Project, King Abdullah University of Science and Technology, Beacon Development (KAUST-BD, KBD), in partnership with expert coastal modelling partners DHI A/S, has provided RSG with specialist environmental input on a broad range of projects. RSG, with the support of KBD, has developed best practices in environmental design and impact assessment, standardizing approaches for environmental data collection and developing an environmental planning approach that is embedded within RSG's project design process.

This paper provides an overview of the data-driven environmental design process that RSG applies during the early project design phases, with a view to optimizing the design process and minimizing or avoiding potential environmental impacts associated with installing infrastructure in a highly sensitive coastal environment while recognizing opportunities for habitat creation and enhancement.

Environmental Overview

The Al Wajh Bank and the surrounding lagoon's ecosystem is a particularly sensitive natural location with high-quality marine and coastal ecosystems that support a range of high-conservation-priority species. The outer coral bank has created a protected lagoon that reduces sea surges and enables development of coral, mangroves, and seagrass beds within its waters. These foundational habitats support and provide sanctuary to a diverse array of resident and migratory ecological communities.

The area within The Red Sea Project does not include any nationally designated areas for biodiversity purposes. However, the site is within an Important Bird and Biodiversity Area (IBBA) as set out by Birdlife International (Birdlife International, n.d.). A few of the breeding bird species utilizing the islands are listed as Saudi National High-Conservation-Priority (HCP) species under Saudi HCP Criterion No. One. Expert opinion provided by regional specialists indicates that some of the species can be considered to be either endemic to this region or significantly range-restricted. The presence of species such as the Sooty falcon (*Falco concolor*), Crab plover (*Dromas ardeola*), White-eyed gull (*Ichthyaetos leucophthalmus*), and a number of tern species are regionally important.

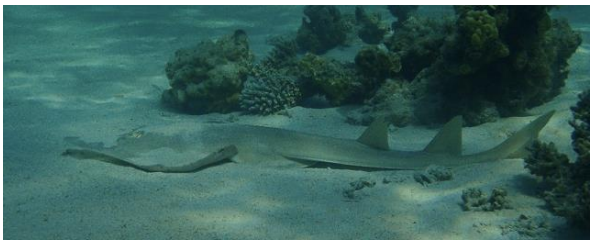
Red-Billed tropicbird with chick in nest

Sooty falcon

Crab plover

The Red Sea Project area is recognized as one of the most important zones within the Red Sea in terms of Green turtle and Hawksbill turtle nesting distribution, abundance, and rookery size (Al Ameri, et al., 2022; Shimada, et al., 2021). The Halavi guitarfish (*Glaucostegus halavi* - critically endangered) breeds in the lagoon, with the shallow reef flats around many of the islands serving as nursery sites. A variety of other elasmobranchs (sharks and rays) are reported in the range of habitats around the lagoon. Dugongs (*Dugong dugon* - vulnerable) are present, though the ecology of this species remains cryptic and comparatively poorly understood. The area also supports Indian Ocean humpback dolphin (*Sousa plumbea* - endangered), with four other species of cetacean reported, predominantly in deeper waters outside of the lagoon.

Hawksbill turtle



Halavi guitarfish

Using Environmental Data to Guide Infrastructure Planning

RSG has developed an environmental design approach through an integrated Planning and Assessment process to address the potential environmental impacts during the design progress, offering solutions and alternative approaches, seeking to design-out potential environmental impacts to avoid\minimize their effects while protecting and enhancing environmental values and benefits provided by existing ecosystems. These recommendations are embedded using a toolkit into the project design process from inception to ensure the sustainable management of environmental resources.

The approach is data-driven and adopts the mitigation hierarchy, with information and guidance recognized based on the outcomes of various surveys, studies, and modelling specific to the project site. Regular interaction and guidance are provided to the RSG key stakeholders on an on-going basis deployed in parallel to the development of the project visioning and continued throughout the pre-concept and schematic\concept masterplan design stages. It is intended to guide the placement of key assets and infrastructure, aiming to continuously improve the designs to avoid any potential degradation of ecosystem functioning through early impacts avoidance and integration of inherent mitigation measures throughout the project delivery framework. The key components of this process are summarized in the following section.

Methodological Approach:

a. Environmental Baseline Surveys and Habitat Mapping

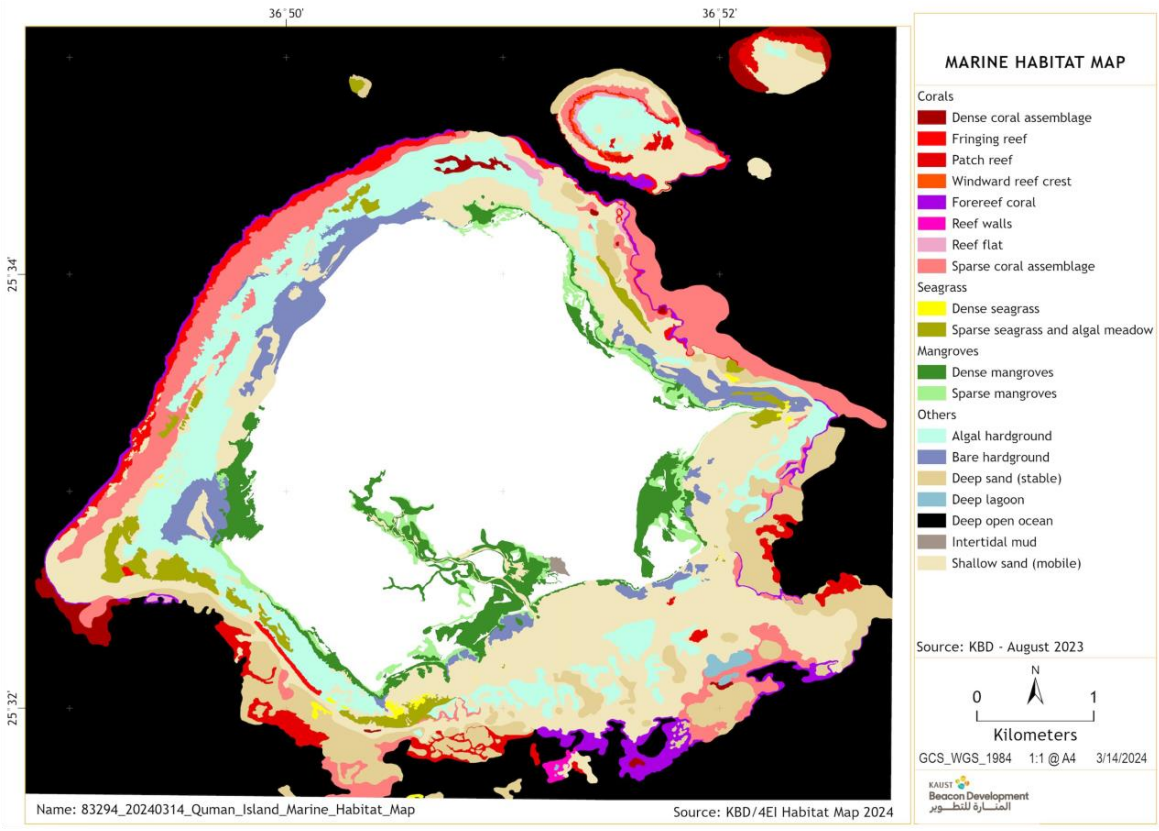
Following project initiation, RSG commissions a comprehensive search for available references, including but not limited to data and reports from other RSG sites, secondary information from publicly available sources, and literature reviews. A desktop review report is prepared synthesizing key data and identifying data gaps, providing a foundational understanding of environmental and social conditions in the Area of Interest (AoI) and guiding development of the scope of environmental surveys to be carried out with a view to enhancing understanding of natural systems in the AoI.

Utilizing the scope of works developed through desktop review, environmental baseline surveys are undertaken at the outset of the pre-CMP design process. They typically include components such as: marine water and sediment quality; marine and terrestrial ecology surveys, ranging from Phase One rapid site assessments to detailed community surveys; soil and groundwater intrusive

investigations; deployment of Acoustic Doppler Current Profilers (ADCPs) to collect data on water flows and waves; archaeological and cultural heritage surveys; and others. These surveys are conducted based on standardized guidance notes for terrestrial and marine environmental baseline survey methodologies, which are carried out through all RSG programs and assets to ensure that data collected is meaningful and comparable.

Survey efforts and findings during baseline surveys

Following completion of baseline surveys, a high-resolution habitat map is developed using 0.5 meter x 0.5 meter resolution satellite imagery of the site. Once imagery is acquired, a segmentation process is undertaken to group together pixels with similar spectral signatures into pre-defined habitat map categories. An initial unsupervised habitat classification is then validated using ground-truthing data collected during the field surveys. A final habitat map with supervised classification is then delivered to RSG and becomes a key tool informing the spatial planning process.



Example of habitats map created using satellite imagery and ground-truthed data from baseline surveys

b. Met-ocean and Hydrodynamic Studies

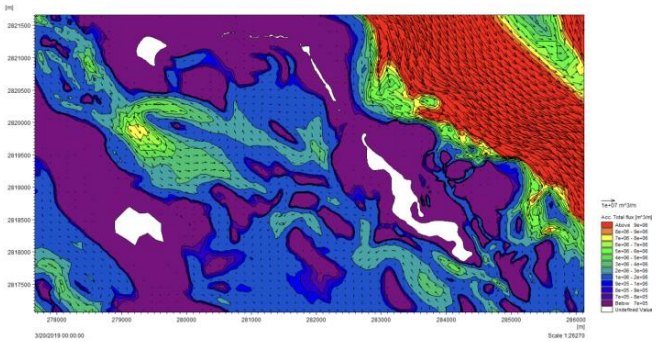
In parallel with the ecological and environmental surveys, preliminary met-ocean and hydrodynamic screening studies are conducted to provide conditions at the project site. Met-ocean conditions are characterized using hindcast met-ocean data from KAUST's Red Sea hindcast database, considered the most reliable dataset of its kind for the Red Sea. A long-term time series (~40 years) of wave- and water-level conditions is extracted from KAUST's Red Sea Model database, and the long-term time series of water-level conditions are analyzed to provide seasonal water-level changes at each of the islands. An extreme value analysis is completed for each asset, using DHI's in-house extreme value analysis tool, to derive the 1:1-year, 1:10-year, and 1:100-year return period wave- and water-level conditions and the associated wind conditions on all the projects they are contracted.

DHI has developed a MIKE 3 FM hydrodynamic (HD) model and Spectral Waves (SW) model of the Al Wajh Lagoon, calibrated with data collected from over 20 sites within the lagoon since 2018. The models are run for a calendar year to establish modelled simulations of pre-development hydrodynamic baseline conditions at the site. This modelled output is utilized to inform areas that might be suited for placement of critical infrastructure as well as areas that should be avoided.

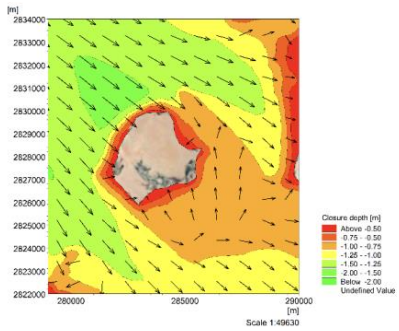
Modelling studies conducted by DHI are utilized to ascertain the suitability of locations in terms of:

- Dilution potential/flushing
- Temperature and salinity of the ambient water
- Bathymetry/tendency for pooling of disposed effluents

Following the initial screening studies, during schematic/CMP design, DHI evaluates the impact of development on hydrodynamics, wave characteristics, shoreline dynamics, sediment transport, and nutrient release modelling, informing decision-making for infrastructure development.



Integrated water flux



Closure depth - waves

c. Offsets and Buffers

Environmental and hydrodynamic baseline surveys conducted provide an outline of the natural assets and settings of the surveyed area, our efforts include utilization of those data to establish offsets and buffers that will:

- Avoid/minimize impact to priority species.
- Set core and transition zones and their associated activities.
- Provide mitigation measures.
- Define areas suitable for enhancement.

Recommended buffers proposed
around identified sensitive habitats

d. Environmental Opportunities and Constraints Workshops

Environmental and hydrodynamic consultants lead workshops with key project stakeholders during which the findings of the preceding studies and the associated implications on the pre-concept masterplan development are set out. These workshops include outputs from the marine modelling studies and highlight the key environmental and ecological constraints and opportunities specific to both the project site and the nature of the assets/infrastructure that are proposed for development. Engagement with the stakeholders ensures collaborative decision-making and alignment with RSG's environmental and social goals.

Attribute	Opportunity	Constraint
Sensitive Marine Habitats	Easily accessible, rich and healthy marine ecosystem are an excellent resource for low impact recreational activities (e.g. snorkelling, diving). The AoI is afforded access to a variety of habitats all within close proximity to the proposed development island.	The matrix of sensitive habitats are interconnected, each providing valuable services to the wider ecosystem. Disturbance of one or more of these habitats caused by the proposed development has the potential to alter the natural balance of the system with an associated decline in local and regional biodiversity.
	A system with coral reefs, mangroves, seagrass, macroalgal beds and sand flats provides habitat for a broad range of species at various stages of species' lifecycles. This combination of habitats provides a variety of ecosystem services.	A high degree of protection should be afforded the marine ecosystem in the AoI. This may result in the need to scale-back, modify or reposition components of the proposed masterplan design to limit anticipated ecological degradation during the construction or operational phases.
	Provides a beautiful natural setting, with significant intrinsic value.	Coral, seagrass and mangroves are all classified as Environmentally Sensitive Areas (ESA) by MEWA that are to be preserved from damage or loss due to anthropogenic activities.
Mangrove Habitats	Extensive mangrove coverage provides benefits to the site both in terms of biodiversity enhancement and coastal resilience.	Protection and enhancement of this habitat may constrain the development footprint and require some masterplan components to be modified, repositioned or discarded.
	There is potential to enhance the mangrove habitat area through the implementation of an engineered wetland. This would enhance the biodiversity by providing a habitat that would attract a variety of species.	The mangrove habitat supports populations of pest species, such as mosquitos and sand flies. Decomposing organic matter can also generate hydrogen sulphide gas which creates an odour similar to that of rotten eggs. Both of these factors may impact upon the amenity of masterplan components situated in close proximity to the mangrove habitat.

Environmental attributes with relevant opportunities and constraints

e. Design Reviews and Site Optioneering

Masterplan designs are subject to multiple reviews, with regular feedback provided to design teams at project stage gates. The design teams are provided spatial planning guidance and appropriate environmental mitigation measures that help identify viable alternatives. Site-specific opportunities and constraints guide the development of a set of design review criteria that is utilized to review and allocate a score to design options. This facilitates clear communication of infrastructure placement implications to non-technical stakeholders, ensuring alignment with our environmental objectives, and potentially reduce significant adverse impacts on both sensitive environmental receptors and the functionality of the assets and infrastructure.

The design optioneering process focuses on specific infrastructure components and includes the alignment of corridors and rights of way, routing of proposed dredge channels, siting and orientation of marinas and marine infrastructure, placement of desalination plant intake/outfall, water treatment utilities and/or designation of ecological protected areas/natural reserve zones, among others.

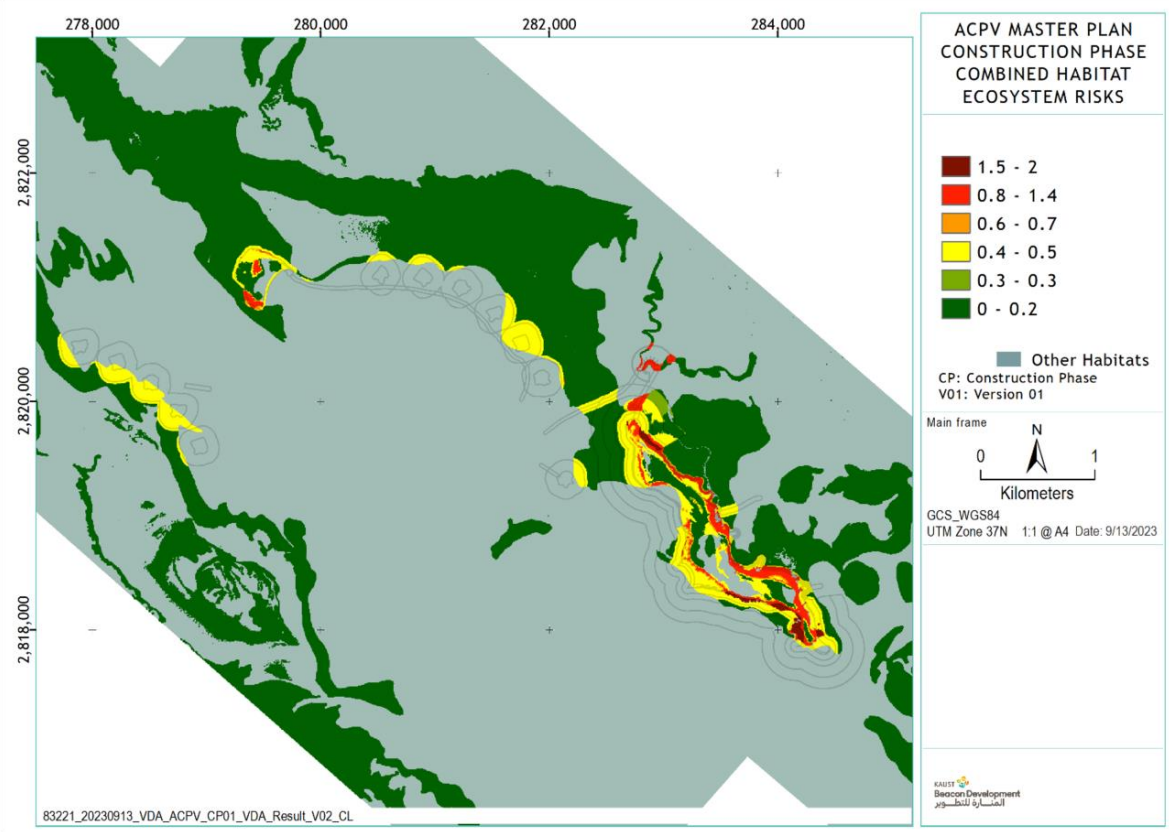
Example of environmental design feedback on a proposed masterplan

f. Habitat Risk Assessments

A qualitative risk assessment, based on the baseline information and expert judgement is undertaken using the InVEST Habitat Risk Assessment (HRA) Model, developed by the Natural Capital Project, Stanford University. A Risk/Opportunity Index draws on an ecological risk assessment approach, to identify risk to natural habitats by accounting for locations of specific activities (spatially delineated stressors).

Using the habitat map developed, the risk assessment evaluates direct interactions between habitats (coastal natural capital) and activities (stressors), mapping resulting risks and identifying areas where cumulative risks from multiple stressors is greatest.

Based on the results of the HRA model, risk-mitigation measures are identified for key habitats, influenced by factors like habitat loss/degradation and changes in hydrodynamic conditions. The maps help in identifying locations where the remedial measures are recommended for implementation. Similarly, the assessments highlight areas suitable for compatible development activities based on low habitat risk.



Environmental risks highlighted in a proposed masterplan

Summary

RSG is developing high-quality tourism assets and associated infrastructure in an area of high ecological sensitivity. The natural systems in the Al Wajh lagoon, and the associated biodiversity, are a key asset to the development that warrants protection. Recognizing this, RSG has proactively implemented an environmental planning approach intended to ensure that environmental considerations are embedded into the development of project designs from the outset. Site-specific data collated from secondary sources, remote sensing platforms, targeted site surveys, mathematical modelling, and offsets and buffers is a critical tool that guides spatial planning of infrastructure at both the asset and wider project level.

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Session: 180
Title: Shared experience of SEA implementation from Malta and Ireland: Promoting best practices for environmental protection within the context of island states
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Abstract

Malta and Ireland have several commonalities that have shaped their approaches to implementation of the SEA Directive over the past twenty years. Both are island states with uniquely rich biodiversity, cultural heritage and vulnerabilities to climate change. Both have experienced historical emigration and more recent economic growth and tourism development. Historical British rule has resulted in common law systems in both countries which influences the application of environmental legislation and planning processes in a post-colonial context. This paper presents the results of a recent technical study exchange on SEA in both countries with participation by national, regional and local government bodies on a multi-sectoral basis. It analyses how best practices can promote a culture that appreciates the central role of SEA in environmental protection and the understanding of the need for related investment in institutional capacity, research, and guidance to all stakeholders. Specific recommendations are made for SEA implementation for the next 20 years within and between EU Member States for: 1) Consolidation and strengthening of the SEA process through stakeholder exchanges and a more structured framework; 2) Training needs for the SEA Focal Point, Designated Authorities and Responsible Authorities; 3) Access to information and public participation in user-friendly and innovative ways to promote participation, understanding of issues and ownership. 4) Capacity-building techniques to overcome challenges in resources and procurement of expertise for SEA.

Summary Statement

Two island nations within the EU with uniquely rich biodiversity and cultural heritage share their experience of implementing SEA in a post-colonial context to plan for their growing economies.

Aim

Analyse best practice to promote in both countries the central role of SEA in environmental protection through exchange visits in 2023.

Background

Issues of culture, governance and development stand out as particularly important to the relationship between "smallness" and "islandness" and policy-making for sustainable development[1]. "Islandness" is characterised by "geographical boundedness, historical distinctiveness, biotic diversity and endemism, linguistic nuances, cultural specifics, innovative governance practices and 'pseudo-development' strategies"[2]. "Smallness" may be advantageous for states due to their compact and centralised administration, consensual policy style, small internal market and specialised open economies"[3], flexibility, the accessibility to policy-makers and personal contacts[4]. Thus, small states can be sites to innovate change[5] for a sustainable future.

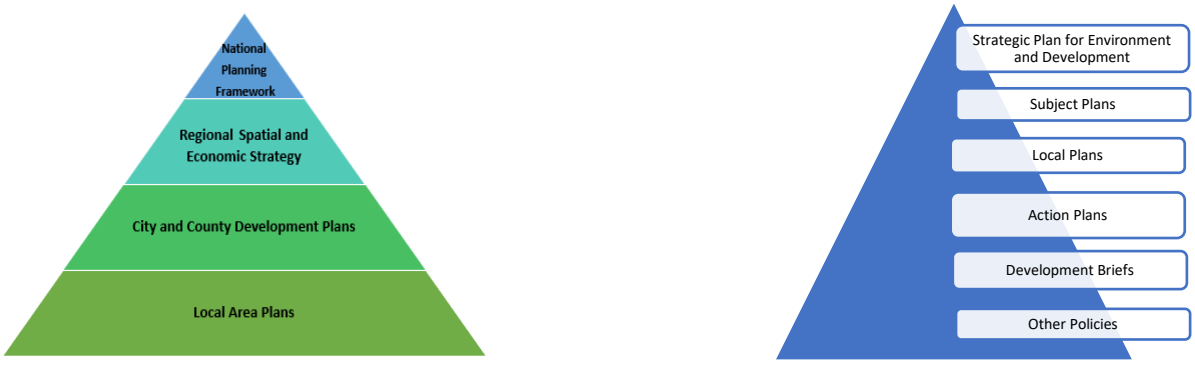
Malta and Ireland are smaller, peripheral members of the EU-27 (Table 1) and have several commonalities that have shaped their approaches to implementation of the SEA Directive over the past twenty years[6]. Notwithstanding migration histories under past British rule[7,8], there are strong development pressures due to recent robust economies and population growth, through a combination of natural increase and declining net outward migration[9].

Table 1: Comparison of geographical characteristics of Ireland and Malta[10, 11].

Characteristics	**Ireland**	**Malta**
Year of Independence	1922	1964
Land area sq. km. (2022)	84,421	316
Land area ranking EU-27 (2022)	19th	27th
Resident population (2023)	5,194,336	542,051
Resident population ranking EU-27 (2023)	19th	27th
Population density persons per sq. km. (2022)	75.2	1692.7
Resident population density ranking EU-27 (2022)	20th	1st

The Republic of Malta comprises three main inhabited islands: Malta, Gozo and Comino. It has the smallest land area and highest population density in the EU-27 (Table 1). Ireland comprises 26 counties which, together with 6 counties of Northern Ireland within the United Kingdom, make up the island of Ireland. Ireland has one of the lowest population densities (Table 1) but the third-fastest population growth rate in the EU-27 in the last 10 years, up by 14.4% when compared with an EU-27 average of 1.7%[12].

The application of environmental legislation and planning processes in both countries is influenced by common law systems from historical British governance. This model is process-focused whereby judges may incrementally modify and clarify the law through judgements on cases[13]. By way of judicial review, courts may rule on administrative decisions where there is a flaw with the decision-making *procedure*, however they are in principle not entitled to interrogate the *substance* of the decision, which is viewed as solely within the discretion of the decision-maker[14]. This results in refinement and transparency of legislation but can be a lengthy and costly process, at times causing uncertainty for the adoption and implementation of plans and programmes. Malta has a mixed legal system of both civil law and common law - but Maltese law is also influenced by international law and, more recently, European Union law. Not all the sources of the common law system have infiltrated the Maltese legal system: for instance, Malta does not abide by the doctrine of precedent[15].



Figures 1a and 1b: A comparison of the planning systems of Ireland[16]and Malta[17].

A comparison of both planning systems (Figures 1a-1b) illustrates the hierarchy to which SEA is applied using a tiering approach[18]. Ireland (Figure 1a) is currently revising its National Planning Framework (NPF)[19]. It is executed on a six-year cycle through three Regional Spatial and Economic Strategies, which in turn instigate 31 different local authority Development Plans, with Local Area Plans for settlements over

5,000, all of which reviewed by the Office of the Planning Regulator (OPR)[20]. In Malta, the Strategic Plan for Environment and Development (also being revised) guides the Subject Plans, Local Plans, Action Plans, Development Briefs and Article 50 Policies[21]. (Figure 1b). Malta's SEA Focal Point acts as regulator and Competent Authority with a number of consultees. Ireland has designated environmental authorities on a sectoral basis to be consulted by the Competent Authority that is preparing a given plan[22].

Given these contextual commonalities and resulting operational frameworks, the respective governments and the European Commission agreed that a technical study exchange on SEA in 2023 with participation by national, regional and local government bodies on a multi-sectoral basis would be highly beneficial.

Description of the technical exchange process

This process involved an expert group visit from Malta to Ireland in June 2023 and a reciprocal visit in October 2023. Over 40 representatives from Competent Authorities as regulatory agencies, plan-making Responsible Authorities, and national environmental Designated Authorities participated during each visit.

Its aim was the analysis of the governance and frameworks to operationalise the SEA process. The main topics of the exchange were:

1. Integration of the SEA process into plan-making by national and regional authorities to ensure environmental protection and sustainable development.
2. Capacity-building for the provision of environmental assessment in Malta and Ireland.
3. Legislative and policy frameworks for SEA in Malta and Ireland and application of case law.

Main outcomes

Four key areas to advance best practice in SEA emerged from the discussions:

1. Promoting national dialogue. Establishment of the National SEA Forum in Ireland as a means of dialogue and improving expertise proved to be of benefit to SEA implementation[23]. The Maltese SEA Focal Point is exploring the establishment of a similar Forum with eventual opportunities for joint events with Ireland. This visit has shown the benefits and challenges of different institutional formats for designation of competent and environmental authorities.

2. Public consultation methods. This key aspect of SEA[24] requires further pilot initiatives as there is limited EU guidance to increase participatory planning through the SEA process[25]. Malta has experience with gaining public input and engaging the public in examining alternatives to improve SEA implementation. The Maltese SEA Focal Point has developed a Screening Process template to assist plan-makers in their responsibilities including input from concerned parties. Public engagement with the SEA process in Ireland is low, and is the subject of a research project funded by the EPA and OPR[26].

3. SEA and cultural heritage. The exchange highlighted challenges faced in terms of touristic pressures on cultural heritage sites, limited expertise and institutional memory on SEA, and new challenges posed by climate change and biodiversity loss. The Irish Department of Housing, Local Government and Heritage and Maltese Superintendence for Cultural Heritage representatives discussed the greater incorporation of SEA into heritage planning and management and challenges arising from development, tourism and climate change for the long-term protection of UNESCO World Heritage sites, many which overlap with Natura 2000 sites. Requirements for SEA will be increasing in the Irish national heritage consent regime under new national legislation passed in 2023[27]. Examples from the Gozo Regional Development Authority (GRDA) of participatory planning in setting the Vision Statement for Gozo[28] and the first Regional Development Strategy[29] illustrate best practice in Malta for spatial planning and sustainable urban development. Ireland is drafting its first National Strategy for World Heritage[30] with recommendations for specific guidance for sustainable development. Both strategies address key issues of protection of cultural heritage and biodiversity, climate change mitigation, sustainable tourism and rural development. A wider

interpretation of the term environment is needed to include not only natural aspects but also cultural heritage.

4. **Resourcing and procurement.** Capacity-building techniques were explored to address challenges in resourcing and procuring the expertise for SEA. Recent studies by professional institutes in Ireland reveal critical vacancies in planning for over 60% of public and private entities[31] and a capacity crisis in the ecology sector[32]. Applications to Irish university courses have declined sharply in city planning and environmental policy (40%) and environment (17%)[33]. Intake by students in spatial planning courses in Malta is also worryingly low. Both countries rely upon out-sourcing of expertise by public bodies with increased costs and time delays through procurement procedures from a limited pool of consultants. Irish authorities use multi-party framework agreements for public procurement of consultants for environmental assessment to encourage competition, manage costs and reduce timeframes for SEA and it is recommended to be included in SEA Action Plans. The Maltese SEA Focal Point deemed that further capacity-building and training on SEA including through training courses, expert exchange of views, seminars, conferences, and possibly more well-publicised educational programmes in environmental assessment to increase in-house expertise would strengthen the SEA process.

Discussion

There are many similarities between Malta and Ireland including historical, demographic, social, cultural, economic and environmental aspects. The aspect of island culture and ecology was discussed and this is a strong theme in terms of the unique language, biodiversity and history of cultural inculcation of both islands combined with modern economic growth and touristic development. This has led to possible contradictions emerging from 'openness' and 'closeness' of island states emanating from the drive to develop and modernise, while at the same time holding on to island culture and values[34, 35].

Both countries continue to experience challenges in, addressing and increasing awareness of the SEA process. Increasing environmental awareness requires considerable ongoing time and effort. This need for capacity-building for environmental assessment has highlighted the importance of such exchange visits for peripheral nations, as it was remarked many times during the visit by both delegations that "we don't feel so alone now". This experience highlighted that authorities responsible for SEA and its challenges can greatly benefit from such expert 'learning' sessions that provide much needed mutual support and reassurance. While there was a good gender balance of speakers, the older age profile illustrated the need to attract younger professionals to undertake environmental assessment.

EU legislation and CJEU rulings can be challenging to implement for the SEA process in a common law system[36]. A shared challenge is the limited availability of technical expertise to meet legal requirements for SEA, posing a risk to the planning processes. It is evident that further efforts are required to provide and improve the level of networking as a means of training. The exchange visit has highlighted the need for cross-fertilisation of ideas and for more educational programmes for both countries and within the EU generally. This visit proved to be a success on various counts including: improved awareness, strong and effective cooperation, and a positive outlook towards the future, that could be summarily described as a non-formal learning opportunity based on the sharing of experience for improved policy implementation.

Recommendations

Specific recommendations for SEA implementation for the next 20 years within and between EU Member States include:

1) Consolidation and strengthening of the SEA process through stakeholder exchanges and a more structured framework.
Countries that have not already done so could explore capacity-building measures, namely:

- Establishment of a National SEA Forum.
- Commissioning an SEA Effectiveness Review (SER).

- Preparing an SEA Action Plan.

2) Training needs for the SEA Focal Point, Designated Authorities and Responsible Authorities are explored.

- Re-training and upskilling of experienced staff to increase in-house expertise is critical.
- The Irish EPA website is a repository for national and EU resources and guidance documents on SEA[37].
- Promotion of exchanges on SEA using TAIEX for networking improvement could be increased within the EU-27.

3) Access to information and public participation in user-friendly and innovative ways to promote participation, understanding of issues and ownership.

- Further collaboration between Malta and Ireland on public participation for sustainable development, including on World Heritage sites.
- Malta's Environment and Resources Authority has developed a standard mechanism for recording SEA consultations which could be used as a best practice.
- The SEAWAY Project in Ireland can provide peer-reviewed research resources[38].

4) Capacity-building techniques to overcome challenges in resources and procurement of expertise for SEA.

- Future exchanges may link to universities, thus promoting careers in SEA.
- Improved sharing of procurement frameworks among governmental bodies and supporting entry into the market of new service providers are areas for future focus.

Conclusions

Awareness and implementation of SEA can benefit from the provision of opportunities for exchange of views. Such programmes can serve as a platform for increased awareness, enhanced cooperation, consolidation of environmental values, training and informal education for policy-makers. The evaluation of this expert exchange visit corroborates that informal settings can serve as a form of Education for Sustainable Development (ESD) for policy-makers[39].

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Advancing Cumulative Effects Research at Natural Resources Canada: Challenges, Discoveries, and Moving Forward

Brian Eddy, Christina Clarke, Colter Kelly, Effah Antwi, Wenjun Chun, Curtis McKinney, Michael Parsons, Christine Rivard, Lisa Venier

The Challenge

Canada has now entered a period of energy transition from fossil fuels to low carbon energy sources for both domestic use and global export. This transition requires multiple types of clean growth initiatives using renewable energy sources such as wind, solar, geothermal, and biomass. Hydrologic resources and sustainable forestry practices will also be necessary, along with the development of critical minerals to support the technology enabling the transition. Due to these factors, the pace of anticipated natural resource development over the coming decade is unprecedented.

Many of these anticipated new projects will be in regions with past or existing natural resource development, which will likely result in the effects of each individual project interacting with the effects of other projects in various and potentially poorly understood ways. This overlap of effects is broadly referred to as *cumulative effects* (CE; Sinclair et al., 2017). The Canadian Council of the Ministers on the Environment defines CE as "*...changes in the environment caused by multiple interactions among human activities and natural processes, which accumulate across time and space*" (CCME, 2014).

The current approach to managing natural resource development in Canada, including impact assessments, focuses primarily on a single project at a single point in time, with the proponent responsible for data collection and analysis on the areas under their care and control (Noble, 2010; IAAC, 2020).The main mechanism to consider CE is during project-level impact assessments, which may be insufficient for assessing long-term impacts, as the scope is too narrow, the scale is too small, and often past, current, and potential future projects are not sufficiently considered (Noble, 2010). This type of problem has been described as a resulting from a "tyranny of small decisions" (Noble, 2010). A case in point is the precedent setting Yahey v. British Columbia (2021) decision, in which the B.C. Supreme Court ruling established that the "*cumulative impacts of industrial development meaningfully diminished [Blueberry River First Nation's] exercise of its treaty rights,*" emphasizing the growing need to better manage projects and their CE.

The Government of Canada (GoC) strengthened provisions for regional and strategic assessments in the *Impact Assessment Act*, 2019 (the Act). Although regional-based approaches are encouraged to better manage CE, as well inform future decision-making of project-level impact assessments, only one terrestrial regional assessment has been announced (Regional Assessment in the Ring of Fire Area) since the Act came into force and has not yet advanced past the terms of reference. Additionally, there is often a significant gap in scientific data, knowledge and methods available on a regional scale to adequately assess CE.

Access to regional scale information about processes and interactions that occur at different spatial and temporal scales is required for comprehensive CE assessment. Scientific understandings of CE from combined past, present and future activities and associated pressures on valued ecosystem components is needed, above and beyond the effects of individual project activities (Therival and Ross, 2007). To establish a robust baseline and understand the complexity and interaction of effects, a wide range of scientific research, technical advice, and generation of knowledge on physical, biological, and human components are required.

Therefore, researchers from many disciplines are needed to identify, predict, and evaluate the potential effects of multiple development activities on the environment, develop future scenarios modelling, as well as guide future monitoring (Eddy et al., 2014). In addition, an evaluation of the value components and the relationships between each of the components will require a transdisciplinary approach that considers a diversity of perspectives, including Indigenous (First Nations, Inuit, and Métis) knowledge systems. Taken together, the scientific information generated may be used to support risk analysis and decision-making in land-use planning related to sustainable natural resource development and promote Indigenous self-determination.

Approach

With expertise related to geoscience (e.g., minerals, energy, groundwater), forestry (e.g., forest management, timber supply, and biodiversity), geomatics (e.g., remote sensing, GIS, open data platform), and interdisciplinary sciences (integrating, for instance, climate change, sustainability assessments, socio-economic structures and considerations, natural resource development), Natural Resources Canada (NRCan) has a broad scientific research portfolio that provides a strong foundation for more comprehensive knowledge generation to support CE assessment. Reflective of the diverse and interdisciplinary nature of CE, a committee comprised of scientists within NRCan with expertise in diverse fields was established to provide interdisciplinary perspectives on CE research issues. Known as the *Selecting Terrestrial Areas for Cumulative Effects Research (STACER)* committee, the committee initially aimed to develop a process to identify areas for future CE research in terrestrial areas of Canada to help focus the department's CE research.

As part of this initiative, the committee sought to provide strategic guidance in selecting areas of past, current, and anticipated industrial development, to support anticipated need for scientific data, knowledge, and technical advice, focusing on areas in which researchers could:

- Improve our understanding of baseline conditions, trends, and possible future states of Canada's terrestrial environment in relation to natural resource development.
- Generate information/knowledge that can inform impact assessment processes, including regional assessment;
- Generate information/knowledge that can advance GoC and NRCan science and policy priorities; and
- Generate information/knowledge that can help Indigenous groups better understand the impacts of CE on their lands and communities.

To do this, a GIS mapping exercise was initially carried out to visualize and analyze areas favourable for NRCan's CE research. GIS data layers were acquired on past, present and future natural resource projects, along with communities, infrastructure, and locations of Indigenous communities based on publicly available datasets (Beneteau, 2022; Eddy et al., 2023; NRCan, 2022[1]; NRCan, 2022[2]; NRCan, 2022[3]; NRCan, 2022[4]). Data layers were weighted and combined in a GIS overlay analysis to map favourable regions. Weighting prioritized future project areas, where regional or individual project-level impact assessments would be anticipated, with preference for locations where future projects overlap with past and currently active resource project areas. Highest scores were assigned to locations where past, present and future projects coincide. This approach reflected the desire to consider the CE of different combinations of past, present and future development activities. The map in Figure 1 shows one result that reveals numerous locations in all regions of Canada that could serve as potential CE research study areas.

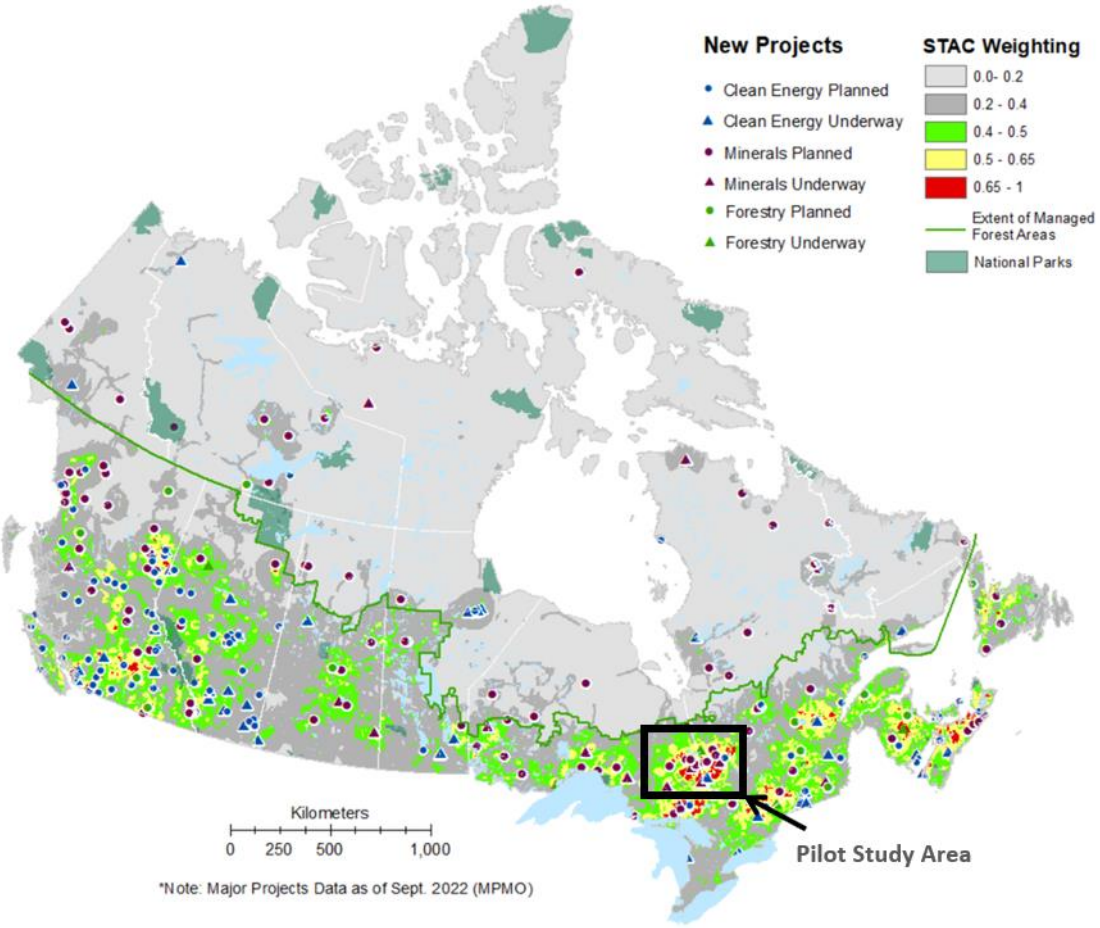

Figure 1. GIS analysis revealing numerous areas favourable for CE research in the vicinity of anticipated future resource development projects. (Note: Pilot Study Area is discussed further in the text)

Discovery

Although the GIS mapping exercise proved helpful in identifying favourable areas, the committee uncovered several challenges when trying to narrow down a selection of candidate study areas. This was due to the extent of Canada's landmass and the wide range of resource development settings and diverse research interests. Additionally, committee members identified the need for a framework to support interdisciplinary/multidisciplinary research at the departmental level. Such a framework could provide researchers within NRCan the organizational support for collaborating across the department. Although researchers from across the department have managed to collaborate informally in the past, a CE assessment requires a more formalized framework at the department level that is separate from individual programs.

Realizing these needs, the STACER committee adopted the use of an *Adaptive Management with Information Ecology* (AMIE) framework (Figure 2; Eddy et al, 2014) as a tool to guide their work moving forward. The AMIE framework illustrates how diverse types of research are needed to support decision-making for both regional and project-level assessments. The primary level of the framework pertains to the realm of fundamental natural and social scientific research (e.g. sector-based primary research). The secondary level pertains to more applied and integrative multi-disciplinary research organized around decision support components on the tertiary level. The tertiary level is the realm of actual decision-making and engagement which requires information support from both primary and secondary levels. Currently in IA and CE assessments, research is typically fed directly from the primary level to the tertiary level without any integrative or mediative processing that would normally be provided by secondary level research.

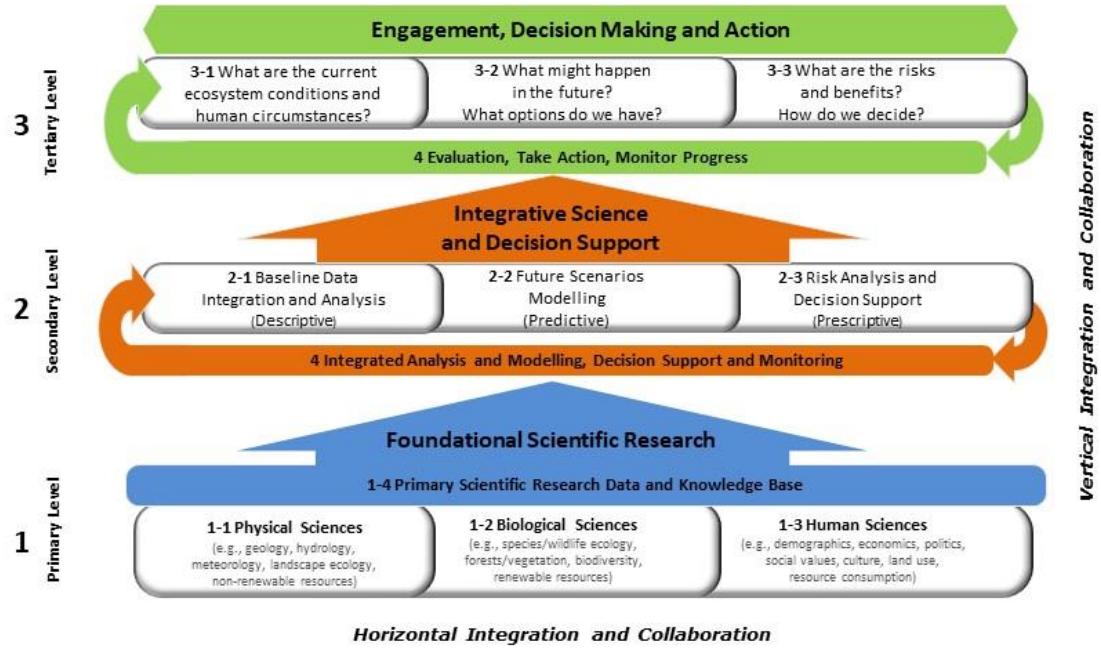

Figure 2: Schematic of the AMIE Framework from Eddy et al. (2014)

The STACER initiative was repositioned to support this as a new multidisciplinary research framework, recognizing the importance of all levels of research in understanding CE. As a result, the committee recommended a staged approach whereby priority should be given to orienting individual CE research projects on the primary level towards working in geographic areas of anticipated future projects, preferably where current and past activities are also present. Issues surrounding secondary level collaborative CE research could be addressed through the initiation of a pilot study to explore both scientific and organizational considerations, which would be considered for the development of a departmental-level framework. To date, the committee has begun two initiatives to address these recommendations.

Moving Forward

To support on-going, sector-based primary level research, the STACER committee will continue with the implementation of an on-line GIS map that will be used to collect information on current CE research projects at NRCan (Figure 3). Known as the STACER map, it will be available to CE researchers at NRCan to assist in identifying locations for research projects in relation to resource development settings. The map contains multiple layers of information on past, present, and future resource projects, along with information on communities, infrastructure, Indigenous communities, and selected environmental themes. The use of the STACER map will be supplemented with a corresponding survey to be conducted among current CE researchers to capture pertinent information related to how current research projects may potentially support future regional and project-based impact assessments. This information will be collected in a database which will be used both for reporting to senior management and for researchers to share information to foster potential collaborations in geographic areas where project areas overlap or are in close proximity.

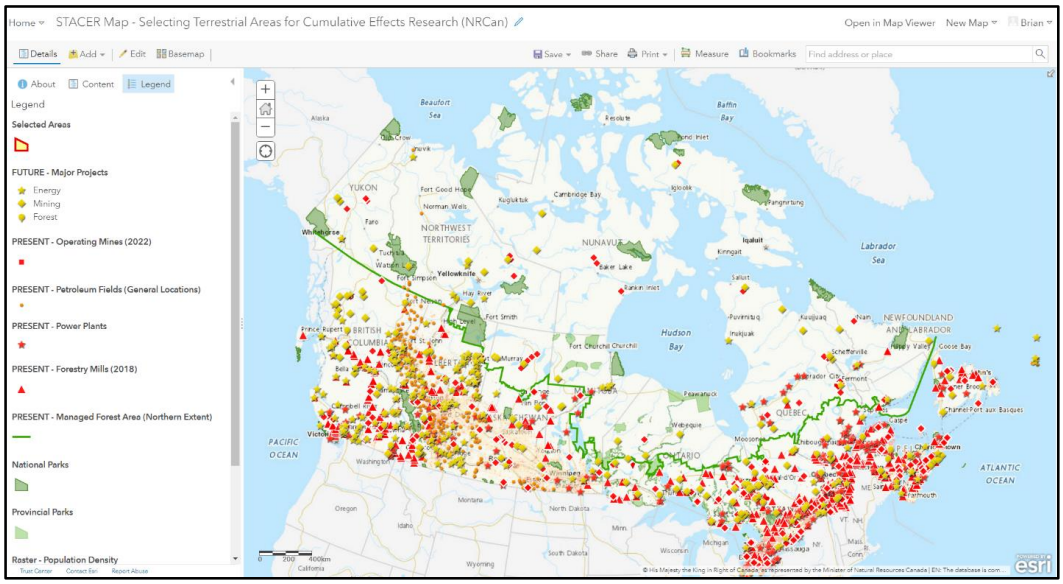

Figure 3. Screen capture of the on-line GIS-based map 'STACER' (Selecting Terrestrial Areas for Cumulative Effects Research).

For secondary level initiatives, the committee has recommended scoping a pilot project in the Abitibi Resource Belt region between northern Ontario and Quebec (see box insert in Figure 1). This region was selected because of its intense past and current resource development activity in multiple resource development (including minerals, forestry, and energy) and more than a dozen new projects, including critical minerals, identified for future development. The CE of future projects in this region are expected to compound effects from the numerous past and current project activities in complex ways which makes the Abitibi Resource Belt a suitable candidate for a pilot project. The Geological Survey of Canada (GSC) of NRCan has already initiated a CE project in this region based on this rationale. The information gathered from the initial scoping exercise will be used to report back to the committee and consult with both scientists and management to examine scientific and organizational requirements to develop and implement a departmental level multidisciplinary research framework.

Summary

Natural Resources Canada's mandate is to improve the quality of life of Canadians by ensuring the country's abundant natural resources are developed sustainably, competitively, and inclusively. Recognizing the anticipated pace of development over the coming decade, the challenges surrounding the CE of multiple natural resource developments across Canada are characteristic of a "wicked problem" (Kawa et al. 2021) that needs to be addressed to ensure long-term environmental and socio-economic sustainability. A wide range of scientific research, technical advice, and generation of new scientific data and knowledge on physical, biological, and socio-economic components are needed as the foundation to understand CE. The multi-tiered approach taken under the guidance of the AMIE framework and the two initiatives discussed above provide a way forward for the STACER for the near future. It is anticipated that this initiative will encourage better use of resources and improve linkages with federal decision-making to support sustainable resource development and the protection of vulnerable social and environmental components identified by IA processes surrounding multiple natural resource development projects.

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Brazil ES Overview Assessment: Strengthening Borrower's Capacity & Systems

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ABSTRACT

Intending to evolve and look for better ways to respond to global challenges, the World Bank is in the midst of a lively process of updating its vision and mission: to end extreme poverty and boost shared prosperity on a livable planet. At the heart of the Bank's Environmental and Social Framework (ESF), is the constant effort to strengthen borrower ES frameworks and institutional capacity for ES risk management (ESRM). In this context, the ES Overview Assessment is being developed, a project that sought to systematically evaluate all ESF requirements, in light of the Brazilian legal framework, to assess the degree to which the application of the latter would bring materially consistent results to those expected by the ESF. To this end, a structured comparative methodology was developed which resulted in the degree of material consistency between the two frameworks and, importantly, identified short/medium/longer term opportunities for strengthening ES framework at the national/sub-national level. Measures were defined to be adopted during projects' preparation, in order to align with and/or complement legislation requirements, and thus enable the projects' ESRM to achieve the ESF's objectives as far as possible through the country's systems, contributing to its strengthening, creation of internal capacities, and knowledge sharing. The resulting set of tip-sheet notes is intended to serve as a decision-support toolkit for the borrowers to better design and coordinate projects' ES compliance strategy, and, above all, promote more sustainable and resilient projects.

KEYWORDS: environmental and social risk management, decision-support toolkit

June, 2024

1. BACKGROUND

The World Bank Group works in every major area of development, and provides a wide array of financial products and technical assistance, and helps countries share and apply innovative knowledge and solutions to the challenges they face. Since 1947, the World Bank has funded over 12,000 development projects, via traditional loans, interest-free credits, and grants. The WBG is comprised of five institutions (IBRD, IDA, IFC, MIGA and ICSID) working for sustainable solutions to reduce poverty and build shared prosperity in developing countries.

When providing governments with financing to invest in projects — such as building a road, connecting people to electricity, or treating waste water — the World Bank aims to ensure that the people and the environment are protected from potential adverse impacts. This is done through policies that identify, avoid, and minimize harm to people and the environment. These policies require the borrowing governments to address certain environmental and social risks in order to receive World Bank support for investment projects, acknowledging that including environmental and social considerations into project design and implementation improves development outcomes.

In August 2016, the World Bank adopted a new set of environment and social policies called the Environmental and Social Framework (ESF). As of October 1, 2018, the ESF applies to all new World Bank investment project financing (IPF). The ESF supports green, resilient and inclusive development by strengthening protections for people and the environment and making important advances in areas such as labor, inclusion and non-discrimination, gender, climate change, biodiversity, community health and safety, and stakeholder engagement. It uses a risk-based and proportionate approach that applies increased oversight and resources to complex projects and allows for greater responsiveness to changes in project circumstances through adaptive risk management and stakeholder engagement. It promotes integrated environmental and social risk management.

As part of the WB Environmental and Social Policy for IPF, the ESF foresees the use and strengthening of borrower's environmental and social framework as one of its pillars. It supports the use of the borrower's ES Framework in the assessment, development and implementation of projects, provided this is likely to address the risks and impacts of the project, and enable the project to achieve objectives materially consistent with the ESSs.

To support increasing use and strengthening of the borrower's ES Framework, the ES overview assessment is a key instrument that supports the assessment of borrowers' existing policy, legal and institutional framework for addressing environmental and social risks and impacts, and related implementation capacity. The overview assessment identifies aspects of the existing framework that can be strengthen, and the capacity-building needed to support this.

In this context, Brazil's overview assessment process has initiated in 2022 and in currently reaching its third phase as summarized below:

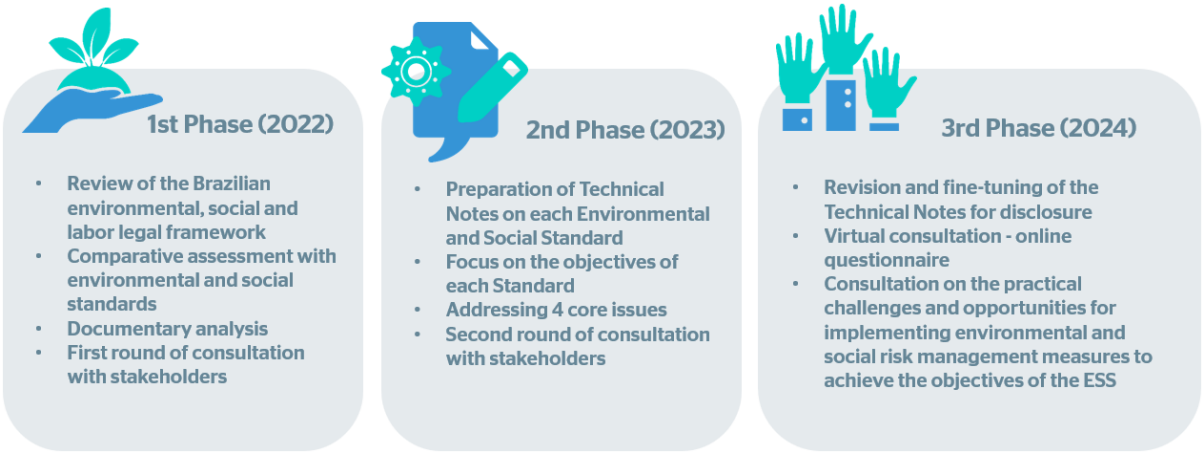

Figure 1: The 3 phases of the overview assessment process.

2. OBJECTIVES

The objectives of this work are threefold:

- On the basis of the full overview assessment, to prepare brief notes based on each Environmental and Social Standard assessed aiming to disseminate and validate its findings through consultations with relevant national and subnational agencies and non-governmental stakeholders;
- To carry out meaningful consultations with governmental and non-governmental stakeholders to a) gather their views and inputs on how the country framework works in practice and; b) some recommendations for further enhancement of those frameworks; and,
- To summarize the findings of the overview assessment report (per ESS) and the consultation process in simple and short technical notes, that can be more easily used in the day-to-day operational work of ES teams and borrowers' teams.

The tip-sheet notes basically will serve as a practical toolkit for the implementation of projects financed by the World Bank in order to achieve the objectives of the ESF. Fundamentally, the work endeavored to answer the following questions: i) Which objectives and requirements of the Environmental and Social Standards are completely, partially or not achievable using the Brazilian system, and ii) What additional measures would borrowers need to adopt for their projects to achieve the objectives of the ESSs?

By answering these questions, this activity represented an opportunity to advance dialogue with Government on policy actions and capacity building needs to improve the country's institutional and legal frameworks (including implementation and enforcement) in the discussed areas, where pertinent. It is expected to facilitate preparation of new World Bank financed operations and provide upstream advice to the Government in improvement of key environmental and social frameworks and systems.

3. MATERIALS AND METHODS

The comparative analysis between Brazilian legislation and the World Bank's Environmental and Social Standards was basically based on discretizing all the requirements presented in the ESF and conducting a sufficiency analysis using five categories:

Figure 2: Classification used in the comparative analysis between Brazilian legislation and the World Bank's Environmental and Social Standards.

Furthermore, the fifth classification criterion used was: requirements that derive exclusively from the contract with the World Bank (bilateral demands). These requirements are not covered by the use of the Brazilian regulatory framework insofar as they would not be required or necessary if there were no loan agreement with the World Bank.

An assessment matrix (example below) was the tool used to compile and classify information about the ESSs requirements. The first column presents the item in which the obligation is positioned in the Standard (paragraph), followed by the part of the paragraph that is important for the analysis (requirement). The next column deals with the classification of the project life cycle stage.

The fourth column indicates the correspondence of the obligation in national legislation, observing in which national legal provisions the aspects of the requirement are addressed. Next, the degree of adherence to national legislation is indicated, followed by comments on the specific item. Finally, the identified gap is recorded, when applicable. The matrix allows for a series of filters that enable quick visualization and grouping according to classifications.

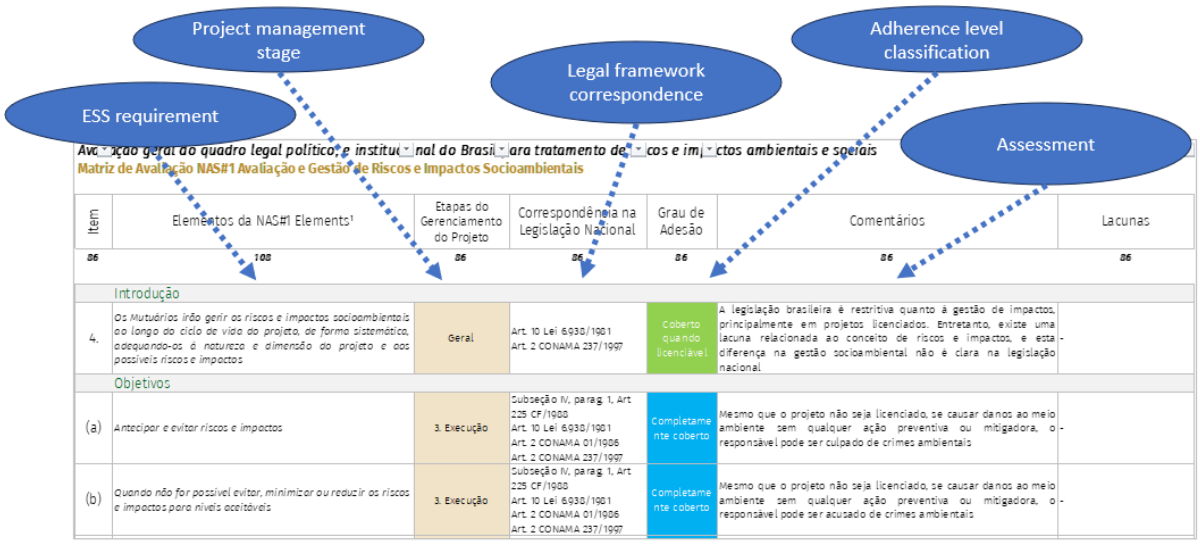

Figure 3: Example of evaluation matrix used in the comparative analysis between Brazilian legislation and the World Bank's Environmental and Social Standards

Based on the classification, the degree of adherence of Brazilian legislation in relation to the requirements of each of the World Bank's Environmental and Social Standards was measured by an algorithm. This algorithm corresponds to the weighted average of the value given to each requirement based on the classification categories, by the weights assigned to them.

$$GA = \frac{(1 * PLA) + (1 * CQL) + (0.5 * PRA)}{NEA}$$

Where: DA = Degree of Adherence; PLA = Number of requirements/objectives Fully Achievable; CQL = Number of requirements/objectives Achieved When Subject to Licensing; PRA = Number of requirements/objectives Partially Achievable; NEA = Total number of elements analyzed

From the degree of adherence to each of the requirements and objectives, measures to be additionally adopted by Borrowers in order to complement the demands of Brazilian legislation that they already have to follow were listed with the aim to allow project's E&S to achieve the objectives of the WB's set of Environmental and Social Standards. It is worth highlighting that, in this analysis, gaps related to the ability to implement this legislation are not considered, as it is based on the assumption that – at the project level – measures can be implemented to correct them.

4. RESULTS AND DISCUSSION

The results of the ES assessment are summarily presented in the table below. It is noteworthy that such results/numbers are still preliminary and be further revised and fine-tuned as an output of the third phase of the ES overview assessment.

ESS	Completely covered	Covered when licensed	Partially covered	Not covered	Elements	Adherence
ESS 01	22	23	11	19	**75**	***67%***
ESS 02	19	0	7	2	**28**	***80%***
ESS 03	37	5	15	6	**63**	***79%***
ESS 04	9	10	8	2	**29**	***79%***
ESS 05	8	8	16	17	**49**	***49%***
ESS 06	17	19	9	13	**58**	***70%***
ESS 07	8	7	12	2	**29**	***72%***
ESS 08	18	29	22	2	**71**	***82%***
ESS 10	1	11	3	1	**16**	***84%***
TOTAL	139	112	103	64	418	-
SCORE	251		51.5	0	302.5	***72%***

Table 1: Preliminary Results of the ES assessment

Nine brief (tip-sheet) notes based on each one of the Environmental and Social Standard (ESS) - with the exception of ESS9 - Finance Intermediaries - have been prepared aiming to disseminate and validate the findings of the overview assessment (Phase 1) through consultations with relevant national and subnational agencies and nongovernmental stakeholders.

The tip-sheet notes consider how well the use of the Brazilian Legislation would allow the achievement of the objectives set by each ESS as well as how much they will address the specific requirements each ESS makes for the adequate management of environmental and social issues. In addition, the notes make recommendations on measures task teams and Borrowers can take - at the project level - to improve the

procedures for E&S risk management. These notes are meant to be easily used in the day-to-day operational work of ES teams and Project Management Units.

Avaliação geral da estrutura política, legal e institucional do Brasil para tratamento de riscos e impactos ambientais e sociais

THE WORLD BANK IBRD • IDA | WORLD BANK GROUP

Avaliação e Gestão de Riscos e Impactos Socioambientais

NAS1

1. OBJETIVO DA NOTA

Esta Nota Comparativa tem por objetivo servir para orientar as equipes do Banco Mundial e de seus Mutuários no Brasil, durante a preparação de operações e implementação de suas atividades, no que se refere à identificação, avaliação e gestão de seus riscos e impactos socioambientais, permitindo promover melhores desempenhos socioambientais e fortalecer a capacidade dos Mutuários. A análise buscou indicar que objetivos da Norma Ambiental e Social 1 – Avaliação e Gestão de Riscos e Impactos Socioambientais do Quadro Ambiental e Social do Banco Mundial (doravante designada por Norma 1) podem ser alcançados plenamente ou parcialmente utilizando o marco regulatório nacional e quais de seus requisitos são assim atendidos.

2. GRAU DE ADESÃO

75 ELEMENTOS (EXIGÊNCIAS) NAS#1

67% ADERÊNCIA

Completamente coberto 22 | Coberto quando licenciável 23 | Parcialmente coberto 11 | Não coberto 19

40% das exigências com lacunas

3. VISÃO GERAL

A Norma 1 define as responsabilidades do Mutuário no que diz respeito à avaliação, gestão e monitorização de riscos e impactos socioambientais associados a cada fase de um projeto apoiado pelo Banco, por meio do Financiamento de Projetos de Investimento, para a consecução de resultados ambientais e sociais consistentes com as Normas Ambientais e Sociais do Quadro Ambiental e Social do Banco Mundial. A Norma 1 é a norma que conjuga e direciona a aplicação das outras nove Normas do QAS. É também onde estão estabelecidos os processos e orientações para a avaliação e gestão dos riscos e impactos dos projetos financiados pelo Banco, o que inclui a avaliação da capacidade institucional do mutuário e as obrigações bilaterais de reporte e comunicação entre as partes.

Na legislação federal brasileira, a Norma 1 pode ser considerada especialmente refletida na Política Nacional do Meio Ambiente (Lei 6.938 de 1981), que é o guarda-chuva da regulamentação da gestão de impactos ambientais no País. Um degrau abaixo, mas de igual importância e rebatimento das diretrizes da Norma 1, encontram-se as resoluções CONAMA 001 e 237, que estabelecem critérios básicos e diretrizes gerais para elaboração de estudos de impacto ambiental e para o licenciamento ambiental de projetos potencialmente poluidores ou que possam causar degradação ambiental e social. O licenciamento ambiental é o principal instrumento desta política no que toca à gestão de riscos e impactos de projetos. É no âmbito do processo de licenciamento ambiental que se dá a avaliação prévia dos potenciais impactos do projeto, inclusive sobre os direitos dos possíveis afetados, e onde são definidas as medidas a serem cumpridas para mitigação e ou compensação desses impactos. Não menos importante para avaliação do rebatimento da Norma 1 na legislação brasileira é a Lei de Crimes Ambientais (Lei 9.605 de 1998), que estabelece sanções penais e administrativas derivadas de condutas e atividades lesivas ao meio ambiente, e resguarda, em algum grau, o financiador em relação a uma má conduta do mutuário em sua gestão socioambiental.

Considerando a vigência das citadas legislações, e diversas outras analisadas no presente levantamento, a análise mostrou que o arcabouço legal brasileiro alcança um grau de aderência com a Norma 1 de 67%.A maior parte das lacunas tem como berço o maior rigor do Banco em relação à avaliação e gestão dos riscos e impactos ambientais e sociais dos projetos, como será explorado a seguir.

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Figure 4: Example of the tip-sheet note for the ESS 1.

Each of the Tip-sheet notes is organized into seven sections:

1. Purpose of the note
2. Degree of adherence (infographics)
3. Overview
4. Which objectives of the ESS are achievable using the Brazilian system?
5. Which objectives of the ESS are partially achievable using the Brazilian system?
6. Which objectives of the ESS are not achievable or which of its requirements are not covered when using the Brazilian system?
7. What additional measures do borrowers need to take for their projects to achieve all the objectives of the ESS?

During the process of preparing the tip-sheet notes, consultations were carried out (in the format of interviews) with selected stakeholders, group of professionals, including technical experts and managers from different segments, such as consultancy, private sector, public bodies (licensing agencies, regulatory bodies , local authorities, etc.). The degree of adherence between ESSs and the legal framework is considered significant (with particular consideration to ESS 5 and 6). This result suggests that the use of Brazilian legislation can, to a large extent, ensure the achievement of the objectives of the 9 ESSs analyzed.

Notwithstanding, there are two factors that need to be considered. Firstly, and as highlighted by the vast majority of experts consulted, there is great heterogeneity in the country in terms of institutional capacity to enforce the requirements established by legislation. Secondly, because the requirements included in each standard can be classified – among themselves and in the context of each standard – as critical or complementary to achieving the objectives of each of them, the degree of adherence – even if objectively calculated and equalizing all requirements to each other – does not reveal this scaling or, more clearly, the different relevance of the requirements among each other.

5. FINAL CONSIDERATIONS

As a result of the ES overview assessment process, important lessons could be drawn. The degree of adherence between the Brazilian legislation and the ESSs is much greater when considering the objectives of the latter rather than their specific requirements. The high degree of alignment between the two regulations suggests that: a) in many respects, the use of the Brazilian system incremented by a few additional precautions would allow achieving the objectives of the ESSs and, on the other hand, that b)

the application of these standards does not represent an excessive burden in relation to what the Borrowers are already obliged by law to carry out in terms of the ES risk management of their projects, but only some complementarities.

In general, the projects located at the “extremes” of the Bank's ES risk classification (high-substantial and low risk) show a greater tendency to allow the use of national systems related to the assessment of ES risks and impacts and the implementation of applicable control measures.

- Higher risk projects – due to the fact that they are obligatorily subject to environmental licensing according to Brazilian legislation – are necessarily subject to a rigorous assessment of their potential environmental and social impacts and require the adoption of prevention, mitigation and/or measures compensation, which cover most of the relevant issues highlighted by the ESSs. Therefore, in relation to them, it can be expected that the requirements of the Brazilian legislation would allow the achievement of the objectives of the ESSs. Some exceptions to this rule would be found in specific requirements of ESS 5 and 6, which would require gap-bridging measures.
- Moderate risk projects are in a range that denotes a more careful assessment, on a case-by-case basis, of the potential alignment between regulations. On the one hand, according to the requirements of the ESF, they require the application of studies, analyzes and specific measures for the management of their environmental and social risks; on the other, following the national regulations, many times such projects will be able to fit in the projects “exempt” or subject to “waiver of licensing”, which would not imply the implementation of specific measures, but rather, basic compliance with environmental and social standards for projects.

Finally, during the different rounds of consultations and interviews, it was observed that, there is a great need for ongoing engagement and technical training with Borrowers and other public agencies involved in the project implementation process (licensing agencies, regulators, etc.) for greater and better dissemination of the WB’s Environmental and Social Standards. Also, as a result of the consultation process held on April 2024 (Phase 3), which involved a series of meetings and high-level discussions about the preliminary results of the assessment, the ES toolkit will be further revised and fine-tuned to reflect the outcomes of the engagement.

6. ACKNOWLEDMENTS

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Starting at the end: a proposal to improve ESIA effectiveness

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Presented at IAIA 2024, Dublin, Ireland 24 – 27 April 2024
Note: we hope to progress this paper for future submission to a peer-reviewed journal

Abstract

ESIAs are sometimes criticised for being overly academic, with focus placed on baseline data collection and impact analysis rather than the design and development of a realistic and actionable, properly-resourced management plan which will cascade down through the project design stages and into construction and operation. Regulators are often under-resourced and sometimes fail to appreciate the need for detailed and workable controls which will adequately address E&S risks during project development.

This paper will examine four infrastructure projects whose management plans had to be re-opened or re-worked in order to produce a sufficiently robust and granular management plan which would bring the project into line with the lender's E&S requirements.

Based on this project experience, the paper will propose a novel approach to ESIAs, whereby the study is driven by a provisional management plan developed during the scoping stage. This front-loaded, outcome-oriented approach will produce management plans that are more fit-for-purpose, proportionate and cost-effective, improving E&S management throughout the life of a project and will allow early identification of resource issues and capacity building needs. The approach is based on the concept of adaptive management – a focused, structured, iterative process that informs robust decision making. The paper will set out recommendations for how to apply this approach, while avoiding typical obstacles to implementation, and invite consideration by IAIA attendees.

1. Introduction

While there has been much improvement over the years on the ESIA[3] process, concerns remain about post-permitting follow up and on the overall effectiveness of ESIAs to materially address project impacts. Discussions at IAIA 2002 focused on EIA follow up (Morrison-Saunders et al, 2003) and led to publication of International Principles for best practice EIA follow up, (Marshall, et al (2005). A decade later, Bennett et al (2016) examined the effectiveness of management plans to address environmental impacts, and found that not all jurisdictions require EIAs to include EMPs, and even when they do, their quality and level of detail is highly inconsistent. They noted that although the EMP is an important link between the EIA process and the post-consent management of risks, their effectiveness as a tool to address risks was unclear. They suggested that many EMPs do not effectively consider how projects will be procured and contracted. As recently as 2018, Loomis and Dziedzic (2018) examined 64 studies on EIA evaluation, and concluded that empirical evidence is still lacking on how effective EIAs are in actually reducing impacts in practice, and did so interestingly without once mentioning EMPs or management plans.

This paper uses a qualitative approach to look at the ESIA process from the perspective of the management plans. Building on the authors' experience, it examines the ESIAs from four infrastructure projects and argues that the management plan is the crucial output of an ESIA, and the one element which leads to the project changes necessary to reduce risks. It asks whether the

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[3] ESIA is used in this paper as a generic term which also covers EIA. The authors understand that these are not exactly the same but the main principles being discussed here apply to both. Same for ESMP and EMP throughout.

focus of effort and resources in ESIAs could be allocated more effectively, and proposes a revised, outcome-orientated approach to ESIAs which is focused on the development of effective management plans.

2. Comments on the typical ESIA process

Traditionally, ESIAs are founded on a detailed and often costly baseline investigation which produces colourful and detailed baseline chapters, often with quantitative and spatial detail. But very often, the detailed descriptive baseline does not strongly inform the impact identification and particularly the management plans.

Conversely, the management plans – arguably the most important aspect of the ESIA since they are the one element that remains 'live' throughout the project – are often done in a rush, towards the end of the ESIA process and with only a fraction of the resources and consideration of the baseline and impact assessment stages.

Rarely in the authors' experience, do the management plans feature any of the spatial detail which has been captured in the baseline. In fact, many management plans are so light in specific project and spatial detail, that they could arguably have been written before the impact assessment was conducted.

Management plans are often drafted wholly by the ESIA team with little involvement from the project's technical/implementation team, and are rarely informed by the mechanisms and timetable by which the project will be implemented.

Crucially, management plans rarely effectively consider the project owner's capacity (human and financial) to implement them, and are often written as a high-level 'tick box' exercise with the detailed planning pushed down the chain to construction contractors, rather than as a serious means to address the E&S risks identified. Yet capacity gaps are a key obstacle to effective implementation.

Overall, we argue that the typical ESIA process is too 'front-heavy', i.e. it places too much emphasis on a detailed baseline investigation and too little effort on developing practical and detailed project-focused management plans which will adequately address the risks and impacts identified. Much of the ESIA's effort and resources are therefore often effectively wasted as they do not lead to robust and effective management plans which can be practically implemented within the constraints of the project.

3. Project case studies

In producing this paper, four specific projects were examined. These are summarised briefly here but without detail and maintaining their anonymity in order to protect the projects. They will be expanded in the journal article to be developed following the IAIA 2024 Conference. Here, one key feature is drawn out from each case.

Case A: An operating mine project with an approved ESIA, but where the ESMP was found to have been taken from a different project and was neither appropriate to the project in question, nor implementable. A new ESIA was required to take account of process changes, and to develop appropriate management plans.

Case B: A second mine project where the management plans had captured none of the relevant spatial detail necessary for effective control, despite such spatial detail having been captured in the ESIA. Although the ESIA with its management plans had been approved, the client requested that the plans be re-developed with sufficient detail for the project to implement.

Case C: A new highway project in southern Europe where although an ESIA has been approved, with an ESMP, it later transpired that the operational actions from the ESMP could not be guaranteed by the client, as a different Government agency was responsible for the operations phase. So the ESIA had been approved, the project permitted and works begun, despite the parties knowing that some key ESMP actions would not be implemented.

Case D: A large scale linear infrastructure project in Africa where an ESIA was submitted with significant management plans totalling over 200 pages with hundreds of actions, most of which would be the responsibility of a national Government institution. Despite the extent of the ESMP, the mapping and spatial data on vulnerable receptors produced in the baseline was effectively wasted as the information was not reflected in the management controls. Additionally, despite attempts by the consultants, there had been no review or sign-off from the implementing institution. There was significant disconnect between the level of detail in the ESMP and the capacity of the project owner and parties responsible for ESMP implementation. These gaps in capacity were never identified and the parties do not expect this to be implemented effectively.

These cases support the concerns raised earlier, and illustrate that ESIAs do not prioritise the development of useful, detailed and workable management plan which can be implemented by the project. In all cases, there is a significant disconnect between the information and understanding developed in the early phases of the ESIA study, and the 'resulting' management plans. Resources are focused towards the baseline and impact assessment, with the management plans developed quickly later, with insufficient involvement from the project's technical specialists. The effectiveness of the implementation suffers, and ultimately the usefulness of the ESIA process in helping the project mitigate its E&S risks and impacts is compromised.

This paper therefore asks – is there a better way to conduct an ESIA which recognises the time and resource constraints, and the realities of how the control actions will be implemented going forward by the project owner? Could the limited resources of the ESIA study be reprioritised with a stronger focus on management plans, and how could this be done?

4. Proposed new approach

4.1 Aims of the new approach

Based on the above, the authors suggest that a new approach is needed which provides:

1. A **stronger alignment** between the impact assessment and the ESMPs, with more of the spatial mapping and project understanding reflected in the management plans.

2. More emphasis on the **ESMPs as the key output** from the ESIA, with the focus of the study on producing usable management plans, rather than extensive baseline mapping.

3. Management plans which reflect **more understanding of the how the project will be implemented** by the project owner.

4. Plans which reflect a realistic **understanding of the capacity of the project owner** to implement the management control actions, including identification of where technical support or capacity building is required.

5. **Plans developed early and in conjunction with the project owner**, involving collaborative working sessions to identify how actions could be addressed and built into to the project development and at what stage. The project owner should not be seeing the management plans for the first time in the draft ESIA report.

4.2 Outline of the proposed approach

One potential way to integrate the above into the ESIA process is to introduce a requirement to develop a provisional set of management plans during the scoping stage, before the assessment begins.

In this proposal, a provisional set of management plans would be developed during the scoping stage based on whatever information was available at the time, and professional judgement and experience. These plans would be informed by stakeholder engagement and would focus on the sphere of influence of the project and the likely actions under its control.

Since management plans produced at the scoping stage will necessarily be provisional, based on incomplete information, and contain only high-level detail, they will expose any gaps in understanding on the project and its activities, the surrounding environment, and the likely effects, as well as raise questions about how and where some of the required mitigation actions should be applied. These gaps would inform development of the Terms of Reference for the remainder of the study, with a re-orientation of the entire ESIA plan around the question '*what information do we need to design appropriate control measures for the project to enact*', rather than on a stepwise, academic characterisation of the baseline and impact assessment for its own sake.

The new approach is illustrated in the following Figure, with the traditional process in black, and the modifications shown in red.

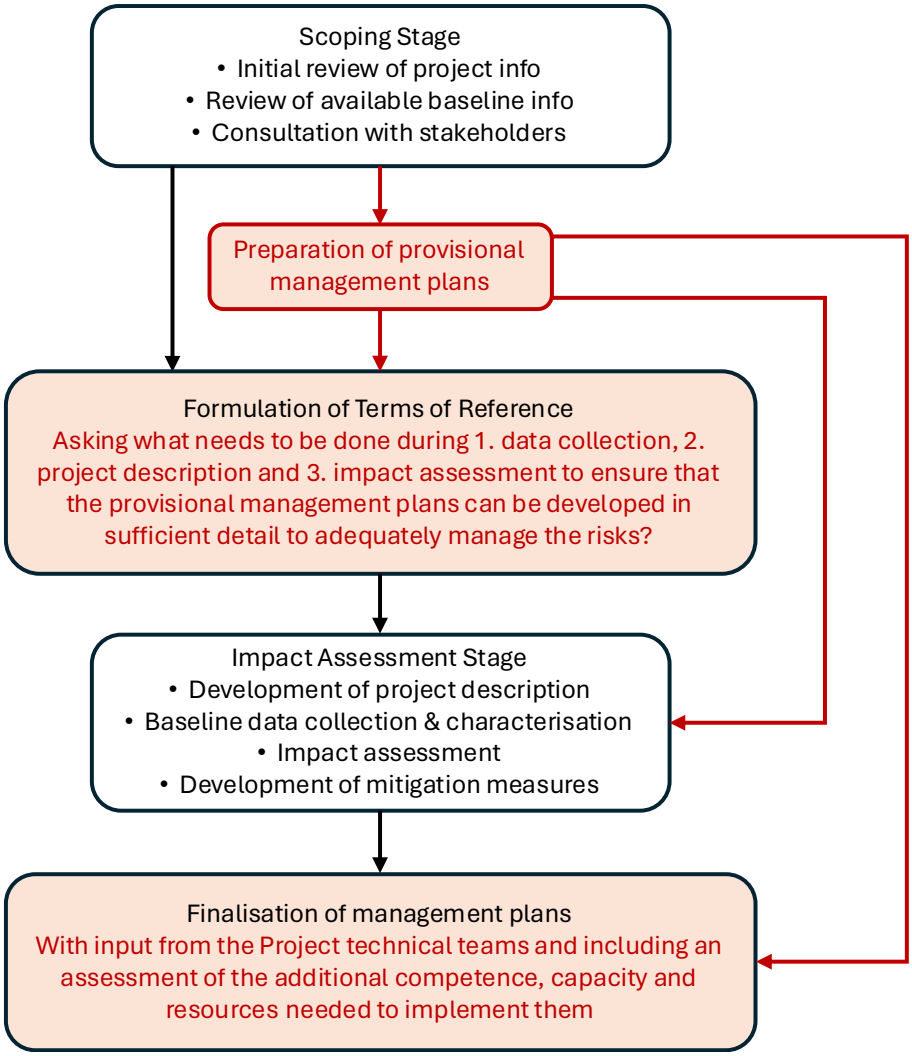

Figure 1. Proposed Management Plan-led ESIA Process

This management plan-focus would guide the prioritisation of resources at each stage of the study. Having the provisional plans at hand throughout the assessment will help ensure that efforts on data collection and impact assessment are focused on providing more detailed and useful management plans, rather than on a stand-alone baseline characterisation and impact assessment which although perhaps intellectually satisfying, does not usefully inform the key output from the study, namely the management of E&S risks and impacts of the project.

4.3 Advantages of the new approach

This approach would identify where gaps in baseline understanding need to be addressed in order to develop the management plans in sufficient detail, and would focus the data collection on what data needs to be collected for the study, and what doesn't. This could save both time and budget as the data collection phase is often heavy on resources.

It would focus definition of the scope of the study away from a more theoretical '*how could this project potentially affect its environment*' and towards '*what do we need to know to design the control measures needed to manage the E&S risks and impacts of this project*'. This could make ESIA studies more streamlined and less unwieldly. ESIA studies are often criticised for their length.

It would introduce a project-focused approach from the outset, formulated around identifying what actions the project needs to take, rather than having management plans as a bolt-on afterthought.

It would highlight the need for input from the project team in the development of management plans, so that appropriate technical definitions are incorporated, and actions required to embed the required actions in the project development are identified.

Early consideration of the mitigation and management measures from a project perspective, would allow consideration of the capacity of the project team and the resources available to implement them. Requiring the ESIA to identify capacity gaps – basically identifying the implementation risks and capturing the mitigation measures needed to avoid these risks - would highlight whether additional support to the project owner was needed around hiring, training, consultant support, equipment, etc.

Where baseline measurements are needed only for a pre-project baseline against which changes arising during the course of the project can be measured, they could be captured in the management plans as a permit-condition-action to be undertaken prior to construction rather than as part of the ESIA.

In addition, perhaps a management plan-focus would allow projects to push back on regulators against the need for extensive baseline data collection for its own sake. A plan-focused approach provides a way of justifying why the baseline data collection may be reduced, or where some data collection can be moved into the management plan stage, rather than enacted in the ESIA. Agreement with the regulator on the approach and scope may be easier with this new focus, although more capacity building may be needed..

5. Criticisms and next steps

These proposals will be critiqued by practitioners - clients, developers, ESIA consultants, environmental regulators and lenders, and several criticisms could be levelled, not least:

1. Impacts need to be identified before they are mitigated, and the ESIA study should not preclude identification of effects not known at scoping stage.

2. It is risky to reduce focus on the baseline data collection, and many regulators are comforted by large data collection campaigns.

3. The ESIA study is often conducted too early in the process to identify appropriate measures and develop management plans to the detail being asked for here.

However, it would be interesting to trial this revised approach, to understand whether it will have the outcome described. This would require some project/ESIA clients to produce a revised scope of work for ESIAs, with new requirements: 1. For outline management plans to be developed during scoping; and 2. To require these provisional plans to inform the ESIA Terms of Reference and each subsequent stage of the work; 3. To examine implementation capacity and strengthen the emphasis on workability and detail of the management plans produced at the end of the ESIA study, and 4. For monitoring of the degree to which this innovation changes or improves the process.

To this end, the authors would welcome correspondence from parties interested in further detailing and trialling a revised approach.

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How are follow-up programs implemented in Canada?

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Abstract

As part of the Impact Assessment (IA) process, follow-up programs provide a mechanism for evaluating what worked (or is working) when mitigating project-related effects and verifying whether the assessment predictions were accurate. Follow-up programs are required under Canada's *Impact Assessment Act* and some provincial or territorial processes such as the BC *Environmental Assessment Act or* through Nunavut Impact Review Board. The resulting Decision Statements, commitments, and conditions of such assessment processes describe the project's follow-up program and the required elements that it must contain. Through selected case-study, we evaluated examples of follow-up programs and considered ways to improve implementation to provide insights for future projects.

Introduction

Follow-up is defined under Canada's *Impact Assessment Act* (IAA) as a program for "verifying the accuracy of the impact assessment of a designated project and determining the effectiveness of any mitigation measures" (Government of Canada 2019). The IAA has accommodations for public participation and requires that the results of the follow-up program must be documented. This facilitates transparency and engagement with independent communities and external agencies. Follow-up as required by IAA and provincial or territorial jurisdictions includes recording data, evaluating against performance targets, adjusting during the project as warranted (adaptive management), and engaging stakeholders and rights holders. Monitoring — a key element of follow-up (Arts 2022) — includes activities that may fall outside the scope of the follow-up program, such as regulatory compliance activities.

Follow-up programs are integral to determining (1) if effects occur as predicted and (2) if mitigation effectively avoids or reduces effects as expected. At the assessment stage, decisions are made on the best available information, implying that project outcomes hold some uncertainty (Aarts and Morrison-Saunders 2022, Fitzpatrick and Williams 2020 , Morrison-Saunders et al. 2021). Globally, there are indications that mitigation measures prescribed in effects assessments may not achieve their anticipated objectives (Sánchez and Gallardo 2005), and the objectives or intended outcomes for many are only vaguely stated or not stated at all (Tinker et al. 2005). The purpose of follow-up is to enable improvement of assessment, mitigation, and ultimately, risk minimization for future projects (Aarts and Morrison-Saunders 2022, (Fitzpatrick and Williams 2020), Government of Canada 2019).

Objective

This paper examines the requirement for and implementation of follow-up programs through case-study of selected major projects in the Canadian province of British Columbia (western Canada temperate and coastal mountain) and the territory of Nunavut (northeastern Arctic Canada). Using a review of publicly accessible information and 'scorecard' approach, we provide a systematic account

of the number of projects that commit to follow-up programs and a select review of how follow-up is implemented through case study of projects representative of differing jurisdictions.

Regulatory Context

Canada has separate federal, provincial, and territorial statutes and relevant regulations. The Federal *Impact Assessment Act — IAA* (Government of Canada 2019) makes follow-up programs mandatory in impact assessments and the development of approved projects. There are various regulatory statutes in provincial jurisdictions that require review of projects, and a project reviewed under provincial legislation may or may not be designated under the IAA.

The *British Columbia Environmental Assessment Act — EAA* (2018) requires an effects assessment. "Follow-up" is not mandated by law using that specific definition/terminology but is partly addressed in required project commitments within monitoring and management plans. An application undergoes review by a technical advisory group and if the Project successfully receives approval in the form of an Environmental Assessment Certificate (EAC), there are legally binding conditions. Permitting processes coincide or occur after a certificate is issued and result in additional required conditions. Since formal review by the Auditor General (OAGBC 2011), the BC Environmental Assessment Office has implemented policy resulting in EAC conditions being written with increased clarity, measurability, accountability, and with increased frequency of inspections.

The IAA does not apply to the territorial jurisdictions in Canada. Nunavut Impact Review Board (NIRB) has authority through Canada's Nunavut Agreement and has always required approved projects to have follow-up monitoring. The NIRB plays a review role during the Life of the Project, from project proposal to project approval (and associated terms and conditions) and ultimately monitoring and reporting. While the proponent often takes corrective actions as results show unexpected adverse effects, the NIRB can enforce project conditions to ensure that project monitoring and effects are within acceptable limits. Similarly, the EAO and IAA have compliance teams that inspect and enforce project conditions.

Investigative Approach

Our approach focused on two levels of analysis. First, we conducted a keyword search within the Assessment Reports, Decision Statements, and Certificates of approved projects to determine how often follow-up is a legally binding project commitment. Next, we used a selected case study to examine how follow-up is implemented compared to best practices. All information that we reviewed was from publicly accessible sources. No proprietary or information that EDI would have knowledge of due to contractual work on these projects was used during our review.

We selected all projects that were approved under the BC EAA or NIRB in the last 20 years. We then used the BC Environmental Assessment Office (BCEAO), NIRB, and Impact Assessment Agency of Canada (IAAC) public project registries to search project approvals and their attached schedules (i.e. the lists of conditions). The keywords, "follow-up", "monitoring", and "adaptive management" were searched to determine the proportion of projects that have follow-up as part of their legally binding conditions.

Through case-study, we reviewed three projects (two in BC and one in Nunavut) authorized from 2016 – 2018 that were in the construction or operation phase. We evaluated follow-up programs

within these projects against five questions that encompass the best management practices in Aarts and Morrison-Saunders (2022), Fitzpatrick and Williams (2020) and Morrison-Saunders *et al.* (2021), as follows:

1. Was the follow-up plan designed and planned early in the IA process and followed through?
2. Was it implemented?
3. Was it publicly accessible?
4. Was it well-defined and enforceable?
5. Did it promote learning and adaptive management?

Selected projects were not comprehensively analyzed but scanned for keywords in the conditions and the monitoring reports. Results were constrained by ease of availability and accessibility of data. Given that accessibility of data is a factor related to effectiveness of follow-up, potential inconsistencies or gaps in sourcing information would be inherently reflected in the scoring.

Results

Keyword Search

We reviewed 40 projects that were approved under the BC *Environmental Assessment Act* and five that were approved by the Nunavut Impact Review Board (NIRB). Table 1 shows the results for the 45 projects summarized by the type of legislation they were approved under. The projects were approved between August 20, 2007 and October 10, 2023. Of the projects that were approved under the BC *Environmental Assessment Act*, 17 were designated and approved under Canada's federal legislation. Notably, all the projects under NIRB committed to follow-up programs, monitoring, and adaptive management. Most projects approved under both BC and federal legislation had evidence of follow-up commitments, and a majority of projects approved under BC legislation only lacked specific follow-up commitments.

Table 1. Keyword search in projects approved under BC Environmental Assessment Act and Nunavut Impact Review Board (NIRB).

Legislation	Total number of projects	Contained "Follow-up"	Contained "Monitoring"	Contained "Adaptive Management"
BC and Canada	17	88%	100%	88%
BC only	23	30%	100%	83%
NIRB	5	100%	100%	100%
Total	45	60%	100%	87%

Case Study

Results of the scorecard analysis are summarized in Table 2. We selected one project in each jurisdiction (Nunavut and BC) for selected case study:

1. Baffinland: Mary River Iron Ore Mine — Nunavut
2. Site C Clean Energy Hydroelectric dam — British Columbia

Table 2. Follow-up scoring against best practices.

Project Name	Jurisdiction	Designed /Planned	Implemented (Y/N)	Publicly Accessible (Y/N)	Well-defined, Enforceable	Promotes Learning
Mary River	NU	Referenced - Clear Plan	Yes	Yes	Clearly Defined	Good
BC Hydro Site-C	BC	Referenced - Clear Plan	Yes	Yes	Clearly Defined	Good

1. Baffinland: Mary River Iron Ore Mine (Nunavut)

This project refers to a 6 Mtpa iron ore mine located in the Canadian High Arctic on the lands and waters of the Qikiqtani Inuit. The Environmental Assessment Certificate (EAC) was issued in 2012 which outlines many terms and commitments [regarding ongoing effects monitoring, mitigations, and adaptive management]. Numerous project-specific follow-up and effects monitoring plans have been actions across multiple disciplines including marine mammal response to shipping, risk of invasive species introduction, caribou response to disturbance (to name just a few) each with defined schedules and reporting requirement. Although there is some redundancy/overlap among some management (e.g. "Caribou Protection Plan" that is distinct from the broader "Wildlife Protection Plan") these tools are intended to address changing Project needs. Plans published by the proponent are publicly accessible (https://www.baffinland.com/media-centre/document-portal/); annual reports are available through government registries and online inventories. In terms of accountability, there are schedules and requirements specific to meeting project terms and conditions. Findings are reported to and within specific Working Groups used as 'sounding-boards' for discussion on adaptive management and program improvements, including ancillary investigations and pilot studies. Although there has been difficulty in achieving consensus and/or shared understanding for certain topics, the Working Groups have been successful forums for improving/enhancing data capture and verifying monitoring assumptions — and facilitating dialogue between Working Group members. More recently, revised terms of reference have shifted the role of the working group towards Oversight Committees which will have authority to impose enforceable commitments.

2. Site C Clean Energy (Hydroelectric Dam)

The Environmental Assessment Certificate (EAC) was issued in October 2014 under the BC Environmental Assessment Act (Government of British Columbia) and was designated under CEAA 2012. The project is in the construction phase. Documentation (dating back to August 2011) is available on EPIC. An independent Environmental Monitor (IEM) was appointed prior to construction and the requirement for several different detailed Management Plans was listed. A total of 77 detailed conditions were committed to within the EAC and covered a wide range of mitigation measures. Detailed and specific inspections by EAO Compliance and Enforcement have been undertaken, though the results of monitoring are not publicly available.

Follow-up programs were listed in EAC Schedule B, some of which only come into effect in operational phase. Follow-up reports are based on various plans as required by the EAC Schedule B that are written to be defined and describe requirements. They are available on EPIC. There is a comprehensive library of reports published on BC Hydro's website, including mitigation and monitoring plans, and annual reports.

REFLECTIONS ON IMPROVING FOLLOW-UP

The process of follow-up has improved over the years with more clear, well-defined, and enforceable conditions being written into Environmental Assessment Certificates. The following are opportunities for additional improvements.

1. 'Be Transparent'— There is no requirement for results of monitoring to be made public in all cases. Making documents publicly available improves public perception and trust in the assessment process. Making documents available for all practicing professionals facilitates veritable opportunities for project learning and improved future practice.
2. 'Keep it simple' — Large, complex projects often require many/multifold plans and programs. This increases the potential for redundancy and excessively complex (potentially contradictory) pathways/objectives. To the extent practical, it is critical to identify and (if/where possible) consolidate shared program themes and objectives. Concordance of program objectives can streamline follow-up.
3. 'Define Thresholds and Response Planning' — Trigger-Action Response Plans (TARP) are gaining momentum as a structured approach for data assessment paired with pre-determined responses that are scaled to the level of risk. Development of a TARP applies risk management principles to identify pre-defined responses applied when measurable threshold are met. A framework has been issued in some jurisdictions (cf. Development and Use of Trigger Response Plan; BC Ministry of Environment and Climate Change Strategy 2022)
4. 'Track Your Commitments' — The final recommendation on follow-up refers to active ongoing tracking of project commitments in relation to monitoring outcomes and follow-up activities. Consistent with Items #1-3, project accounting is critical to verifying assumptions/trends, tallying project performance and supporting transparency.

A common thread is to streamline the follow-up process to make it more holistic, implementable, and accessible. Wherever possible, related and overlapping themes should be combined; components should use measurable variables as thresholds and data outputs. Clear and accessible data outputs is essential for continuous improvement and public confidence in the regulatory processes.

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Generating Wellbeing is a Must, Not an Option

The design, execution, and operation of infrastructure projects in Colombia are deeply influenced by the country's socio economic complexity. This complexity is characterized by state neglect in various regions, high levels of poverty, significant gaps between urban centers and rural areas in terms of access and development opportunities, limited social investment, and the presence of armed conflict with territorial control by illegal groups. This situation causes the mere arrival of a project promoter to trigger tensions and various interests seeking benefits not previously envisioned. Additionally, the active presence of environmental advocacy groups, which perceive projects as threats and opt for radical opposition, adds another layer of complexity.

Given this situation, the question arises: How can projects be developed that generate well-being for society and gain local acceptance? To address this issue, in Colombia, from the preparation of Environmental and Social Impact Assessments (EIAS), this concern permeates socio-environmental activities. Moreover, the creation of solid baselines faces the challenge of lacking official information, which is often outdated and without political will for its update. It is crucial to have current information to show that socio-environmental investments, both voluntary and mandatory, generate returns and well-being for the communities and stakeholders in the area of influence.

In Colombia, it is imperative for projects to demonstrate that, in addition to controlling impacts, they generate real benefits and opportunities for the population in the area of influence. This obligation involves conducting an economic environmental evaluation, whose main objective is to show that benefits are generated for society.

The Environmental Authority in Colombia recognizes three types of investments as benefits: i) productive linkages, which involve the inclusion of local goods and services required for the project's execution, ii) local employment of unskilled labor, crucial in a context where income generation opportunities are limited, and iii) voluntary socio-environmental investments in the area of influence.

Productive linkages are ideal but face significant barriers, from the legalization and formalization of services to the requirement of quality standards, which are challenging for small-scale economic initiatives. Therefore, at the beginning of projects, expectations and the number of interested parties may be high, but as processes advance, beneficiaries decrease without a strong commitment from promoters to provide constant and permanent support.

Local employment generation, although representing tangible improvements in quality of life, also poses significant challenges. These include the loss of access to the subsidized social security system when having an employer, and the difficulty of returning to the subsidized system if job offers are short-term. Additionally, the involvement of unskilled labor in projects can displace the workforce needed for local agricultural activities, generating community opposition.

Voluntary socio-environmental investments are almost essential for projects to obtain social license, meaning acceptance from stakeholders. Promoters must offer win-win schemes, not only for society in general but with real opportunities for communities in the area of influence. These investments

must be planned and executed with systematic monitoring to demonstrate their return and avoid being perceived as ad-hoc contributions with no significant impact.

Therefore, to develop projects that generate well-being and gain local acceptance, it is crucial to make early investments, even before obtaining environmental permits, to build solid relationships with stakeholders. However, these voluntary investments are not recognized by the Environmental Authority and do not necessarily address needs identified in a baseline, leading to lost opportunities for economic environmental analysis.

Consultancy efforts have focused on ensuring that EIAS are objective, solid, and reliable, and on proposing positive impacts and benefits as a viable discussion with the Environmental Authority. This requires promoters to make strategic socio-environmental investments that demonstrate net benefits for society.

In conclusion, social license, economic environmental evaluation, and the benefits a project can generate beyond impact control represent a significant opportunity. The economic environmental evaluation should be valued and recognized as an integral part of the Environmental Impact Assessment and not just as a final conclusion to determine project feasibility.

Social Inclusivity for Climate Adaptive Approaches for Climate Justice

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Abstract

The impact of climate change has forced the social groups to think for climate adaptation. The uncertain rain patterns have really caused problems for the agrarian societies heavily dependent on rain water. The agriculture sector and the agrarian societies have been facing issues of livelihood, right to food, right to water due to either heavy flood or water scarcity in countries like India. India has already set its goals for achieving climate justice through many policy initiatives and adopting sustainable lifestyle approaches. But looking to the glorious past of India, it cannot be denied that various social groups and indigenous communities have always played remarkable roles in preserving eco-friendly approaches. The present research paper evaluates the scope for social inclusivity and its impacts on strategic planning for climate adaptive approaches particularly based on some selected case studies from India. The paper analyses the impacts of such practices in achieving climate justice. The present paper follows mixed methods of empirical and doctrinal methods. The research conclusion helps in understanding the best practices adopted by some social groups and their impacts. It also tries to analyse how these best practices can be adopted on larger scale.

Research Methodology

The present research has followed mixed method of doctrinal and empirical study approach. Certain case studies of women Self-Help Groups, working through smart agriculture practices, have been carried out through case studies from Gujarat have been carried out through empirical methods and doctrinal analysis of Decan Development Society in Telangana. The empirical method has been adopted for the case studies of tribal women's self-help groups of Aravalli district of Gujarat.

Introduction

Climate Change has largely affected the socio-economic conditions of the human populations across the world. The impact of climate change is largely disproportionate across the globe. India having its tropical weather conditions could witness the severe impacts of the climatic conditions on its social life. In recent pasts, there is increased trend of cyclones and floods resulting into huge economic loss and social disturbance in India. The uncertain rain pattern causing extreme situations of floods or draughts, extreme heat or cold, have largely affected the human population across the country. With huge population, pressure on the limited land and water resources has made the situation worse in majority parts of India. An analysis by the Council on Energy, Environment and Water (CEEW) suggests that three out of four districts in India are extreme event hotspots, with 40 per cent of the districts exhibiting a swapping trend, i.e., traditionally flood-prone areas are witnessing more frequent and intense droughts

and vice-versa. [1]. The climate vulnerabilities of certain agricultural dependent communities are much higher in comparison to urban communities. For example, the tribal communities in India are heavily dependent on agriculture sector for their livelihood and they are more vulnerable to impacts of climate change. The present paper had analysed four case studies of such tribal communities and their initiatives to tackle impacts of climate change through climate adaptations. The study analyses the impacts of the smart agricultural practices adopted by some tribal women groups in combating climate change. The present paper has been divided into 5 parts

I Need for Social Inclusivity to Secure Climate Justice

Social inclusion is defined as the process of improving the terms of participation in society, particularly for people who are disadvantaged, through enhancing opportunities, access to resources, voice and respect for rights.[2] In reference to the present research, the focus is on the inclusion of the tribal women in adapting and mitigating climate change. In the tribal family set up, women play pivotal role in supporting the family and helping in agriculture. The house hold work, taking care of children and helping family through labour work in agriculture is very normal in Indian tribal households. Moreover, the impacts of climate change largely increase the burden on the women in the family for example in managing house hold affairs with minimum income, water and food management etc. The inclusion of women in climate change adaptation and mitigation is sine quo non. Especially inclusion of tribal women in this process can bring remarkable positive results. The National Action Plan on Climate Change (NAPCC) 2008 in India, also recognises that the impact of climate change is different on men and women due to gender relations, roles.[3] This indicates that the inclusion of women in climate change discourse is very crucial. Their role is pivotal in decision making process related to the climate change adaptations, mitigations and resilience. The next part of the paper studies the selected groups wherein inclusion of women has played pivotal role in developing climate adaptations through smart agricultural practices. These women groups have adopted the smart agricultural practices for growing millets of growing millets All the groups consist of tribal women. The Deccan Development Society is registered society with women members and now working on large scale. Some self- help groups in Orissa are also active. In Gujarat, the tribal women have started growing turmeric and millets through various government schemes in the district of Aravalli.

II The Deccan Development Society [DDS]

This society was established in 1983 Pastapur village, Sangareddy District of State Telangana which works with Sanghams (village level groups) of women mainly poor and dalits. Initially it was established to fight with the challenges of semi-arid environment, dry land with limited

[1] https://www.ceew.in/publications/mapping-climate-change-vulnerability-index-of-india-a-district-level-assessment

[2] https://www.un.org/esa/socdev/rwss/2016/chapter1.pdf page 17.

[3] Sara Ahmed, Elizabeth Fajber, *Gender and Development*, Vol. 17, No. 1, Climate changes and climate justice (March 2009), pp. 33-50 (18 pages) available at https://www.jstor.org/stable/27809205

water source. At present it has 5000 women members and spread over 75 villages. They started millet-based agriculture practices and farming and present running gene banks. Through these initiatives, they combat the issue of climate change and problems of mal nutrition. Gradually it has evolved into a programme which has three guiding principles: gender justice, environmental-soundness and people's knowledge.[4] At present they have been taking various initiatives and provide inputs in the policy making at the national and international levels. They have community grain fund, community green fund, community gene fund and collective cultivation through land lease etc. The DDS has contributed in environment and livelihood sustainability along with empowering Dalits and poor women. It has remarkably accelerated the socio-economic growth of these women. Simultaneously, it has boosted the millet farming and economic independence of this Dalit women. The members practised ecological farming with crop varieties of more than10. It also provides platforms to the women to demonstrate and share their knowledge of greens.

Crop Diversity

Women in Farm

Figure: 2
Source: http://www.ddsindia.com/www/default.asp

III Self-Help Groups in Orissa

The women led Self Help Groups in Orissa have also played remarkable role in securing climate resilience. The Government of Orissa launched Orissa Mission Millet Programme in 2017 for promotion of millets in tribal areas. Initially the Mission was started in 7 districts in 2017 but due to positive response, it was expanded to 19 districts. Currently, Odisha has emerged as one of the forerunners of millets, ensuring the participation of women Self-Help Groups (SHGs) in the millet value chain where they are playing a leading role in processing, value addition, and marketing. The initiative not only empowers women entrepreneurs but also promotes the consumption of millets, contributing to a healthier lifestyle in the state.[5] The new initiatives of opening Millet Shakti Café' at Lok Seva Bhawan in the Khorda district of Bhubaneswar and Kalinga Stadium in Bhubaneswar with the government's support and outlet with the help of Government have been remarkably grown.

[4] http://www.ddsindia.com/www/default.asp
[5] https://www.downtoearth.org.in/blog/agriculture/women-shgs-in-odisha-champion-push-for-millets-90913

IV Self Help Groups in Gujarat

Government of Gujarat has launched Mission Mangalam in 2010. The aim is to eliminate poverty and empowering rural women. Through this mission rural poor women are organised into Sakhi Mandals i.e self-help groups to earn their livelihood. These Sakhi Mandals are linked to banks for financial assistance and to skill development agencies and industry associates for skill development and market information respectively. Separate officials are also appointed to help implementation of the scheme of Mission Mangalam. In Aravalli districts total eleven such self-help groups in Meghraj Taluka of Aravalli districts were interviewed which specifically work on climate adaptive agriculture. Out of these eleven groups one has been earning through production of turmeric and red chilli and powder made from the same.

Source: Dry arid farming land of Aravalli district, Gujarat

V Impacts of Social Inclusivity in Climate Adaptive Practices and Securing Climate Justice

As per IPCC's sixth assessment report[6] "Indigenous Peoples have been faced with adaptation challenges for centuries and have developed strategies for resilience in changing environments that can enrich and strengthen current and future adaptation efforts. Valuing Indigenous knowledge and Local knowledge is also important for recognition, a key component of climate justice." Climate justice rests of three principles distributive justice, procedural justice and recognition. Distributive justice refers to allocation of burdens and benefits among individuals, nations and generations.[7] The procedural justice emphasises participation in decision making process. The climate vulnerabilities have reduced. Recognition entails basic respect and robust engagement with and fair consideration of diverse cultures and perspectives[8].

The present case studies of Aravalli districts reveals that the impact of climate change is varied in nature from water availability to crop production and temperature rise. Cumulative impact of all these changes is observed on the culture, lifestyle and economic conditions of the tribal groups during the study. The local government's initiative to provide financial support to self-help groups of women, providing them training and make them participate in the decision-

[6] https://www.ipcc.ch/report/ar6/wg2/chapter/chapter-1/#1.3
[7] *Ibid*
[8] Ibid

making process by playing lead role in their family's economic conditions, has helped in securing procedural justice.

The study of these Self-Help Groups leads to following observations:

The Women members of Self-Help Groups under study have knowledge about the less water intensive crops (Millets), their health benefits, and high potential in small holding of farms. They have wise planning of livelihood earning through the same. The impact of the inclusion of tribal women through this Self-Help Groups have also helped in reducing poverty in their families.

The poverty is reduced due to shift in the source of livelihood from labour work to smart agriculture practices on small land holding, providing maximum crop output and thus securing consistent source of income. The problems due to climate vulnerability on socio economic conditions has been reduced. The housing facilities, agriculture output and education of children have been improved. They could afford better health facilities, nutritious food and felt self-reliant without any social and economic pressure. It shows that these Self-Help Groups have been successful in securing climate justice to their lives and families.

Their regular meetings have strengthened the knowledge sharing of the members' experience. They lean good practices from each other and work collectively. Thus, the meetings have helped them to learn more about climate adaptive agricultural practices. The arid land of Aravalli district with reduced rain fall makes the land unfit for paddy or wheat production. Their experience taught these women farmers to adapt farming of less water intensive crops. This has helped them to save available little ground water for their daily needs instead of large usage of it in irrigation. Their economic conditions have improved amidst the deteriorating climatic conditions. Some of the pictures below captured in the Month of April, 2024 reveals extreme climatic conditions in the area. The health and nutrition of the entire family have improved as the women are home managers and take care of providing nutritious food to the family members. They could afford healthy food due to their economic enhancement. They take utmost care of protecting quality of seeds to sustain healthy food.

They share their knowledge through stories among the other tribal women and motivate them to choose organic farming methods for millet crops. In the entire Meghraj Area, there is increase of millet farming which has in fact help them to get relief from changing climatic conditions and their impacts on crop production.

1. They have started preparing various dishes from millets for which the demand is very high in urban areas.
2. The overall health of all families has improved
3. They have started investing in educating the children.
4. The women have shifted to digitization due to purchase of smart phones due to their better financial conditions. Which ultimately help them to connect to Krishi Vigyan Kendra and its farming knowledge sharing programmes.
5. The increase in family income has resulted into purchase of new cattle and business of animal husbandry. The milk cooperatives have also increased in this area. The women have been earning through animal husbandry and milk cooperatives also.
6. They have become self-sufficient in organic fertilizers due to this animal husbandry initiatives. The labour migration has stopped.

Overall financial stability has been achieved through this climate adaptive farming approaches. This has ultimately secured climate justice to these vulnerable families.

Committing to Net Gain in the Colombian High Mountain Ecosystems: Raising the Bar

IA has been key in determining the effects on biodiversity due to projects and its activities. Implementing further efforts in local characterization, tailored and measured ecosystem variables and computer modeling have paid off in understanding biodiversity in the territories. Results are encouraging, using multi-temporal ecological integrity analysis as one of the biodiversity measurements, the territory speaks for itself and shows consultants and promoters where strategic efforts, management plan implementation and investment will not only balance negative effects but have a net positive outcome. Extensive connectivity and fragmentation modeling, as well as analysis of ecological integrity in the Colombian high mountain andean ecosystems provide meaningful information for committing to biodiversity net gain.

General Discussion

Colombia's geography offers the country the opportunity to be one of the most biodiverse countries in the world. Unique and diverse ecosystems cover its territory, of special interest due to the wide range of ecosystem services they provide, high-mountain ecosystems have attracted attention in the last decades. However the remainder is exposed to anthropic activities that threaten their conservation. Within this type of ecosystem the “Paramo” ecosystem is of most interest, as it is considered a “water factory”, thus the source of water for millions across the country. Located in altitudes nearing 3000 m.a.s.l and ranging up to 3.600 m.a.s.l they cover over 1.900 ha, out of which a third is protected under National Parks (1).

Agriculture, cattle grazing, uncontrolled tourism, infrastructure and mining are some of the socio-economic activities that pressure these ecosystems. While most activities do not require special permits or licensing, infrastructure and mining projects do and must comply with rigorous studies and impact assessment (IA) that demonstrate no impact, when there is an impact a compensation or off-set plan must be presented for approval. The plan must comply with the “Biotic Compensation Manual” which is a tool that makes part of Colombia's Biodiversity and Ecosystem Services Integrated Management Policy (PNGIBSE) and helps project promoters and environmental authorities quantify impacts on ecosystem, where to apply the off-set plan and finally how to apply the plan (2). While the tool has served its purpose to prevent impacts and effectively manage mandatory compensation plans, today´s needs and interest demand net gain and not just off-sets that compensate project or activity impacts (no-net loss).

Consultancy related to IA in Colombia has acquired extensive experience related to biodiversity off-set plans, specifically in high-mountain ecosystems, mainly due to the need to build infrastructure related to main urban areas or where resources are available. Local authorities, communities and stakeholders plea for conservation of the surrounding ecosystem, even though they are currently under pressure and have historically suffered uncontrolled intervention. The need to demonstrate that projects not only compensate for their impacts but guarantee a net gain is imperative specially for locals, environmental authorities and conservation policies.

Detailed studies using ecosystem integrity indices overproject or activity area of influence (and beyond) have demonstrated useful to evaluate project impacts, off-set plan and maximize effectiveness of the latest towards biodiversity net gain.

Case Study

Over the last decades different tools, concepts and approaches have been used to measure biodiversity. While there is no specific and unified methodology several concepts have been applied worldwide. As the consultancy and IA demand detailed studies that surpass the area of influence of activities and projects, a consistent methodology to measure biodiversity, quantify impacts and predict biodiversity net gain has been developed and applied in development of environmental and social impact assessment studies in Colombia.

The methodology relies on the EII (Ecological Integrity Index) calculated by overlapping ecosystem conditions and characteristics over a wide area or territory, usually one that surpasses the area of influence of a project or activity.

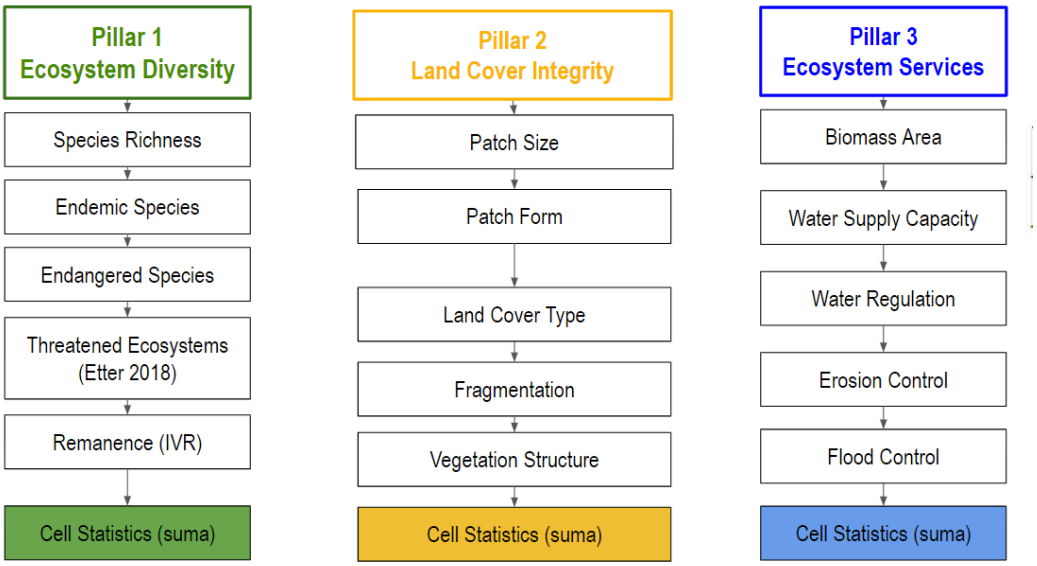


Figure 1. Ecological Integrity Index
INGETEC. 2024

Adopting biodiversity and ecosystem services concepts used worldwide, 15 attributes are arranged within three biodiversity pillars: Ecosystem Diversity Attributes, Land Cover Attributes and Ecosystem Services Attributes.

According to the conditions and characteristics of each attribute a number between 1 to 5 is assigned to each attribute within a cell. Using GIS (Geographic Information Systems) attributes under a pillar are added; the three pillars are then added resulting in an overall value to determine the Ecological Integrity Index (EII). Even though implementing the methodology requires a considerable amount of effort and resources to obtain an adequate and detailed baseline, using the EII has proven feasible and appropriate. It offers a standardized, repliocable and quantifiable means to compare results over different site conditions, time (past, present and

future) and alternatives for implementation of off-set plans. The same methodology has been applied over the national territory with consistent results.

Analyzed over different scenarios, Ecological Integrity Index is a useful tool to determine impacts caused by a project, quickly compare impacts of alternatives for a project or activity, compare alternatives for off-set implementation, determine historical effects of activities in the territory among others.

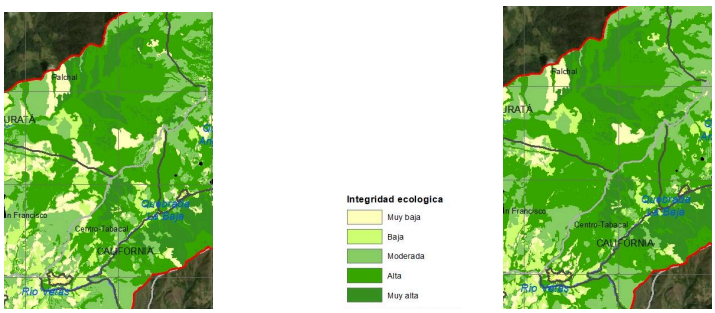
Four scenarios are considered mandatory for a particular project (3), however additional scenarios can be helpful:

a. Past scenario: using historical data, aerial or satellite images, and historical biodiversity related monitoring, past scenarios can be considered into the overall ecosystem analysis. This scenario is useful to obtain changes or tendencies in the territory prior to any project activity
b. Present Scenario: considered as the baseline scenario it is usually the scenario that has the most information and one that allows project promoters in evalauating project design alternatives. This is considered base scenario for analyzing project impacts
c. Project Scenario: this scenario takes into account the most critical activities, project footprint and operations activities. It can be subdivided into scenarios related to the construction, operation and closure phases of the project. These scenarios determine project impacts, magnitude and aid in determining area of influence
d. Post Project Scenario (post-closure): this scenario is predictive and is considered of importance since it is the base scenario to determine the effectiveness of the project compensation or offset plan. It considers all project activities finished and off-set plan has been implemented. When compared to the baseline scenario it becomes the key to determining plan effectiveness and if such a plan will result in Biodiversity Net Gain (BNG).

Implementing other intermediate scenarios aid in impact assessment and formulation of off-set plans. Scenarios related to compensation plan progress while the project is still active in any phase or scenarios that study the positive (or negative) effects of conservation measures or activities can prove useful.

Figure 2 illustrates sections of maps resulting from the results of an EII analysis developed for a capital investment project in high mountain ecosystem territory and neighboring “páramo” ecosystem. The corresponding Environmental Impact Assessment Study supplemented the EII analysis with detailed studies related to fragmentation, connectivity, critical habitat and extensive fauna and flora monitoring.

The two extracts allow for the comparison between two modeling scenarios: Scenario B - project implementation with no off-set and Scenario D - project implementation with off-set. Results show and increase in EII in project neighboring areas, however and most important, EII increase in key and strategic fauna conenctivity corridors. The analysis and comparison between scenarios demonstrate that off-set, strategically located, increase ecosystem health and increase mobility of species along high-mountain ecosystems neighboring project implementation sites.



Scenario B- EII no off-sets Scenario D- EII with Off-sets

Figure 2. EII Map Extracts - Comparison Between Scenarios
INGETEC. 2024

After considering several scenarios, the use of EII proved to be useful in:

- Determining how past and current socio-economic activities have exercised high pressure on high mountain ecosystems over the last decades
- Impact prevention by early identification of biodiversity strategic areas and avoiding activities in such areas
- Determining and spatializing impacts on project neighboring ecosystems
- Assisting in selecting optimum location for conservation and compensation activities and creating a wide portfolio of areas in case specific sites were not available
- Identifying most sensitive and critical areas either to prevent or minimize project related activities or maximize and focalize conservation efforts

As a supplement to Ecological Integrity Index analysis, studies can be coupled with fragmentation and functional connectivity studies. By selecting representative “umbrella” local species and analyzing critical habitats and mobility corridors over EII results for different scenarios, it can be demonstrated that there is a direct correlation between increased EII and connectivity of species.

Applied over a wide range of projects in Colombia's geographical territory and over a wide range activities and projects (highways, power substations, renewable energy generation, power transmission lines, mining, among others) the Methodology for Modeling Ecological Integrity Index for Biodiversity has been used to demonstrate off-set effectiveness as well as Biodiversity Net Gain (BNG). Besides, it has also proven to be an important supplement to connectivity, fragmentation and compensation analysis to determine impacts and effectiveness of biodiversity conservation activities.

Conclusions

Measuring biodiversity is one of the challenges when demonstrating Biodiversity Net Gain (BNG), while there is no unique and sole methodology for calculating biodiversity, different concepts are commonly applied and referenced as a way to qualify and quantify biodiversity in a given area or territory.

Applied over a diverse set of types of projects, activities and territories in Colombia (including high-mountain ecosystems), the consultancy has adopted a process and methodology (based on measuring EII - Ecological Integrity Index) that allows measuring biodiversity under different scenarios and predicting results related to off-set and other conservation measures applied in a territory. Results gathered from different studies consistently demonstrate that using EII as a basis for measuring biodiversity provides an opportunity, among others, to predict BNG when selecting off-set location strategically.

Applied case studies uncover other benefits of using EII as a measure of biodiversity:

- Effects on biodiversity from project activities can be predicted
- If involved in the project decision phase, designers can be alerted as to better alternatives for location of project related infrastructure (mitigation hierarchy)
- Selection of sites for conservation measures can be more effective, as comparative simulations can be implemented for different alternate sites
- Off-set implementation can be studied and predicted over time, sites with the best effectiveness can be prioritized
- The methodology allows for “calibration” of models over time with real data once the project reaches its implementation stage and conservation strategies are implemented
- Prediction of BNG can be better supported and can be demonstrated over time

Overall EII (as described previously) incorporates and integrates diverse attributes related to biodiversity and can be considered as an index that can be used as a method for comparison of different scenarios. It is replicable over time, can be applied over different types of projects and in practically any territory.

For project promoters, the methodology and process described previously, provide a basis for committing to off-set implementation and better securing effectiveness and value for their investment. When analysis as those described are included in IA, results can be used to demonstrate to authorities, stakeholders and other decision makers impact extent as off-set and conservation activities effectiveness.

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DUBLIN DECLARATION ON FAIR AND EQUITABLE LAND ACCESS

We, the authors and supporters of the '*Dublin Declaration on Fair and Equitable Land Access*' and the participants in a special session on Development-Forced Displacement and Resettlement at the 43rd annual conference of the International Association for Impact Assessment, which was held in Dublin, Ireland, 24-27 April 2024, RECOGNISE that:

1. **Development strategies around the globe continue to exploit land[1] and other resources rapidly,** securing land access through market transactions, expropriation, acquisition of access rights, resumption, negotiated settlements, or by imposing restrictions on land use. This leads to escalating development-forced displacement and resettlement (DFDR). Cumulatively, projects to address emerging anthropogenic climate change are also escalating climate change displacement and resettlement (CCDR).

2. There is consensus among academics and practitioners that **DFDR resulting from projects** such as dams, extractives, transport, urban infrastructure, ports, special economic zones, agribusiness, solar and wind power, conservation, and climate change adaptation and mitigation, **is impoverishing millions of people each year**.

3. Whether for public or private sector projects, current approaches to secure project land access pose risks of **human rights violations and impoverishment**. The risks arise whatever the legal status of the affected person in relation to the land; and whether for urban or rural losses, temporary or permanent losses, partial or complete losses or losses of jobs, income, and business for affected enterprises. The losses might include: lost housing, income and livelihoods; lost sources of food, water, and essential resources; lost opportunities for education, healthcare, services, and jobs; lost cultural, social, economic, and political assets and rights; lost knowledge and practices; and loss of freedom of movement and even of life. These losses may impact people differently depending on age, gender, and other social characteristics. Affected people are those who experience such losses, together with similarly impacted people who host them in their new location.

4. **Current international standards which govern DFDR promote techno-managerial approaches** which assume that, with the right expertise and financing in place to develop resettlement and livelihood plans, in consultation with affected people, resettlement can have positive outcomes. One variant, 'Resettlement with Development', requires improved livelihoods and living standards, utilizing additional resources and benefit-sharing to promote

[1] The term 'land' includes all areas of land and water.

development opportunity. However, the evidence presented by proponents of these approaches demonstrates that there have been few successful cases of resettlement and many negative examples.

5. **People's movements and human rights organizations have periodically called for a moratorium on DFDR** pointing, among others, to the numerous human rights violations that result. They advocate a 'Development without Displacement' approach.

6. Recently, a group of DFDR scholars called for an **end to displacement and a fundamental rethink of development itself**, asserting that, only when displacement is no longer an option, will context-specific, human scale alternatives emerge. They labelled as myths the claims that, in the current context, displacement is inevitable for development, that resettlement can bring development to displaced people, that resettlement can be voluntary and consensual, that people can meaningfully participate in resettlement and rehabilitation planning, and that resettlement can be successful if 'best practices' are followed.

7. **Human rights principles, country legal frameworks, and the resettlement policies** of international lenders that relate to project land access **are beginning to converge**, but currently still do not adequately align; and their implementation in projects is often weak.

8. In projects seeking to secure land access, **human rights may not constitute enforceable legal rights,** be legally established, or be adequately protected in the lender policies that are imposed on borrowers for specific lender-financed projects.

9. **Current development strategies generally put developer interests and priorities above those of affected people**.

10. **Current approaches to securing project land access are disempowering, and they marginalise and impoverish affected people.** CCDR also risks incurring similar adverse impacts and outcomes. Both DFDR and CCDR are likely to lead to increasing inequality.

We, therefore, DECLARE that it is time to introduce a 'Fair and Equitable Land Access' (FELA) Approach by development projects as an alternative to DFDR. In FELA, project developers, lenders, and implementing agencies recognise, respect, and empower the people affected by development projects, centralising their agency, their decision-making role, and their enhanced wellbeing.

We RECOGNISE that all human rights principles apply to DFDR-affected people, before, during, and after their displacement. Among these, we recognise as being particularly salient the human rights principles expressed in the Universal Declaration on Human Rights (1948), the International Covenant on Civil and Political Rights (ICCPR) (1966), the International Covenant on Economic, Social and Cultural Rights (ICESCR) (1966), the United Nations Declaration of the Human Right to Development for All (1986), and the United Nations Declaration on the Rights of Indigenous Peoples (2007). The United Nations Declaration on the Right to Development for All establishes development as a right and puts people at the centre of the development process that enhances their wellbeing, in accordance with their values and interests, based on their active, free, and meaningful participation, the elimination of social injustice, and in the fair distribution of development benefits. The United Nations Guiding Principles on Business and Human Rights (UNGPs) recognize that private sector organizations also have duties to protect and respect the right of people affected by projects, and to remedy any negative impacts.

We DECLARE that Fair and Equitable Land Access must be implemented in such a way that the six core principles set out below, together with their associated key recommendations, are adequately addressed.

Principle 1: Recognize the rights, knowledge, and agency of affected people, and their right to enhanced wellbeing.

- **Recommendation 1**: Grant recognitional justice to all affected groups by acknowledging and granting them their rights, status, legitimacy, and respect in negotiating agreements relating to project land access.
- **Recommendation 2**: Recognize the rights of women and men of all ages and capacities to engage in culturally appropriate dialogues designed to enhance land access-related laws and regulations.
- **Recommendation 3**: Recognize the rights of affected women and men of all ages and capacities to engage in culturally appropriate and gender-sensitive dialogues designed to define their own objectives and strategies for enhanced wellbeing through economic, social, cultural, and political development. This includes the right to say no to development projects where they consider this is warranted, and the right to derive significant development benefits on their own terms in return for agreeing to a project.

Principle 2: Promote inclusive decision-making through a fair and transparent procedure from the outset and throughout the lifecycle of the project.

- **Recommendation 4**: Full and effective participation of all relevant actors in inclusive decision making is fundamental to a fair and transparent land access procedure prior to and throughout the project lifecycle. Affected women and men of all ages, capacities, and socio-economic identities must have the opportunity to engage and participate, with special consideration to children. All responsible entities, including developers and sponsoring agencies, must provide sufficient information, opportunity, financing, and resources to empower all affected people, commensurate with the level of project impacts, to enable them independently to represent their own interests, values, knowledge, and priorities in dialogue and negotiation regarding the project and their terms and conditions on which it may proceed.
- **Recommendation 5**: This support, before project approval, enables the affected people to review the project land access needs, options, and alternatives, including a 'no-project' option. Any project-affected Indigenous Peoples must be allowed to give or withhold their Free, Prior and Informed Consent. Dialogue procedures for Broad Community Support (greater than 80%) should be implemented for all affected communities.
- **Recommendation 6**: Throughout the project lifecycle, should it proceed, this support empowers the affected people to formulate their own development objectives for their enhanced future wellbeing; as well as to design appropriate and acceptable programs, including strategies, measures, mechanisms, processes, outcomes, indicators of success, and means of verification.

- **Recommendation 7**: Such support enables the affected people to negotiate legally binding contracts with project developers, including measures to avoid, minimize, and mitigate displacement impacts and to ensure communities achieve enhanced wellbeing and benefits, which are enforceable through access to independent arbitration and remediation.
- **Recommendation 8:** Lenders, governments, and projects must establish a policy of zero tolerance of any threats, intimidation, or violence against affected peoples, their representatives, and/or human rights defenders.
- **Recommendation 9**: The United Nations should consider establishing capacity that would focus on harmful DFDR and seek to raise standards for land access across all government and private sector agencies that implement projects involving planned resettlement.

Principle 3: Ensure a fair distribution of impacts and benefits and align with the Sustainable Development Goals.

- **Recommendation 10**: Before project approval is given, potentially affected people should have participated in identifying and weighing-up the distribution of all the anticipated economic, social, cultural, and political costs of resettlement against the distribution of likely project benefits. Understanding the full costs is essential to determine whether the project is appropriate, viable, has an adequate business case, and is in the broader public interest. Affected people should be part of the decision-making about projects that relate to these assessments.
- **Recommendation 11**: During project preparation and implementation, independent analysts, in consultation with affected people, must identify the structural and power constraints to equitable decision-making, achieving gender equity, and to the equitable distribution of the benefits from the resettlement process. Together, they should recommend supporting measures in cooperation with the affected people.
- **Recommendation 12**: The project should investigate and include project land access strategies that might be suggested by affected people that might maximise their land security and ownership status.
- **Recommendation 13:** Where there are serious livelihood impacts, the project must implement effective, sustainable livelihood enhancement measures for all affected people, regardless of their legal status in relation to the land. This requires feasibility studies to be undertaken to explore and justify all avoidance and mitigation measures with a clear theory of change based on expert opinion, benchmarking of similar projects, inter-generational equity principles, and community co-design.
- **Recommendation 14:** The project must investigate and, when requested by affected people, include benefit-sharing schemes for the affected people, in cash or in kind, while incorporating measures to limit poor investment decisions and financial dependency.
- **Recommendation 15:** Developers and appropriate government agencies must address any material, tangible losses as well as any immaterial, intangible losses of social, cultural, psychological, or political capital that are essential to attachments to place, sites, networks, knowledge, skills, heritage, language, or identity. Additionally, the agreed measures must be sufficient to counter the disruption of displacement, to enable the affected people to catch up and benefit from development as might their non-affected peers.
- **Recommendation 16**: Project staff should engage closely with affected people to focus on building flourishing communities centred around longer-term community perspectives on enhanced wellbeing, rather than only on short-term housing and compensation.

Principle 4: Ensure high standards of professionalism and planning and sufficient resources to improve the lives of affected people and their communities.

- **Recommendation 17**: Developers and governments should provide evidence that competent teams with social scientists exist to support a FELA process and have appropriate social expertise and field experience in community development, and skills such as gender equity, sustainable livelihood enhancement, innovative land access, benefit sharing strategies, cultural and heritage transformation, health and wellness, etc.
- **Recommendation 18**: Sufficient funds must be provided to enable a proper FELA planning process that can address all impacts, provide for agreed benefits, and for contingencies. Also, adequate resources must be provided so that affected people can access independent expertise. Sufficient funding must be available to address any necessary remedial action throughout the project cycle.
- **Recommendation 19**: The timeframe for planning, implementation and follow-up of FELA must be sufficient to allow affected people meaningful engagement and shared or devolved decision-making in options assessment, project planning, and negotiations on their preferred objectives, strategies, and outcomes. There must be sufficient time for implementation, verification, and remediation (which may take up to 10 years).

Principle 5: Address power differences and contextual factors.

- **Recommendation 20**: Project developers must consider potential socio-political impacts by conducting a political scan to identify the power brokers and to determine whether equitable negotiations with affected people can be undertaken. Steps must be taken to ensure that there is no corruption throughout the whole process.
- **Recommendation 21:** A project's environmental, social, cultural, political, and economic impacts may be categorized either as 'complicated problems' (i.e. can be resolved by good practice) or as 'wicked problems' (i.e. cannot be easily resolved). For wicked problems, a FELA process would recognize that linear, expert-led plan approaches will not work, and an inclusive, transdisciplinary approach will be required, including questioning whether the project itself is justified and appropriate.
- **Recommendation 22:** Project developers, together with local communities, must proactively assess contextual factors, and be prepared to reassess and potentially redesign or reconsider projects if these factors are found to be particularly hazardous for the affected people.

Principle 6: Ensure remedy and accountability through access to Grievance Redress Mechanisms, remediation, and legal recourse.

- **Recommendation 23:** Affected people and communities must have access to a choice of grievance redress mechanisms to provide effective remedy for project-induced harms, adverse impacts on their human rights, and non-compliance with commitments made by the developer in agreements.
- **Recommendation 24**: There must be multiple channels available to affected people and communities to access remedy, including: company-level grievance mechanisms for household-level, non-systematic grievances; independent fact-finding; mediation; and compliance and arbitration processes to enforce legal agreements between affected communities and project developers, and the environmental and social requirements in investment or procurement contracts. These non-judicial grievance mechanisms should not preclude access to justice through judicial or administrative action.
- **Recommendation 25:** Affected people and communities must be given access to independent lawyers to support them through any necessary contracting, mediation, arbitration, and other remedial processes.
- **Recommendation 26:** Shareholders, lenders, buyers and other business entities that enable the project must ensure accountability by establishing human rights grievance processes to give effect to their responsibilities under the United Nations Guiding Principles on Business and Human Rights. In addition to their responsibilities to enable or

contribute to remedy, these stakeholders must also institute material consequences for project developers that fail to prevent or promptly remedy adverse human rights impacts.

We RECOGNISE that implementing this Declaration may include:

- Further work with developers, lenders, NGOs, governments, international agencies, and communities, especially to implement the FELA approach.
- Refining, publicising, and seeking endorsements for the Declaration more widely.
- Allocating specific responsibilities for its implementation.
- Implementing the FELA Approach, as framed in this Declaration, in projects and identifying the lessons that can be learned.
- Advocating for governments, lenders, and companies to incorporate the FELA Approach in their laws, standards. and practices.
- Comparing this Declaration with alternative ways of proceeding, for example, Resettlement with Development, or a Moratorium on resettlement.
- Adapting this Declaration to be suitable to other forms of displacement and resettlement, for example, climate change displacement and resettlement (CCDR).

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Using AI for Review of Automated Remote Wildlife Camera Data

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Abstract: There is growing potential to collect large amounts of data using automated remote technologies during field-based programs. These data are used to analyze project-related effects and to establish baseline conditions upon which to compare future monitoring data. New opportunities for using AI in processing and analyzing arise often, yet effectively using, verifying, and ultimately integrating these techniques into effective workflows takes time and diligence.

As one example, we will present our successful experience in using object recognition AI in processing remote, automated wildlife imagery data. Object recognition was available in its early stages in 2008 to aid in photo tagging. The potential to use facial recognition in processing wildlife camera data was recognized, tested, and verified in the years that followed. Some of the challenges that were overcome to integrate this tool fully into the analysis workflow include inaccuracies, incomplete data processing, and potential for bias towards certain species or environmental conditions. Overcoming these challenges required a patient and cautious approach to reap the benefits of accurate and reliable data. Use of AI is a factor that allows automated data programs to increase in scale to obtain defensible, quantitative data analysis for effects assessment and monitoring, given the use of an effective study design.

1. Introduction

In recent decades, there has been an exponential growth in the advancement of technology incorporated into wildlife conservation efforts. From Unmanned Aerial Vehicles (UAVs) such as drones to camera traps, Acoustic Recoding Units (ARUs) and more, all of these have become standard tools in wildlife studies [1-2]. These technological innovations have immensely addressed various conservation needs and facilitated better insight and effective management of wildlife resources [3]. In fact, the recent increase in public and academic interest in preserving biodiversity has led to the growth of the field of conservation technology [4]. The term 'Conservation Technology' was first proposed by Berger-Tal in 2018 to broadly describe the use of technology to manage and conserve wildlife [5] which aims to increase accessibility to tools and modern technology to address conservation problems in entirely new ways [4].

Accurate detection of individual animals is integral to the management of vulnerable wildlife species [6]. A 2022 paper reports that out of more than 120,000 species monitored by the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species, up to 17,000 have a 'Data deficient' status which emphasizes the importance of data collection in wildlife management initiatives [7].

All of these efforts have conventionally gravitated the focus of developments toward building high-precision devices which are now able to inexpensively capture many types of data from an ecosystem. Among these, camera traps have quickly transformed the way in which many ecologists study the distribution of wildlife species, their activity patterns and interactions among members of the same ecological community [8]. The camera trapping method has its roots in the 1890s. George Shiras developed a technique for photographing wildlife by incorporating a tripwire that an animal triggered; this innovation gained him recognition for introducing a novel approach to wildlife photography [9]. In the modern age,

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camera traps are remote devices equipped with a motion or infrared sensor that automatically record images or videos [10]. Some typical applications of camera traps are to describe activity patterns, foraging, social behaviour, denning and antipredator behaviours. Changes to these behaviours can affect individual survivorship and fitness and given sufficient frequency and effect size, population dynamics [11].

These cameras naturally generate a huge amount of graphic data which often makes manual analysis, that mainly revolves around detection and/or classification of wildlife species, inefficient. Hence, recently the focus of attention has shifted toward developing automated tools to facilitate these analyses in the pipeline, with Artificial Intelligence (AI) which uses Deep Learning with Neural Network algorithms behind the scenes, being at the forefront of these developments. These algorithms can perform image classification and object detection after being trained using a pre-labelled dataset that uniquely identifies each species (or category) of interest [8]. Some of the use cases of the application of AI in this context are removing empty images (i.e., images without animals, also referred to as blanks [12]), species identification [13-16], species classification [14-15], or counting of individuals when there is a single species in an image [14].

These advancements in technology have led to the development and launch of AI-powered platforms such as Conservation AI [17], MegaDetector [18], MLWIC2: Machine Learning for Wildlife Image Classification [19], Wildlife Insights [20] and more. Some of these tools are under continuous development and in their paper, Juliana Vélez et al., have done a comprehensive review of some of these platforms and their applications [8]. Although AI makes it feasible to process camera trap images in a short period of time with a decent accuracy, these models require a huge amount of diverse data for training. The performance of these models may suffer when developed on a limited training data and then applied more broadly e.g., when trained on the data from a certain ecosystem and used in a different habitat or when applying the models to low resolution images [8, 13, 18-19, 21].

In this paper, we present our experience in analyzing camera trap images with MegaDetector v5.0 (referred to as MD hereafter). MD is an open-source object detection Deep Learning model developed by Microsoft specifically for the processing of camera trap data [18]. The model has been trained on millions of images from a wide range of locations and contexts and is able to detect three object classes within images, namely, humans, animals, and vehicles, and can thus be implicitly used to detect images that are blank [22]. MD is often used as a “coarse filter” in processing camera trap images where experts are only interested in reviewing images in which there are animal(s). The processing of images using MD is far faster compared to human analysis. One research reports a 500% increase in processing speed [22]. In terms of performance metrics, very promising numbers are reported in the literature [8, 22].

2. Methods

We decided to benchmark MD for processing time and performance using the data from a wildlife study that includes a multi-year remote camera trap program for one of our clients. The objective of this work is to improve understanding of seasonal wildlife use within a mining project area, particularly caribou use of lichen habitats and movement patterns of large mammals along the local trail networks. The trails generally run northeast-southwest parallel to the valley at this location. This information is used to support effective

mitigation for wildlife during exploration activities in support of the wildlife mitigation plan and to provide data on wildlife habitat for consideration during the planning phase.

A total of 24,595 images were first analyzed by MD. For this analysis, a machine with an NVIDIA T1000 Graphics Processing Unit (GPU) was used. Next, and to have a baseline, a human expert was asked to analyze the same images using Timelapse, a software used by wildlife scientists for management and processing of camera trap images and videos [21]. The results of the two approaches were then compared.

To simplify the benchmarking, the following assumptions were made:

- The "animal" class was assumed as the target class for both analyses.
- Only detections with confidence ≥ 0.8 were preserved and low-confidence detections were excluded from the pool. Based on MD's distribution of detection confidence (image below), with the 25th percentile of the distribution a little over 0.8, this is a fair assumption.
- For images where MD generated multiple detections, only the detection with the highest confidence (maximum confidence detection) was retained.

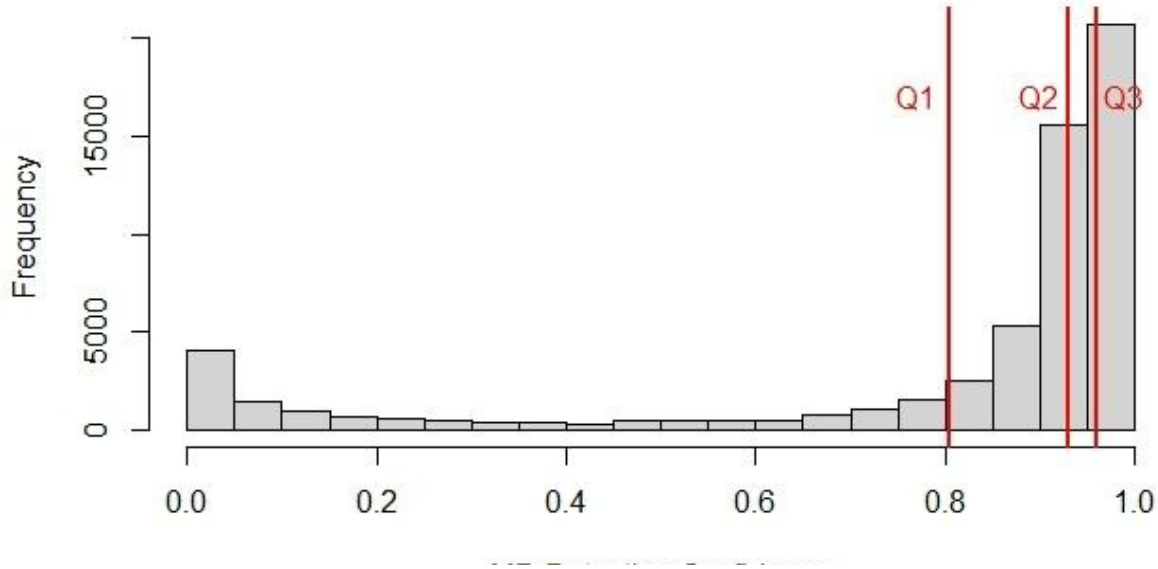

Figure 1: Distribution of MegaDetector Detection Confidence

- The comparison is made at the episode level. In camera trap terminology, an episode is the sequence of images that capture an activity/motion when the camera is triggered [21]. It was assumed that for the images within an episode, if MD gets at least one prediction right, it would be considered that it has made the correct prediction for that episode.

3. Results

3.1. Processing speed

Our computer was able to process the images at approximately 1.25 images per second. This result is in alignment with the benchmark timings reported on MD's website [23]. When compared, we concluded that processing with MD is roughly six times faster than manual processing.
In manual analysis we varied in time to review images. On average users required up to 5 seconds per image. Similar values were observed across multiple projects and common literature.

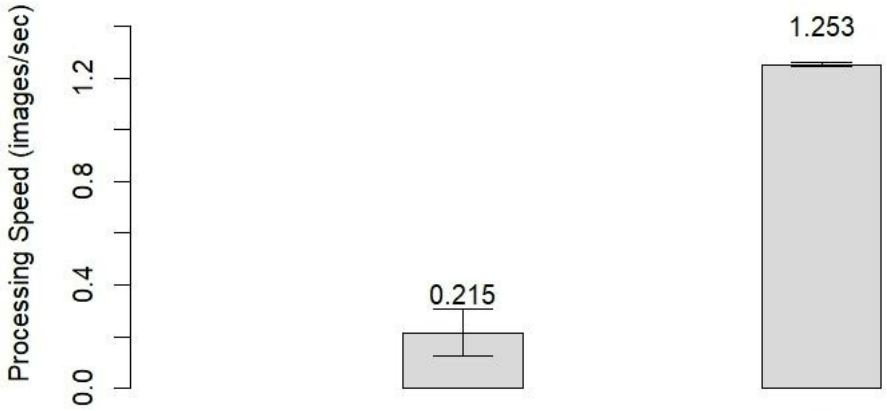

Figure 2: Comparison of Processing Speed between MegaDetector and Manual Analysis

3.2. Performance

To evaluate MD's performance, we used precision ($\frac{True\ Positive}{True\ Positive+False\ Positive}$) and recall ($\frac{True\ Positive}{True\ Positive+False\ Negative}$) as performance metrics.

Based on our results both precision and recall were calculated to be 100%, i.e., MD did not miss any "animal" and did not falsely predict an image as an "animal" class either which was quite impressive. This information was used as a benchmark for later application of MD in our workflow.

3.3. Beyond benchmarking

We have successfully integrated MD into our camera trap data management workflow and used it, in several other projects, mainly to filter out the blank, i.e., noise, from the source images which has continued to be both efficient and precise. Our dedicated image data analysis workstation is equipped with an NVIDIA RTX A4000 GPU which is approximately 6.65 times faster than our benchmark machine.

4. Conclusion

Camera traps have been used for quite a while in ecological research to study wildlife behaviour in a non-invasive fashion. The main issue with this technology is the huge amount of visual data being generated which often makes manual analysis a formidable challenge. The application of Artificial Intelligence approaches using deep learning algorithms to process the outputs has recently gained traction in the field. Using a computer that runs on GPU, these models are able to process hundreds of thousands if not millions of images in a single day, some with decent accuracy but still with room for improvement given the limitations in the training phase.

In this paper we went over our experience with MegaDetector (MD), an object detection AI tool developed by Microsoft. We started with a benchmark test run of MD to have a better understanding of its performance. Our benchmark results showed that MD is on average close to six times faster than our routine manual analysis (baseline). Also, for the "animal" class as the target class, MD's predictions on our dataset were practically flawless (precision = recall = 100%). The impressive performance of MegaDetector in this test run, encouraged us to continue using it as an integral piece in our camera trap image data management workflow.

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