BEST PRACTICES IN ENVIRONMENTAL ASSESSMENT:

CASE STUDIES AND APPLICATION TO MINING

By:
Lauren Arnold, BA&Sc, and Kevin Hanna, PhD.
University of British Columbia

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CEAR Centre for Environmental Assessment Research

Canadian International Resources and Development Institute
Vancouver, British Columbia, Canada
www.cirdi.ca
info@cirdi.ca

EXECUTIVE SUMMARY

This report describes best practices in Environmental Impact Assessment (EA or EIA) with a focus on the mining industry. The concepts and practices can be applied to a range of settings including for developing nations. First, we present key guiding principles for EA practice, second we discuss best practices at each stage in EA, third we specifically address cumulative and social analysis, and finally we define best practices for public and Indigenous participation in EA. We draw on information from practitioners and researchers and have integrated a set of mining case studies throughout to provide examples of the operationalization of principles.

EA is a planning tool that supports decision-making. It often fits into larger policy and planning processes. EA is fundamentally a process of gathering information in order to design and implement an action with the best possible knowledge of its impacts. We can define ***best practices*** as the principles and practices that contribute to an effective EA process.

> ***Effective EA is a legally based process that provides complete information about all development impacts, includes legitimate stakeholder engagement, and functions appropriately within decision-making and planning to contribute to proactive environmental management and enhance the benefits of development.***

The process of conducting an EA involves a series of actions. An EA system will generally have seven stages: articulating the proposal, screening, scoping, assessment, review, decision-making, and follow-up. EA should be environmentally-centered, grounded in scientific data, inclusive and participatory, and support transparent and accountable decision-making. Best practices for the follow-up stage can be particularly important for mining projects. The coordination and planning needs for decommission, closure, and monitoring are often substantial. Closure is a prominent aspect of mine planning and operation. It forms a key part deliberations and considerations of the assessment and approval processes for new mines. The case study for Newmont's Boddington Gold Mine in Western Australia that illustrates the benefits in integrating mine closure into the life-cycle of mine project planning.

EA has evolved into a complex policy area and practices have progressed to consider impacts that affect the social and economic environments as well as the biophysical environment. EA now strives to include the evaluation of cumulative impacts, social, health and economic impacts, and public participation. The BHP Billiton iron ore operation case study, in Western Australia, illustrates how a cumulative impact assessment can be successfully applied within a strategic impact assessment for mining developments. Social impact assessment focuses on the impacts of development on the social dimensions of development and is an important consideration for many mining projects. The case study for Cerro Verde in Arequipa, Peru illustrates the potential benefits from linking development to broader decision-making, and for building opportunities to support community well-being.

A key aspect of an effective EA system is meaningful public participation and consultation with stakeholders. Ideally, participation in EA should occur early and be sustained throughout the process. Public participation procedures should be responsive to context, inclusive, cooperative, accountable, and provide accessible information. Distinct engagement in EA is may also be legally required for Indigenous groups. These must recognize the value of local, experiential, and traditional knowledge as information for better understanding complex environmental-societal interactions. Engagement with Indigenous groups ought not be merely symbolic, but a genuine process, which respects the rights and knowledge of Indigenous, people and provides opportunities for sharing information and mutual problem solving. We provide two Canadian case studies to illustrate approaches to effective Indigenous engagement and community participation: The Prairie Creek Mine in Northwest Territories, Canada and the Raglan Mine in Nunavik, Canada.

FUNDAMENTAL PRINCIPLES OF EA

The mining industry is one of the most important worldwide natural resource sectors. Mining provides materials essential to the international economy; it anchors regional and local economies, and provides income and benefits to people across many global regions. For developing nations[1] mining can be a significant part of the national economy and provide important economic and social benefits.

Mining is a temporary activity with a seemingly confined environmental footprint. The extent of activities and their impacts can appear small, but mines entail a range of activities form exploration to extraction and processing that can have adverse impacts on the biophysical and human environments. Effects can be direct and indirect, with potentially extensive temporal and spatial reaches In recent decades, the mining sector has come under increasing scrutiny in many regions and the industry has responded by improving approaches to exploration, extraction and processing and has incorporated many innovations into mine operations to reduce impacts. Regardless of the location, a new mine will be subject to some form of review, assessment and approval process. These may be lengthy, comprehensive and inclusive, or not.

Environmental assessment (EA)[2] is often used in approval processes to assess mine proposals and make decisions about whether or not to permit development. EA is possibly one of the most influential and consistent tools for environmental regulation and protection. In North America and Europe it has a particularly strong presence in the planning, decision-making and approval processes for a range of development activities and across various natural resource sectors. EA has been increasing extended to the international development context, and it now appears in some policy form in the review and approval processes of most nations.

EA is best defined as a process for identifying and considering the impacts of an action. It commonly functions as process with five core features:

1. EA describes a proposed activity and the baseline conditions in the place where it will happen;
2. identifies possible or likely environmental effects of the activity;
3. proposes measures to mitigate or eliminate adverse effects while providing benefits;
4. provides some sense of the remaining impacts and their significance; and
5. provides for project follow-up and monitoring (Hanna, 2016, 2).

> ***Environmental assessment is a planning and decision-support tool, one that fits into processes of decision-making and environmental management. It is intended to be a participatory process that works to understand the biophysical, social, health, and economic impacts of development and identify ways of mitigating them.***

EA is primarily a process of gathering information to provide proponents and decision-makers with the chance to design and implement an action with the best available knowledge of its impacts and likely performance (Hanna, 2016). The capacity for EA to support and influence decision-making comes from the principles and values that shape it as a system, and the linkages and integration it has to policy processes.

In the EA realm, different researchers and practitioners have outlined principles of an effective EA. Sadler's (1996) work on evaluating practice and performance in EA provides a seminal discussion of the principles and core values of impact assessment, or at least what they should be. Sadler (1996) writes of EA as having five main guiding principles (also noted in Hanna, 2009, 6):

1. "A strong legislative foundation. EA should be based on legislation that provides clarity with respect to objectives, purpose, and responsibilities. Application of EA should be codified, based in law rather than in discretionary guidelines.

2. Suitable procedures. The quality, consistency, and outcomes of EA should reflect the environmental, political, and social context within which EA operates, and should demonstrate the ability to respond to divergent issues.

3. Public involvement. Meaningful and effective public involvement must be present. Not only must those affected and interested be consulted, but their concerns should be able to affect the decision. As Healey (1997) notes, the power of public involvement is in whether or not it has the capacity to affect the decision.

4. Orientation towards problem solving and decision-making. The context of EA is inherently practical and applied. Thus, the EA system should have relevance to issues of importance, it should generate needed information, and it must influence, and be connected to, the settings where conditions of approval are set and decisions are made.

5. Monitoring and feedback capability. The consideration of impacts should not end with approval and implementation; rather the process must have some capacity for insuring compliance, accuracy of impact prediction, and evaluation of project performance. Not only does such a role strengthen EA, it provides information that can fine-tune the EA process, provide knowledge of what impacts actually do occur, and measure project performance."

Sadler's principles have been adapted, modified, quoted, and expanded over the years. Additional researchers have used these ideas as the foundation for a range of principles and characteristics for ***effective EA*** (Gibson, Doelle, & Sinclair, 2015; Joseph, Gunton, & Rutherford, 2015, Senécal, 1999). Recently, Hanna and Noble (2015) developed a set of criteria for effective EA based on a Delphi study. This approach sought to gain a better understanding of effective EA practices, process, and systems through consultation with several public, private, and academic experts. Unsurprisingly the results reflect established thinking in the EA disciplines, but with some unique aspects. From that study, Hanna and Noble (2015) advanced a set of nine principles of an effective EA system:

1. 1. "There is stakeholder[3] confidence in the objectivity, accessibility, clarity, objectives, and unbiased application of the EA process.

2. The process is integrative and linked to approval decision-making, has the capacity to incorporate multiple forms of knowledge, and is connected to other approval processes that must respect the information provided by the EA process and its outcomes.

3. EA should promote betterment and longer-term and substantive gains to environmental management and protection; and it should be preventative, require monitoring and follow-up, and have provisions for reporting on such activities.

4. Comprehensiveness is a key quality in the definition of environment (biophysical, social, cultural, and economic). The process should also have the capacity to focus on significant issues and actions, require the consideration of alternatives, and it must account for cumulative effects and impacts.

5. The evidence-based decisions that follow the impact assessment process clearly and directly reflect the knowledge and data presented in the assessment and/or review proceedings, and that the process is open to hearing and considering all relevant, supporting, and opposing evidence.

6. The EA process must be accountable to stakeholders and the public. Documentation and information disclosure requirements are binding on the process and its administrators, proponents, and other stakeholders. There is open and easy access to timely, accurate, and full and complete information. The process is independent.

7. There is a requirement and opportunities for stakeholder participation[4] throughout the process. Proceedings are open to the public and there are no unjustified limitations to open deliberation and the presentation of evidence; and stakeholders can clearly see how participation was accounted for in the decision. Where applicable, the rights and distinct requirements of Indigenous communities are accounted for in the EA process and its outcomes.

8. A legal foundation for impact assessment provides clarity for stakeholders with respect to applicability, assessment requirements, disclosure requirements, process, reporting, and decision-making. The process contains a legal basis for participation and accountability requirements.

9. The EA system possesses capacity and innovation features, and is administered by competent and impartial authorities with sufficient resources to ensure the integrity and effectiveness of the process. The process and supporting institutional framework should be Flexible, adaptive, and open to new and innovative tools and approaches to assessment."

There are two dimensions to best practices in EA. Best practices may be applied to the institutional and governance qualities of EA; specifically, the qualities of the process, system and frameworks used for assessing, reviewing and making decisions. Best practices can also be applied to the technical and other supporting tools for EA. These include the scientific, analytical and predictive tools and approaches used to identify baseline conditions, identify and assess impacts, choose mitigation strategies, determine significance, predict impacts and outcomes, and monitor the performance of facilities. This may encompass a broad range of disciplines, and many forms of knowledge and practice across applied-scientific and scientific fields. These professions will have their own concepts of best practices for methods of mitigating, assessing and predicting.

In this report, the focus is on the institutional qualities of EA. Best practices are those that contribute to an EA process that fulfills its objective—a process that is effective. For our purposes, an effective EA is a process that adheres to the above principles; essentially an effective EA is a legislated process that provides complete information about all development impacts, includes legitimate stakeholder engagement, and functions with influence on decision-making and planning to support environmental management and protection goals.

The purpose and goals of an EA system will be context specific, and understandings and interpretations of effectiveness may vary from the proponent to the regulator to public stakeholders and are collectively shaped by the legal and social setting within which EA functions (Hanna, 2016). Ultimately, the implementation of EA principles depends greatly on the institutional context within which the EA system operates.

ENVIRONMENTAL ASSESSMENT OR ENVIRONMENTAL IMPACT ASSESSMENT?

Environmental impact assessment (EIA) and environmental assessment (EA) are terms that may respectively denote a document or specific assessment (an EIA of a mine proposal, for example), and the process of assessment (the EA system or regulatory review process, for example), but the terms are now often used interchangeably. Here we use EA to ensure consistency with the broader field, and to help emphasize a broad definition of the environment as including the biophysical and human realms (social, cultural and economic) – the sum of the conditions within which humans live. Other jurisdictions, and some in the academic field, use the term impact assessment to capture the range of assessment processes and scope of impacts considered; for example environmental, strategic, social and economic. Impact assessment may be used to demonstrate that it is not only environment (biophysical) impacts and effects that are being considered.
From: Hanna and Noble, 2011

Many developing nations are seeking to strengthen their natural resource management and governance frameworks and processes. The key challenges to EA practice in developing nations can include limited legal and administrative support for EA procedures, a lack of practitioner capacity, limited baseline information and data collection, weak public and Indigenous participation processes, and limited operational support for monitoring and follow-up requirements.

The institutional capacity for EA in many developing nations may be lacking and clear methodology and criteria for EA may not available (Appiah-Opoku & Bryan, 2013; Toro, Requena, & Zamorano, 2010). Without training, defined procedures, availability of data and monitoring capacity, and legislative support the ability of EA to contribute to informed environmental management decisions is limited (Appiah-Opoku & Bryan, 2013; Heinma & Põder, 2010; Toro et al., 2010). While community based and Indigenous knowledge in EA can help supplement scientific data, there is often little opportunity for public input in EA and general lack of transparency from proponents and regulators (Appiah-Opoku, 2001; Appiah-Opoku & Bryan, 2013; Nwapi & Ingelson, 2015).

Although we do not focus on a particular country or jurisdiction, the case studies written by experts in the EA field provide real examples of the operationalization of best practice principles for mining. The report presents best practices that are supported by sources in the field and from both practitioners and researchers. We also refer to the set of best practice principles by the International Association for Impact Assessment (IAIA) (See Appendix 1). In the following sections, best practices are framed for each of key stages of EA, and for public participation and Indigenous engagement, with specific reference to mining practices.

STAGES IN THE EA PROCESS

The process of conducting an EA is best described as a series of stages. An EA system will generally have seven stages, each composed of various methods and steps. Different jurisdictions may describe and combine the stages in different ways, but these steps tend to present regardless of the locale[5].

Stage 1: Proposal

The first stage is defining and describing the proposal itself. This is a basic description of the proposed activity—what we want do and what purposes it serves. An understanding of the nature of the proposal description can inform whether a project will require an EA (at the screening stage), or if an EA will focus on specific parts of the project. In addition to an outline of the project's physical components, location, and operational activities, the description may provide a preliminary description of effects. An example of the ***contents of a proposal description*** is provided in Appendix 2.

Proposals should include a clear rationale for why the project is needed. The project must be justified in reference to alternative options (Pope, Bond, Morrison-Saunders, & Retief, 2013; Steinemann, 2001). In some jurisdictions, considering alternatives may occur at later stages or at multiple stages within the EA, or it may not be required. Mines are necessarily restricted to the location of the resource. For mining projects the consideration of alternatives will likely focus on alternative production approaches to or technologies for extraction or processing, location of supporting infrastructure (e.g. road, rail or power access), or location for activities with potential site flexibility—such as milling, other processing, or even smelting.

The nature of the project, the way the proposal has been developed will have great bearing on the way the EA evolves, if indeed an EA is required. (Hanna, 2016, 9). Conceptually, EA should begin as early as possible in the project life—at the point that the project is conceived. Some EA processes provide options that allow proponents to consult with regulator to create a ***terms of reference*** that will outline what has to be covered in the EA documentation and what the review agencies will indeed expect to see in the submitted EA. This would come at the scoping stage and helps ensure that a more responsive and ultimately acceptable proposal (Hanna, 2016). But even at the project description stage early communication between proponents, EA agencies, and other stakeholders will help address concerns in an efficient manner and contribute to more successful and timely EA processes.

Stage 2: Screening

Screening is used to decide if a proposal will be subject to EA and if so the level of detail required (Senécal et al. 1999). It answers the basic question, is an EA required? Here we can determine if public hearings or an internal or agency-based review will be involved in the review (Hanna, 2016; Zhang, Kørnøv, & Christensen, 2013).

EA legislation can apply to a wide range of activities, many of which might be routine and include minor predictable and well-known environmental impacts (Hanna, 2016). In some jurisdictions, projects might be quickly studied at the screening stage to ensure that no larger impact issues are likely. If that is the case then a project may be approved and operational conditions assigned—all without further EA scrutiny. This is a practical need—to determine if a project will require a substantial review, or an abbreviated one (Gibson et al., 2015; Hanna, 2016; Snell & Cowell, 2006; Wood & Becker, 2005; Zhang et al., 2013). The failure to recommend projects for further assessment that do entail significant impacts negates the opportunity for the consideration of mitigation measures (Snell & Cowell, 2006; Wood & Becker, 2005), and compromises public confidence in the review process. Well structured screening should ensure that proposals are subject to appropriate assessment rigor, without subjecting small projects, or projects without significant impacts, to unnecessary delays and costs (Gibson et al., 2015; Hanna, 2016; Snell & Cowell, 2006; Wood & Becker, 2005; Zhang et al., 2013).

Effective screening must include clearly defined criteria and consistent procedures (Zhang et al., 2013). Screening criteria typically include "legal requirements (is the undertaking subject to EA legislation?), scale (does it fall within a size or cost threshold?), the nature of the proponent of the project (is it public or private? are certain permits required?), the nature of the project, or a combination of these" (Hanna, 2016, 9). There are several approaches to defining such criteria. Some jurisdictions pre-determine

what types of projects should require an EA or conduct a preliminary study of the proposed project in order to determine the potential consequences of development and whether there is a need for EA (Morrison-Saunders, 2011; Pinho, McCallum, & Cruz, 2010).

In mining for example, Canada's federal EA Act (2012) and regulations use aspects such as thresholds for production, mining activity type, and impacts on Indigenous interests as triggers for the EA requirement (see CEAA, 2014). British Columbia uses production thresholds and/or spatial expansion extent to determine EA application (see BC, 2002). Most EA application in mining occurs for extraction and processing/production; mineral exploration activities rarely require an EA. Best practice would suggest that regardless of the production capacity or area size of the mine, any project has the potential for significant adverse effects should assessed before operations begin. Even if it is determined that effects from small operations are minor, assessment would be an important part on ensuring that cumulative effects are considered (see below for discussion of cumulative effects).

Some EA researchers hold that the best practice approach for screening is one which is environmentally centred, where the potential for particular environmental impacts or the risk of exceeding defined environmental thresholds triggers the need for an EA (Morrison-Saunders, 2011; Pinho et al., 2010). This is the approach in Western Australia, where a test of environmental significance is applied to projects on a case-by-case basis; the potential for environmental impacts that are of concern are the focus of screening rather than the type of project or development (Morrison-Saunders, 2011). In addition to a sound conceptual approach, dialogue with proponents during screening, modifying the project as necessary, and considering alternatives and mitigation methods early are considered helpful for more efficient and effective screening processes (Morrison-Saunders, 2011; Zhang et al., 2013).

Stage 3: Scoping

Once we know that an EA is required, we begin the scoping to decide what the EA will cover. Scoping typically works to focus the assessment on key issues and significant impacts. At this stage we establish the terms of reference for the assessment (Gibson et al., 2015; Hanna, 2016). This step is important since there may be significant time and resource limitations for conducting EA and we need to decide which potential impacts and environmental qualities we will focus efforts on.

Some jurisdictions have rules that clearly define what the scope of an EA must be, while others may provide flexible advice, allowing the EA to be adapted to the relevant concerns identified through stakeholder participation or negotiation with regulators, which for some projects could be mostly biophysical and for others mostly social issues (Hanna, 2016). The resulting terms of reference would provide a detailed description of the range of what is to be considered for the assessment. The scoping stage can also highlight what baseline data is needed (see Appendix 2 for an outline of an example project description). In general, scoping should address the type of project and possible alternatives, the spatial and temporal scales of potential impacts, the availability of baseline data, the consequences of potential impacts for key ecological indicators, and mitigation options (Joseph et al., 2015; Wood, Glasson, & Becker, 2006). Scoping should also help determine beyond baseline data, what specific information is needed to support decision-making, identify information gaps and the studies that will be carried out, and outline the proposed assessment methodology and timeframe (Joseph et al., 2015).

For mining projects an adequate scope depends on the location, temporal scale, and operational nature of the project. The industrial activities associated with the development and the ecological and cultural setting of the development dictate the components that would need to be studied. In general, there should be a consideration of social, biophysical, and economic issues in terms of the project itself as well as secondary and regional impacts (Fonseca, McAllister, & Fitzpatrick, 2014; Mulvihill & Baker, 2001).

The spatial and temporal scales for assessing impacts should be set beyond the project site and lifespan, and account for reasonably foreseeable cumulative effects. Ultimately, the framework and indicators for the assessment should be based on a strong conceptual framework, rely on recent and reliable data, and utilize standardized methods (where possible) that are transparent and can be evaluated and tested (Fonseca et al., 2014; Joseph et al., 2015). In addition, the process should include tools to assess trends and future scenarios and evaluate impacts with reference to targets, thresholds, and benchmarks (Fonseca et al., 2014)

Public participation is also an critical tool for defining the scope of the EA (Andre, Enserink, Connor, & Croal, 2006; Snell & Cowell, 2006). Stakeholder participation supports the identification of what is important to those who may be affected by development, and helps to define significant impacts and (Hanna, 2016; Mulvihill & Baker, 2001; Zhang et al., 2013). Early participation with the public and stakeholder groups is also vital for building relationships and trust for the assessment and allows key concerns to be addressed before considerable time and resources have been spent on the project (Hartley & Wood, 2005; Sinclair & Diduck, 2016).

Stage 4: Conducting the Assessment

If screening and scoping exercises determine that an EA is required, assessment of the proposal follows. At this stage, more advanced data collection, impact prediction, the evaluation of impacts and possible mitigation measures occur (Hanna, 2016). Typically the impacts we are most concerned with in EA are the adverse ones, but there are beneficial impacts from development, which may be included in the assessment. The review process may ask the proponent to define and justify the measurement and description of these. Agencies, experts, independent bodies, monitoring or data groups may be relied on during assessment to provide input and recommendations.

Baseline data describes the conditions of the area that would be affected by the project and provides an information-foundation foundation for assessment and impact prediction (Duinker & Greig, 2007). Baseline data can be biophysical, economic and social/cultural. EA is in part a technical tool for evaluating environmental impacts and as such requires strong basis in scientific principles; however, there is also a role in EA for the application of principles and values about what types of impacts are important to stakeholders (Gibson et al., 2015; Hanna, 2016:10; Greig & Duinker, 2011; Morrison-Saunders, 2011).

During this stage predicted impacts are also assessed for their significance. The determination of significance is value driven, but should be technically supported, transparent, and focused on the key issues and objectives which are important within in the jurisdiction and to the stakeholders involved (Lawrence, 2007). The explicit definition of key ecological components and acceptable thresholds for environmental impacts is also helpful for the assessment of impact significance (Lawrence, 2007). Then use of system-based or ecological information is often sparse in baselines studies, which tend to depend on an inventory approach and provide a static image of place. Understanding and accounting for the systemic qualities of location can help better define impacts (adverse and beneficial) and ultimately account for the cumulative effects of development, even for relatively small 'footprint' projects, which can include mines.

> ***Significance can be a subjective notion determined by the importance that the stakeholders—the proponent, the regulators, the public, and decision-makers—attach to specific values and impacts (Hanna, 2009, 7).***

During the assessment stage, we begin to identify mitigation measures and outline a monitoring or follow-up program, and account for decommissioning and closure. "The process of mitigation involves outlining the measures that can be taken to reduce or eliminate the impacts identified" (Hanna, 2016,

11). In mining, the post activity phase can account for a substantial portion of the assessment as operator work to sketch out the plans for long term site stewardship and management of impacts that continue or occur well after the operational life of the mine. This also provides the proponent with the opportunity to improve the project and to respond to stakeholder concerns (Hanna, 2016, 11). Effective mitigation measures improve the likelihood that a project will be accepted.

Stage 5: Review

Once an assessment is complete, and information that has been collected and analyzed is brought together and placed in the EA report, which is presented to the EA agency for review, recommendation and then a decision (Hanna, 2016). The contents of the EA report are often defined by a regulating EA agency. In some jurisdictions, the layout and content requirements, or expectations, may be given through agency publications, pre-consultation with the proponent, or though the formal provision of terms of reference (Hanna 2016, 11).

The information collected and presented in the report is assessed by reviewers from government or independent bodies—depending on the approach used in the jurisdiction. It is important that the review process is independent and transparent (Hanna & Noble, 2015; Joseph et al., 2015). The review stage can include further public participation. In addition to being rigorous, review processes must be open and provide settings where stakeholders can bring forward information and express values, which are then clearly considered in the project review (Gibson et al., 2015; Palerm, 2000; Zhang et al., 2013). The review can include assessing the report for completeness, accuracy, adherence to the terms of reference, compliance with regulated requirements and other criteria.

Stage 6: Decision

In practice decision-making can seem simple, but the factors that shape decisions and the criteria formally considered can be complex. The product of an EA process is often a recommendation, while formal decision-making power commonly resides at the political level (Morrison-Saunders, 2011). Depending on the jurisdiction, the recommendation may be to approve a proposal as it is or with conditions, or reject the proposal outright. But some processes do not provide a recommendation or advice, they provide an outline of impacts and a review of what the project entails. This is then used by other agencies for forming their own recommendations and decision.

The context for reviewing the proposal depends on the jurisdiction, the nature of the proposed activity, and the results of screening and scoping (Hanna, 2016). For activities of low public concern, a review and preparation of a recommendation may be completed within an internal administrative setting, all conducted by the EA agency. But in instances where the activity is accompanied by substantial impacts and concerns, the setting for review may be a public hearing or other formal or quasi-judicial setting (Hanna, 2016).

For EA to contribute to environmental management and planning goals it must function appropriately to guide decision-making (Sadler, 1996). EA should provide usable data for uptake by decision-makers (Heinma & Põder, 2010). Management objectives, environmental thresholds, assessment criteria, and the data gathered during the EA should be clearly framed for interpretation by decision-makers (Joseph et al., 2015). In EA, the decision to approve a project typically involves setting conditions and seeking commitments from developers, all of which should be supported by legislation to ensure implementation and compliance (Gibson et al., 2015; Morrison-Saunders, 2011). But political decision-makers respond to social, economic and partisan motivations, which can also influence the eventual outcome.

In multi-jurisdictional settings, the decision may reside with more than one level of government. In Canada, mining activities commonly trigger both federal and provincial assessments. Opportunities

for harmonizing or coordinating these reviews may exist. Without harmonization the deliberations can become complex and conflict prone. Separate processes render divergent recommendations and decisions. For example, the Canadian mining company Taseko submitted an application to develop a copper mine in south-central British Columbia, the provincial EA process first approved the mine, but the federal one rejected it. Taseko then modified the project design and new application was tendered. The project was rejected by the second federal review, while another provincial review was not conducted. The proposal remains stalled in legal and procedural wrangling.

In instances of multi-jurisdictional EA application, efforts to harmonize reviews or otherwise collaborate in the application of EA requirements constitute best practice, both in terms of fairness to the proponent (regardless of the final decision) but also to ensure public confidence in the reliability and comprehensiveness of the EA, and the consistency of EA practice.

Stage 7: Follow-up, Monitoring, and Compliance

The IAIA defines EA follow-up as including 4 parts: monitoring, evaluation, management, and communication (Marshall, Arts, & Morrison-Saunders, 2005). Monitoring can help ensure compliance with approval conditions, but it also provides information that can be used by reviewers in future assessments, and helps build a record of baseline information that might be useful to other assessments (Gibson et al., 2015; Hanna, 2016; Joseph et al., 2015; Zhang et al., 2013) (See also Appendix 3). Marshall et al. (2005) outline 3 levels of post-EA evaluation:

1. "Monitoring and evaluation of EIA activities." This is conducted on project-by-project scale and whether the specific components of EA were managed in acceptable ways.

2. Evaluation of the effectiveness of the entire EA system. For instance, this might include the influence of EA on decision-making or the efficiency of the process.

3. "Evaluation of the utility of EA." This addresses a broad question of whether EA as a process is beneficial. The key question here is "does EA work?"

In mining, we consider closure from day one. The assessment process will also focus on planning for closure, as an major part of identifying and mitigating impacts after operations ceases The case study by Morrison-Saunders provides an example of effective mine closure and EA follow-up for Newmont's Boddington Gold Mine in Western Australia (Case Study 1). This example illustrates the benefits in integrating mine closure into the life-cycle of mine project planning and EA and the benefits of cooperation between government, proponents, and communities. Public and regulator demands for mine clean-up, decommission, and monitoring throughout the mine life cycle are significant (Durucan, Korre, & Munoz-Melendez, 2006; Kabir, Rabbi, Chowdhury, & Akbar, 2015; Morrison-Saunders et al., 2016). Building trust and accountability is essential to relationships between mine operations and communities, which have been problematic in many areas of the world (Nwapi & Ingelson, 2015). Mining is a temporary activity, but the effects of operations can pose long-term impacts without adequate mitigation, monitoring and procedures for responsibility.

Carrying out monitoring and adhering to approval conditions must be mandatory and enforceable (Arts et al., 2001; Gibson et al., 2015; Marshall et al., 2005; Morrison-Saunders, 2011; Zhang et al., 2013). Regular and sustained dialogue with all stakeholders and the development of processes that align with the local contexts, EA procedure, and legislative network, providing accessible information, and utilizing community engaged monitoring will help improve mine follow-up both during operations and after they cease (Appiah-Opoku & Bryan, 2013).

Mine closures will impose social and economic impacts that can be difficult or impossible to mitigate or eliminate. But, positive long terms impacts in terms of skills development, regional infrastructure and the indirect effects of wealth creation can have lasting positive, and sustainable, outcomes.

The Mine Closure Toolbox developed by AngloAmerican mining has received praise from practitioners and researchers (see AngloAmerican, 2013; Ewing, 2014). The Toolbox was developed in collaboration with mine operators to better integrate the biophysical, social, and economic aspects of mine closure and to better incorporate mine closure into mine planning before development begins. The Toolbox provides guidance for establishing a strategic plan and goals for the mine closure, and conducting a rapid assessment of the closure plan—one that incorporates cumulative impacts, community concerns, and sustainable development goals, and filling any information gaps in the closure plan.

CASE STUDY 1:
Newmont's Boddington Gold Mine in Western Australia

By Angus Morrison-Saunders, Associate Professor of Environmental Assessment, Murdoch University, Australia Extraordinary Professor for Environmental Sciences and Management, North West University, South Africa

Best practice mine closure planning and environmental assessment (EA) principles share many common features. This case study highlights the alignment of mine closure planning with EA using the example of Newmont's Boddington Gold Mine in Western Australia.

Internationally, there is a well-established expectation within the mining sector that mine closure planning should be an intrinsic element of the entire life cycle of mining from initial project design to assessment for mining approval purposes; continuing through implementation, decommissioning, and final rehabilitation and closure. More specifically there is an expectation that mine closure planning should be proactive, commence early, and for ongoing planning becoming progressively more detailed as the end of the life cycle of a mining operation approaches (e.g. MMSD 2002; International Finance Corporation 2007; ICMM 2008).

These mine closure planning principles echo the mitigation and adaptive environmental management expectations within Environmental Assessment (EA) (e.g. International Association for Impact Assessment & Institute for Environmental Assessment 1999; Marshall et al. 2005). Explicit linkages have been made between EA and mine closure planning, highlighting the importance of identifying and assessing environmental and social impacts of mining, along with putting in place appropriate mitigation, management and monitoring measures for developing the EA for a proposed mining project (e.g. Otto 1997; Sánchez et al. (2014); Morrison-Saunders et al. 2016). As such, the two processes of EA and mine closure planning should proceed hand in hand.

Western Australia has a well-developed mining sector and a well-established EA process with dedicated agencies responsible for each. A principle of cooperative governance and efficiency in regulation applies, whereby agencies work together to avoid overlap or duplication of responsibilities. Both the Mining Act 1978 and EA of mining projects under the Environmental Protection Act 1986 allow for mine closure planning to be addressed during initial assessment and approval of new mines, and thereafter to

be periodically reviewed and updated. Joint guidelines issued by the Department of Minerals and Petroleum (DMP) and Environmental Protection Authority (EPA) specify details, and the cooperative approach avoids overlap in agency activity. The guidelines provide for mining companies to consult with affected communities to agree on the post-mining land-uses to be established and to prepare an initial mine closure plan outlining the steps towards accomplishing this (DMP and EPA, 2015).

The mine closure plan is initially produced along with the EA document (in Western Australia this is called a 'public environmental review') and an environmental management plan (EMP) for public review. Following receipt of public submissions on the overall mining proposal covered in these documents, the mining company is required to draw up a formal response to the public submissions and this is published as an appendix to the assessment report of the EPA on the proposal. The EPA assessment report is a public document (open to third party appeals) that is provided to the Minster for the Environment for the approval decision step. The Minister must consult other relevant Ministers (such as the Mining Minister) when making their decision, and this becomes legally binding on the mining company. While the approval decision is a one-off event, the mine closure plan and EMP are 'living' documents that are periodically reviewed and updated, including ongoing participation with the affected stakeholders around progress and the planned post-mining land-uses.

The Boddington gold mine operated by Newmont was one of the first major mining operations to engage in the mine closure planning process now utilized in Western Australia (which came into effect in 2011). The gold mine commenced operations in the 1990s (and had undergone EA back then). In this case Newmont was seeking an extension to their existing operation and in doing so outlined their expected life of mine activities including post-closure land-uses and provided the EMP for guiding the operation to this end. As indicated above, all documents were produced for public review simultaneously providing for full disclosure of the anticipated project (the individual documents are listed below). Importantly though the progressive planning and adaptive management approach utilized in Western Australia will result in periodic updates with greater details and frequency of environmental performance and mine closure plan reporting occurring as the end-of-mine life draws closer.

This case study demonstrates best practice EA and mine closure-planning working together under a cooperative governance arrangement. The mining company has secured community and government support for its operations. It has a clear vision for the future. Meanwhile regulators and the community also know what final land use and environmental performance they can expect the company to deliver.

Types of Impact Assessment

As EA has evolved into a complex planning and policy support tool, practices methods have progressed to consider impacts that affect the social and economics environments as well as the biophysical environment. EA now often requires the evaluation of cumulative, social, health and economic impacts, and public participation (Hanna, 2016; Pope et al., 2013), albeit with varying degrees of success and efficacy. Part of this progression has been the development of distinct impact assessment forms, which have emerged under the larger rubric of EA (Hanna, 2009).

Managing the cumulative impacts of development is one of the most enduring and complex issues facing natural resources management in many jurisdictions. ***Cumulative effects assessment (CEA)***

is a tool for systematically analyzing cumulative environmental change—it accounts for changes to the environment triggered by immediate actions combined with other past, present and future human activities (Ball et al., 2013; Harriman & Noble, 2008; Harriman & Noble, 2011; CEAA, 2014). CEA is a technical and data rich exercise, potentially requiring substantial new data and skill sets to develop long-term and broad spatial images of change. Doing CEA is not necessarily difficult (at least technically), but the institutional and governance arrangements can be difficult to coordinate and sustain, which means that the institutional arrangements, maybe more so than the biophysical assessment, present the greatest challenges and opportunities for CEA application.

Many jurisdictions require the consideration of cumulative effects in development applications, and there has been a recent shift to develop new frameworks, requirements and procedures for incorporating CEA into large-scale land-use planning, impact monitoring, and natural resource management. The emergence of such initiatives is in part a response to the difficulties of managing the cumulative effects of development on a project-by-project basis, and the desire for more collaborative approaches to reduce conflict (Greig & Duinker 2014; Noble 2015; Ross, 1994). For mining, CEA presents important opportunities for comprehensive long-term planning in locations where future operations can be anticipated as the resource is developed. A regional and cumulative approach to assessment can help mitigate the aggregate impacts of mining developments within a defined region. This can include addressing the cumulative impacts of water demand and wastewater impacts, roads and other supporting linear infrastructure, and remediation planning and implementation.

In jurisdictions where small scale or artisanal mining is a significant part of the industry, cumulative impacts can be quite evident over time but not necessarily well addressed in planning or regulation—if at all. CEA can provide a planning tool for regulating the impacts of multiple small-scale developments, and understanding the impacts that will inevitably accrue. The implementation needs are capacity, technical and data based, but can be addressed, and potentially through relatively low cost options. Importantly, the application of CEA would also require connection to planning and decision-making – it would need to be well linked to the institutional or governance setting in which artisanal mining is controlled. This may be used to create a ***class EA approach***, where we develop a routine and predictable understanding of a class of projects that have similar operational characteristics with predictable impacts, allowing regulators to create a set of standard approval conditions that cover the class without the need for individual assessments.

> *Cumulative effects assessment may provide an important opportunity for international development organizations seeking to support artisanal mining and the benefits it can bring to communities, but also support in mitigating ongoing and incremental environmental and social impacts.*

Cumulative impact assessment is arguably most effective if applied within a regional or strategic impact assessment framework (Franks, Brereton, & Moran, 2010; Gunn & Noble, 2011). A ***strategic impact assessment*** is applied to broad policies or plans rather than to a particular activity and is an increasingly important form of impact assessment (Hanna, 2009; Noble, 2009; Polido & Ramos, 2015). Strategic assessment may also advance ***sustainability goals*** by insuring that sustainability criteria is considered during planning (Bond, Morrison-Saunders, & Howitt, 2013; Polido & Ramos, 2015). The case study (Case Study 2) of the BHP Billiton iron ore operations in Western Australia illustrates how a cumulative impact assessment can be successfully applied within a strategic assessment for mining.

> *Sustainability can be defined in operational terms such as the elongation of production and thus benefits, though this may also prolong undesirable effects and postpone closure activities. Mining may provide long term and transferable skills development for workers. Rents, royalties and other revenues for governments and communities can provide an important foundation for investment in other economic activities, but this requires a supporting institutional and governance setting to ensure that such investment are made and that they are oriented toward clear and reckonable sustainability goals.*

CASE STUDY 2:
Voluntary strategic environmental assessment to address cumulative impacts – BHP Billiton iron ore operations, Western Australia

By Angus Morrison-Saunders
Associate Professor of Environmental Assessment, Murdoch University, Australia, Extraordinary Professor for Environmental Sciences and Management, North West University, South Africa

This case study showcases how a major mining company (BHP) addressed potential future cumulative impacts of their anticipated iron ore operations in conjunction with other development activity for a large region in Australia in a voluntary strategic environmental assessment process.

Cumulative impact refers the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of who is responsible for such other actions (Council on Environmental Quality, 1978). This same definition is employed in the EA system in Western Australia where this case study comes from. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time in a particular area.

Project level environmental assessment (EA) has struggled to effectively deal with cumulative impacts because it tends to focus on the activities of one proponent on their specific project site. Strategic environmental assessment (SEA), refers to assessments of policies, plans or programs of development activity (e.g. Fundingsland Tetlow and Hanusch, 2012). Through this broader focus incorporating multiple development proposals within a given region, SEA is much more suited for the assessment and management of cumulative impacts (e.g. Franks et al. 2010; Gunn and Noble 2011). Furthermore when done well, SEA may reduce the need for subsequent project level EAs providing that appropriate management measures have been put in place.

In Western Australia (and also at the federal level in Australia), SEA provisions appear in the same legislation as that of project level EA. Where project level EA is mandatory for proposals likely to have a significant effect on the environment, SEA is voluntary but the process also results in legally binding approval conditions being served on the proponent by the Environment Minister (Stoeglehner et al., 2010). The incentive for proponents to volunteer to conduct SEA for situations where they will be responsible for multiple development proposals in a given region into the future is in reducing the need for project level EA later on. A future project development that is consistent with an approved SEA (known as a 'derived proposal' in the Western Australian EA legislation) can proceed without further EA being conducted by means of applying the relevant legally binding approval conditions for that individual development established within the SEA (EPA, 2012).

BHP Billiton have been mining iron ore in the Pilbara region of Western Australia for several decades, during which time they have undertaken many EAs for individual operations. In 2013, the company voluntarily embarked on a SEA process that would

enable them to assess all of their intended future intended iron ore mining operations over a 50 year period. The assessment of cumulative impacts are the heart of this SEA, which they pledged to within their scoping report produced in 2013 as follows:

Whilst the [SEA] will address and seek approval for only BHP Billiton Iron Ore proposed operations and activities, the cumulative impacts from BHP Billiton Iron Ore operations, other existing operations and reasonable foreseeable operations by other proponents will be considered. In addition, different land uses such as pastoralism will be considered.
Given that the [SEA] is considering developments potentially up to and over 50 years in the future, the assessment will be sufficiently robust to address foreseeable change.

Specifically, the scope of the [SEA] includes:

- Prediction of likely impacts associated with the Strategic Proposal, including potential cumulative impacts associated with other BHP Billiton Iron Ore and third party operations;…" (BHP Billiton 2013, p5)

In March 2016, the SEA was released for public review. A link to the suite of documents is provided below. The main cumulative effects assessment appeared in the Part C document subtitled 'Strategic Proposal Impact Assessment'.

The area of land under consideration in the SEA is 7.6 million hectares in size, incorporating the iron ore deposits of the Pilbara region and a transport corridor to the coast – dedicated railways are used by the mining company to transport the ore to the port at Port Hedland where it is loaded onto ships for export overseas. The cumulative effects assessment within the SEA is carried out with respect to three scenarios as follows:

- The Existing Development Scenario consists of the disturbance footprints associated with four existing BHP Billiton Iron Ore mines and associated rail infrastructure, the existing iron ore mines and infrastructure of two other mining companies (some 10 operations in total) and existing non-mining land uses (roads, power lines, airfields, railway yards and human settlements).

- The 30% Conceptual Development Scenario which 'represents the extent of cumulative direct disturbance within the Project Definition Boundary at a future point when 30% of BHP Billiton Iron Ore's identified operations are operating concurrently (a reasonably foreseeable level of operation)'. In addition to BHP Billiton Iron Ore's developments, the scenario includes reasonably foreseeable third-party iron ore mines (for seven other mining companies) and the Existing Development Scenario.

- The Full Conceptual Development Scenario which is based on the production rate associated with full conceptual development of BHP Billiton Iron Ore's future identified projects being in concurrent operation. It builds on the 30% Conceptual Development Scenario, but does not include future long-term predictions about third-party iron ore mines or other land uses as this information is not publically available. The company note that The Full Conceptual Development Scenario, while useful for assessing impacts at regional and long-term scales, is conservative in nature with respect to BHP Billiton Iron Ore's development footprints as concurrent operation of all BHP Billiton Iron Ore future identified projects is unlikely.

For each scenario, the SEA provides spatial representation of the cumulative impacts giving specific attention to impacts on biodiversity; surface and groundwater; heritage and amenity; air quality (specifically considering particulates and greenhouse gases); and end of mine closure and rehabilitation. The assessment runs to hundreds of pages and scores of diagrams; it is not possible to summarize it here. Importantly, the cumulative effects assessment was subject to peer review by a suite (11 in total) of local, national and international experts on various aspects of the assessment and includes design and mitigation pledges from the proponent and ratings of the significance of impacts at a regional scale. Following the public review, the proponent will be required to respond to public submissions prior to evaluation of the proposal by the Environmental Protection Authority.

This case study represents best practice cumulative effects assessment of mining activity because of the scale of the assessment (in both space and time) and its proactive nature – i.e. attempting to provide a regional scale and long-term perspective on a sensitive ecosystem that has already been subjected to significant mining development.

In some form ***social impact assessment, health impact assessment, and economic impact assessment*** are often integrated into EA or strategic assessments (Esteves, Franks, & Vanclay, 2012; Vanclay, 2003). Social impacts and social risks[6] are an important considerations for mining projects (Evans, 2015). The social changes in the community induced by mining developments can include demographic changes, demands on or changes to social infrastructure, changes in crime and social order, community health and safety issues, changes in labour and working conditions, and human security (Franks, 2012; Vanclay, 2003). Economic considerations for mining include the distribution of benefits, inflation or deflation within the community, and infrastructure demands and changes due to the influx of workers and investment (Franks, 2012). Health impact assessments are concerned with evaluating the potential impacts of development directly on human health or the environmental qualities that affect human health (Bhatia & Wernham, 2009; Noble & Bronson, 2005).

> *Enhancing the long-term benefits of mining activities may be achieved by focusing on social results that benefit communities beyond the life of the mine, ensuring due attention to the distribution of benefits and opportunities, and seeking to maximize the positive outcomes of infrastructure development.*

The case of the Cerro Verde project in Peru demonstrates the important role that mining development can in providing improvements to local or regional facilities. In the Cerro Verde example, the mine development supported the provision of enhanced community water services. The opportunity for improving social well-being was identified during the EA process.

The evolution of these forms of impact assessment reflects the increasing complexity by which we define environment and environmental impacts. Each of these types of assessment represents advancements in considering a more complete range of impacts for development and it is important that these tools function together in order to better inform planning and decision-making (Pope et al., 2013).

CASE STUDY 3:
Peru Water Project: Cerro Verde

By Jocelyn Fraser
PhD Candidate - Norman B Keevil Institute of Mining Engineering, Liu Scholar & UBC Public Scholar, The University of British Columbia

Introduction

When planning for a mine expansion, Cerro Verde personnel in Arequipa, Peru collaborated with authorities, regulators, and water users to investigate options for securing additional water. A key consideration for the company was to avoid placing the mine in competition with farmers for water.

Following a period of participation, it was agreed that Cerro Verde would partner with regional and municipal governments, and water management authorities on a municipal wastewater treatment system.

In late 2015, the new plant, La Enlozada, began operations – providing sewage treatment for Arequipa, treated water for the expanded mining operations, and clean water for downstream agricultural users.

Process

In 2008, as detailed mine expansion planning got underway, Cerro Verde representatives, recalling an earlier suggestion by social leaders, decided to explore the possibility of using treated wastewater for mining operations. At that time 90% of untreated municipal wastewater was discharged directly to Rio Chili, the region's principal water source. Fecal coliform counts in the river exceeded World Health Organization standards set to provide safe levels for human exposure, agriculture and livestock. Yet, downstream of the points of discharge, more than 26,000 hectares of agricultural land was irrigated.

Conversations were begun to determine if wastewater treatment could be an option to secure the water supply required for the proposed expanded operations while also supporting regional water infrastructure. In addition to discussions with the local water utility, representatives of regional and national water regulators, farmers, social groups and elected mayors, workshops and public meetings were held to consult residents of Arequipa on the wastewater treatment proposal.

It was agreed that Cerro Verde would finance the design and construction of the sewage collection system and wastewater treatment plant in exchange for $1m^3$/second of treated wastewater for use in mining operations. The remaining treated water would be returned to Rio Chili, helping to rehabilitate the river. Today, Cerro Verde works in partnership with the local water utility to collect and treat municipal wastewater, monitor treated water quality, return it to the river, and measure outcomes.

- Engaging stakeholders on a topic with business and social impacts required a multidisciplinary and inter-agency team.

- Cerro Verde led the participation effort to explain the process for wastewater treatment, the infrastructure requirements, and how the mine would use the treated water.

- SEDAPAR (Servicio de Aqua Potable y Alcantarillado de Arequipa), Arequipa's regional water and sewage utility, filed the environmental assessment and permit applications for plant operations and the discharge of treated water back to the Rio Chili.

- Mayors of district municipalities within Arequipa department represented their constituents' interests and are shareholders in SEDAPAR.

- The federal government and national water authority (ANA) and its local agencies conducted water studies, approved the EIA, issued the necessary permits, and ensured permit commitments were met. The regional water authority encouraged Cerro Verde to consider the use treated water when options for the mine expansion was being evaluated.

- Farmers were active in discussions about water allocation, river water quality, the use of treated wastewater, and water efficiency initiatives.

- Social and professional groups, including the Chapter of Engineers of Arequipa, brought forward the original proposal for the mine to consider wastewater treatment, and were active in the participation effort and discussions about water conservation and efficiency.

Results

With the commissioning of the US$500 million La Enlozada wastewater treatment plant in November 2015, approximately 99% of city sewage is now treated. Fecal coliform counts in the river have been significantly lowered, reducing incidents of water borne illness, improving agricultural outputs, and substantially improving the health of the Rio Chili. And Cerro Verde, now one of the world's five largest copper producers and major contributor to employment and Arequipa´s economy, has a secure water supply for its expanded operations.

Finding a point of intersection between a business need and a social need enabled Cerro Verde to secure water for mining without conflict resulting from competition for a scarce resource. For Arequipa, the outcome is equally positive: sewage treatment in the city, rehabilitation for the Rio Chili, improved health, and better agricultural production. The case illustrates the role mining can play in advancing sustainable development and highlights the return on investment achieved when mining companies place the concept of sustainable development at the core of business decisions.

Participation and Community Engagement

Best Practices for Public Participation

An important aspect of an effective EA system is meaningful public participation and consultation with stakeholders (Glucker, Driessen, Kolhoff, & Runhaar, 2013; Hanna & Noble, 2015; O'Faircheallaigh, 2010; Sinclair & Diduck, 2016). Stakeholders and the interested public should have the opportunity to understand and contribute to the assessment of development projects that affect them (Gauthier, Simard, & Waaub, 2011; Glucker et al., 2013; O'Faircheallaigh, 2010). Gathering data from the public about the biophysical, cultural, and social environment also has an instrumental value to EA and assists with the assessment, and evaluation of impacts (Glucker et al., 2013; O'Faircheallaigh, 2010; Pohjola & Tuomisto, 2011).

Public participation can also aid the implementation of decisions and reduce the potential for conflict throughout the project life. Providing for participation early in the EA process can help ensure that issues are identified and addressed early and that projects are developed that better align with public values (Franks, 2012). When stakeholders can actively contribute to development decisions they typically have better experiences and more positive views towards those projects (Franks, 2012; Glucker et al., 2013; O'Faircheallaigh, 2010; Sinclair & Diduck, 2016).

An effective and trusted EA process provides opportunities for public involvement throughout the assessment process. The results of involvement should effect the recommendations and decisions generated by the EA process, and help the proponent develop a better project (Hanna, 2016). For effective and knowledgeable participation, full project information must be provided to the public and in turn opportunities must be given for the public to contribute information and values. Key principles have been identified for improved participation in EA processes including defining the outcomes and goals of participation (Gauthier et al., 2011; Glucker et al., 2013; Pohjola & Tuomisto, 2011; Sinclair & Diduck, 2016), early engagement (Hartley & Wood, 2005; Palerm, 2000; Sinclair & Diduck, 2016; Udofia, Noble, & Poelzer, 2016), and providing accessible (open, non-technical, clear) information (Hartley & Wood, 2005; Sinclair & Diduck, 2016). The IAIA's Public Participation International Best Practices provide a broad summary of essential concepts of effective participation (Andre et al., 2006):

- Adapted to context
- Informative and proactive
- Adaptive and communicative
- Inclusive and equitable
- Educative
- Cooperative
- Imputable

More detailed operating principles to translate these principles into a guideline for practice (Andre et al., 2006):

- Public involvement in EA should be "**initiated early and sustained**" throughout the process. This helps to build relationships and trust, improves the analysis of the assessment, increases the opportunities for participation and modification of the proposal, improves the image of the proponent and the confidence of regulators in their decision, and improves public knowledge and education on the project and issue.

- The participation process should be "**well planned and focused on negotiable issues.**" The credibility of the process is improved if all stakeholders are made aware of the procedures, aims, and expected outcomes. In addition, since consensus may not always be possible, understanding of all views should be emphasized.

- The process should be "**supportive to participants**" in that proper assistance for facilitation, resources, and information dissemination should be provided.

- The process should be "**tiered and optimized.**" A participation program should be employed at an appropriate level of decision making for a proposal. Since participation is resource and time consuming it should be optimized and efficient within the decision-making process.

- The process, information, and decisions must be "**open and transparent.**" Information should be communicated in such a way that laypersons, and all cultural and ethnic backgrounds can participate.

- "**Context-orientated.**" Communities may have specific informal or formal procedures for resource management or public participation

- "**Credible and rigorous.**" Facilitation by a neutral party improves legitimacy and increases public confidence and willingness to participate

In the mining context building relationships with communities can be essential for project approval (Evans, 2015; Nwapi & Ingelson, 2015; Ospina, 2014). Early and sustained public engagement is beneficial for both proponents and the public. Identifying key issues early in the project life provides the opportunity for mutual problem solving and adapting the project to better align with community values and livelihoods (Evans, 2015; Franks, 2012). Communication with public stakeholders early in the assessment process is beneficial to the proponent. Without adequate community support, proponents may face increasing challenges to mine developments and future expansion of existing operations. The benefits of effective public engagement are well illustrated in the Prairie Creek Mine case study (Case Study 3) from Northwest Territories, Canada, where input from Indigenous communities was utilized to adapt the project design.

> *Providing opportunities and support, both organizationally and financially, for public input allows issues to be addressed early and more efficiently and can minimize time and financial strains to the proponent through proactive issue identification.*

Participation methods will need to be tailored to the demographic and cultural context of the proposed development. Mining operations may be in remote areas, or located in countries that are not accustomed to the industry or face difficult socio-economic, political, or culture pressures that require thoughtful approaches to engagement. In some settings the potential for creating social risk and community concerns about development may be intensified without adequate participation strategies (Evans, 2015; Nwapi & Ingelson, 2015). When developing participation approaches it is important to consider the social setting. The ability to participate and the consequences of development may affect different stakeholders (Andre et al., 2006). Cultural or other social limitations on participation may greatly influence the voices heard by a proponent and present a skewed image of the benefits expected, the impacts of concern, and the perception of significance.

Inclusion

Gender inequalities can be prominent in many settings. In some places women may be particularly disadvantaged as stakeholders in policy and decision-making processes. As a tool, ***gender-based assessment*** is an analytical approach that seeks to identify and understand the impacts of development on diverse groups by taking into account gender, other demographic factors, and location (Status of Women, 2016). Understanding these factors may necessitate additional or multiple approaches to stakeholder engagement, which are tailored to the social context of the project, but are designed to ensure that women are given a voice in assessing project impacts, and in defining potential benefits

and opportunities. This can require expert approaches to participation to maximize the potential for reaching women and providing economic and other development prospects, while also understanding and carefully appreciating the social norms that affect their lives.

> *Mine development can provide new options for education and skills training, employment, and benefits from additional infrastructure that could be targeted to help improve the lives of women and provide new roles for women in the economy. Mining companies may seek to identify innovative opportunities for linking a project to improvements and prospects outside established gender roles.*

While the mining industry has improved accountability and responsibility, there are opportunities for improvement—particularly for working in developing nations. The industry is by no means uniform. Individual companies develop distinct approaches to their planning, participation and management, and these will be reflected in capacities and willingness to engage and build positive and progressive relationships with communities. The Australian Government published a report titled "Social Responsibility in the Mining and Metals Sector in Developing Countries", which provides guidance for assessment, planning, and management for proponents operating in developing nations (Australian Government, 2013a).

The proponent is responsible for the impacts of its actions on society and the environment and is responsible for being transparent in ways that contributes to sustainable development, takes into account the views of stakeholders, complies with legislation and international standards for behaviour, and practices ethical relationships (Australian Government, 2013a). Other organizations have published similar guidelines for mining operations in developing nations (see International Finance Corporation's Performance Standards on Social and Environmental Sustainability [IFC, 2012]).

Best Practices for the Engagement of Indigenous Communities

Distinct engagement with Indigenous peoples in the EA process may be legally required. The value of local, experiential, and traditional knowledge for understanding complex environmental interactions is well recognized (Baker & McLelland, 2003; O'Faircheallaigh, 2010; Udofia et al., 2016). However, integrating multiple information types into EA is an ongoing challenge. In some jurisdictions engagement with Indigenous groups has been criticized in practice for failing to provide legitimate and meaningful opportunities for participation (Baker & McLelland, 2003; Udofia et al., 2016).

Best practices for the involvement of Indigenous peoples focus on recognizing the rights and sovereignty of Indigenous groups, understanding the validity of traditional knowledge, incorporate cultural customs, and upholding principles of equality and informed consent (Croal & Tetreault, 2012). To be meaningful, engagement must not be merely symbolic, but importantly a process which respects Indigenous groups rights and knowledge and provides the opportunity for sharing information and for mutual problem solving.

DEFINING KNOWLEDGE

Several terms are used in the literature to describe traditional knowledge (TK) or traditional ecological knowledge (TEK). Traditional ecological knowledge (TEK) refers specifically to knowledge about the environment derived from experience and traditions of a particular group including observations about resources, species, ecological systems, patterns, and systems of management that govern the use of resources (Usher, 2000:185). TK can be seen as more broadly applied, beyond ecological contexts. The terms local or Indigenous knowledge emphasize its localness and suggest it is bound to a specific community. Local knowledge is linked to place and experience, but unlike TK and TEK, it is not embedded in a shared multi-generational traditional lifestyle or culture and can be built by an individual in their own lifetime by interacting with their local environment (Croal & Tetreault, 2012). Local knowledge can also transcend Indigenous and non-Indigenous communities. Indigenous knowledge may be used when referring to knowledge exclusive to a certain community or cultural group (Warren and Pinkston 1998:158).

More commonly the term traditional knowledge is used to capture historic and cultural understanding of resources, places and uses. Indigenous people may see the term as failing to account for the dynamics and shifting way that places are used and viewed by their communities, and their changing roles within contemporary economies and landscapes (Houde, 2007; Stevenson, 1996). Regardless, Indigenous communities and governments use of the term traditional may also help convey a strong sense of history and connection to place which can assist in framing issues of rights, title and ownership (Houde, 2007). Traditional ecological knowledge adds a layer of connection to ecological processes, and highlighting its importance within environment and natural resources management (Houde, 2007).

As part of the IAIA best practices Croal & Tetreault, (2012) developed a guide for respecting Indigenous people and implementing Indigenous engagement, and in particular the treatment of traditional knowledge (TK):

- **Provide an open and transparent impact assessment process.** "Developers and government agencies have a duty to include Indigenous Peoples in decision-making processes. This obligation may go above the information standard offered to other stakeholders and often will involve ways of communicating that differ from other stakeholders."

- **Agree on the degree of participation.** "Developers and Indigenous Peoples should jointly determine the degree of participation and the avenues of communication upfront."

- **Provide meaningful participation and reassurance.** "Developers should not only ask the opinions of Indigenous members but report back and explain how their opinions have been considered and how they were incorporated into the impact assessment."

- **Ensure gender equality.** "Women and men play different roles in Indigenous cultures and may be responsible for different heritage places and values. It is important to take both perspectives into account. This may require gathering traditional knowledge from men and women separately."

- **Allow mediation.** Agree on a "processes for mediating and resolving disputes between parties that may arise during the course of the project."

- **Include native customs.** "Use participatory processes that take into account traditional customs, etiquette and decision-making processes."

- **Provide interpretation and translation.** "Verify the meaning and understanding of the communications."
- **Safeguard against exploitation.**

- **Use TK responsibility.** "Keeping traditional knowledge creates responsibility, and misuse of traditional knowledge can have catastrophic consequences for Indigenous Peoples. TK is ordinarily shared among kin and transmitted personally to an apprentice. Developers must refrain from widely sharing TK and from using it to interfere in a community's affairs."

- **Use TK only within its context.** "Developers and governments should not attempt to apply TK given to other ecosystems, areas, and other projects other than the one that the TK was specifically shared for."

- **Plan ahead.** "Developers should start the process early, ideally before entering into the project approval process."

Effective engagement with Indigenous people is an increasingly important focus for many governments and industries, and in EA processes. For instance, the Canadian and Australian governments have developed best practice frameworks for incorporating Aboriginal knowledge into project planning and assessments (Australian Government, 2013b, Shared Values Solutions, 2012; Emery & Croal, 2000).

The two Canadian case studies to illustrate effective Indigenous engagement and community participation. The first is for the Prairie Creek Mine in Northwest Territories, Canada. Indigenous engagement proved to be valuable throughout project life for both the proponents of development and Indigenous groups. This case study provides examples of the ways in which Indigenous knowledge and input can be utilized to adapt and alter the development design. The second example is a case study on the Raglan Mine located in Nunavik, Canada. This case highlights the importance of effective participation processes for the success of the development and for equitable and accountable EA processes.

CASE STUDY 4:
Incorporating Traditional Knowledge early in the environmental assessment of a mining access road

By Chuck Hubert
Associate Manager, Mackenzie Valley Environmental Impact Review Board, Northwest Territories, Canada

Key Messages:

- Gather Traditional Knowledge early during initial community engagement
- Incorporate Traditional Knowledge information during project design
- Traditional Knowledge can assist in modifying project components such as access road routing
- Use of Traditional Knowledge can address First Nation concerns and improve a project

Introduction

The gathering and incorporation of traditional knowledge in an environmental assessment is beneficial to both a mine developer and aboriginal communities. A traditional knowledge study was conducted by a First Nation community and made available to a mine developer during the early project design phase in the environmental assessment of a mining project in the Northwest Territories, Canada.

Information from the traditional knowledge study was used to re-route a winter access road away from important wildlife and wetland areas and mitigate impacts to traditional and cultural values. Early gathering and incorporation of traditional knowledge into the design phase of the project addressed concerns of the local First Nation community and resulted in a better project during environmental assessment.

Context

The existing Prairie Creek Mine is located 90 km northwest of Nahanni Butte in the Northwest Territories, Canada. The Nahanni Butte Dene Band (NBDB) is a small First Nations community in who retain traditional and cultural ties to the land and rely on healthy fish and wildlife populations for subsistence harvesting purposes. The mine and winter access road are within the traditional territory of the NBDB. Both the mine and winter road were originally constructed in the early 1980s but the mine went bankrupt before construction was complete and has never operated. The winter access road was abandoned at the same time and is no longer passable.

In 2009, owners of the Prairie Creek Mine submitted permit applications to regulatory authorities with the intention of placing the mine into production. Due to the passage of time and changes in legislation in the NWT, a new environmental assessment of the partially constructed mine site and abandoned access road was required. Accordingly, the Mackenzie Valley Environmental Assessment Review Board (Review Board) began the environmental assessment (EA) of the Prairie Creek Mine. The scope of development for the EA included both the mine and use of the existing winter access road. The Review Board instructed the developers of the Prairie Creek Mine to

consider and incorporate traditional knowledge during preparation of a Developer's Assessment Report.

TK information gathering

The NBDB commissioned a Traditional Knowledge (TK) Study due to the possibility of renewed industrial activity along the access road and plans for mine re-opening. The purpose of the TK Study was to provide the NBDB with a description of ecological, cultural and traditional values and activities in their traditional territory that may be adversely impacted by the proposed mine and the winter access road. The Study would also identify recommendations to address those impacts.

During initial community engagement with the NBDB, the mine developer requested a copy of the TK Study to determine whether its findings could be incorporated into design of their project. A confidentiality agreement was signed between the mine developer and the NBDB in order to protect sensitive TK information from being made public and possibly misused.

Traditional knowledge from the Study determined that important traditional use areas exist along portions of the winter access route and that archaeological artifacts may be present. In addition, wildlife overwintering areas and mineral licks were found to exist along the access route and might be disturbed during annual winter access construction and operation activities.

The existing winter route is abandoned and has not been used for 3 decades. It is presently not passable due to re-vegetation and numerous stream crossings. The TK Study noted concern among community members that opening up the access route once again might attract hunters from outside the NBDB traditional territory. This could result in over-harvesting of wildlife in an area that currently experiences minimal hunting pressure.

TK Study recommendations

Based on traditional knowledge information gathered during the TK Study, the following recommendations were made should the existing winter access road re-open for mining use:

- Re-alignment of portions of the winter access road to avoid sensitive wetland areas and important wildlife habitat;
- Move start of the winter road closer to the community of Nahanni Butte to allow for monitoring of road and use by hunters from outside the traditional territory;
- Conduct an archaeological assessment along the existing route and proposed re-alignment sections with an NBDB elder and interpreter;
- Use traditional knowledge approaches to monitoring the access route during annual construction and operation.

Incorporating the TK Study into project design

The developers of the Prairie Creek Mine held community meetings in Nahanni Butte during the early phases of the EA. Traditional knowledge was gathered by the developer from these community meetings in addition to the TK Study prepared by the NBDB. The information obtained by the developer was able to influence the project in a positive way because it was collected early in the project design phase. The access route re-alignments recommended by the NBDB were incorporated into

the project design by the developer. The Developer's Assessment Report submitted to the Review Board for environmental assessment included the re-routing of the winter access road.

Conclusion

A TK Study was commissioned by the NBDB in anticipation of the proposed re-opening of an old winter access road and development of the Prairie Creek Mine. Traditional knowledge information was collected by the NBDB and shared with the developer of the proposed mine. Through early community engagement, the developer was able to integrate the TK into project design and modify the winter access road to the Prairie Creek Mine. The TK Study provided recommendations that resulted in the proposed re-alignment of the winter road and relocation of the start of the road. These project design modifications are a good example of how traditional knowledge informed an environmental assessment early during project design, how TK addressed the concerns of a First Nation community and resulted a better project.

CASE STUDY 5:
Raglan Mine Case Study, Quebec

By Peter Croal
International Environment and Development Advisor

The Raglan Mine is one of the world's richest sulphide-based nickel deposits (Shared Value Solutions, 2012). It is situated in the remote Ungava Peninsula, in Nunavik, 1,800 km north of Montreal, Quebec, Canada. The mine went into production is 1997 after more than 30 years of intense exploration, negotiation and development. The Inuit have inhabited the region for over 4,000 years, and now consist of a population of about 8,000 people. The Inuit were originally nomadic, but started permanent settlements in the 1950's. There are now 14 villages in the region. Roads do not link the communities so regional transportation is mainly by air, boat or skidoo.snow machine. The village of Salluit (population 850) lies 100km northwest of the mine, and the village of Kangiqsujuaq (population 370) lies 60km east of the site. The mine is owned and operated by the Glencore Group. There are 3 underground mines and one open pit operation (Natural Resources Canada, 2007).

The Environmental Assessment consisted of many baseline studies. Key issues for the local people were to minimize water effluent coming from the mine site, water consumption, air emissions, minimizing acid rock drainage and progressive reclamation of the mine tailings (Shared Value Solutions, 2012). To safeguard the very sensitive sub-Arctic permafrost, mine worker residences were built on iron pilings so there was no heat transfer to the ground. To ensure Arctic Char (an important local food source) populations were kept healthy, an Arctic Char monitoring program was developed that relied heavily on the Traditional Knowledge of the Inuit from the two neighboring communities (International Council on Metals and the Environment, 1999). The Joint Scientific Fishing Program was established that used local Traditional Knowledge and western science to protect the char.

Traditional Knowledge was also used in the environmental assessment to determine the migration routes of marine mammals. This resulted in the decision to shorten the

ore-shipping season, and avoid ice breaking in Deception Bay from March to June. During the early phases of the environmental assessment and project exploration, the company hired a local Inuit advisor to provide liaison between the company and the communities (Natural Resources Canada, 2007). The company also took steps to acquaint local communities with the project and to consult them about all their concerns. These initiatives included visits by company personnel to the communities, meetings with mayors, councilors and elders, participation in local radio talk broadcasts and visits by community members to operating northern mines. These consultations and frequent contact between the communities and the company created a strong relationship based on trust and transparency that resulted in a development agreement being signed (Mining Watch, 1999).

In 1995, the Raglan Agreement (Impact Benefit Agreement) was signed between the mine operator, the Qaqqalik Landholding Corporation of Salluit, the Salluit community, the Nunaturlik Landholding Corporation of Kangiqsujuaq, the Kangiqsujuaq community, and Makivik Corporation, which is responsible for the political, social and economic development of the Nunavik territory. The Agreement was structured to address the many environmental and cultural issues identified during the environmental assessment. Key to the Raglan agreements effectiveness centres on the requirements to hire suitability qualified Inuit to work at the mine. Of the 600 employees at the mine, about 95 Inuit, or 16% of the workforce are employed at the mine. As well the Agreement stipulates that qualified Inuit business receive preferential selection for the provision of goods and services to the mine (Natural Resources Canada, 2007)

To ease the social strains of Inuit employees being away from their families, the company flies the Inuit back to their home communities at the end of their two-week shifts. The company also provides extensive career and personal counseling to ensure Inuit are content in their jobs and home life. At the mine site, Inuit have access to freezers and kitchen facilities to store and prepare country foods (Natural Resources Canada, 2007)

A six-member Raglan Committee was formed to ensure the Agreement was being respected, and to address all issues related to mine operations. The Raglan committee meets several times a year. Inuit representatives from Salluit, Kangiqsujuak and Makavik Corporation occupy half of the committees six seats, with mining company officials holding the balance (Mining Watch, 1999). There are core lessons for the success:

- Early and continued involvement of Inuit communities
- Use of Traditional Knowledge in the environmental assessment
- Genuine efforts by all parties to resolve issues
- Development of an effective Raglan Committee
- Recognition that the Inuit have unique land and cultural rights

The Mining Association of Canada (MAC) awarded Glencore's Raglan Mine with the 2016 Towards Sustainable Mining (TSM) Environmental Excellence Award for its successful use of renewable energy and community engagement with its wind turbine and accompanying storage facility in northern Quebec, the largest in the province. (Mining Association of Canada, 2016).

SUMMARY

Best Practices in EA and Recommendations for Developing Nations

The mining industry provides a range of important opportunities for supporting economic growth in developing nations. The sector entails unique environmental impacts that can be anticipated and managed through the planning, assessment and review stages of development. Our approach in this review focuses on assessment principles and practices that may be applied to a range of settings, including developing nations

The need for advancing and innovating data management, collection, and monitoring continues to exist for EA internationally. The availability and quality of baseline data is often limited in developing nations (Appiah-Opoku & Bryan, 2013; Toro et al., 2010). Baseline data is needed to support the screening, scoping, and assessment phases of EA for both biophysical and social and cultural issues. It may include past and continuing monitoring data, scientific data, and traditional and local knowledge (Appiah-Opoku, 2001; Appiah-Opoku & Bryan, 2013; Nwapi & Ingelson, 2015). EA can be accompanied by significant data demands but baseline information is essential to predicting and understanding impacts in relation to the existing state of the environment.

Consultation and communication with public stakeholders and Indigenous groups is essential for good EA processes, and can be especially important in many locations where mines are developed. The challenges for EA and participation practices are highly dependent on the demographic and cultural context of the proposed development, the potential for social risk, and community concerns about development. These issues may be intensified and distinctive in developing nations (Evans, 2015; Nwapi & Ingelson, 20150. While improvements have been made for accountable participation, ongoing work is needed to ensure that communities and adequately consulted about and benefit from mining operations.

> ***Transparent and sincere participation processes are beneficial to both the development proponents and public stakeholders. The positive relationship between communities and developers that results, helps builds trust between industry, the public, and regulators.***

In many countries EA is a new and emerging process and would benefit from support for clear procedures, supportive materials and training to improve the capacity and skills of proponents, regulators, and practitioners (Appiah-Opoku & Bryan, 2013; Heinma & Põder, 2010; Toro et al., 2010). It is important that EA is an independent process but established within broader environmental management and development decision-making. There must be political will and support for conducting EA and for using it as a tool for decision-making.

As EA research and practice continues to evolve, new areas are emerging that will require attention. Key areas for future knowledge building include continuing to build data and data management practices and further advancing integration of cumulative effects and strategic assessments into EA. The need for the effective incorporation of cumulative impacts and strategic assessments are well recognized. In particular, issues such as climate change or sustainability are increasingly called on to be included in EA. How best to effectively incorporate these broad issues is an important area for future work (Burdge, 2008). In an applied process such as EA, it may easier to account for objectives such as climate change attenuation or enhancing resiliency and adaptation characteristics of projects, which can be measureable and linked to technical and other targets, rather than more conceptual and equivocal objectives such as sustainability which can be difficult to apply beyond a token way to operational activities in sectors such as mining. Those may be best addressed at a different policy level, or as clear and identifiable aims in strategic planning processes. Nevertheless, many companies

are developing sustainability strategies/policies to help delineate the improvements they make to operations that have positive net environmental and social-economic outcomes, result in reduce impacts to the environment, or improve transparency and community engagement.

Environmental assessment can provide an important process for understanding and accounting for the impacts that mining entails, and for enhancing the benefits and outcomes of mineral and other developments. Regardless of the setting, to be an effective n environmental management and protection tool, and to support well-informed decision-making, EA best practices should encompass core values:

- Effective EA is integrative and linked to decision-making;
- contributes to achieving environmental management goals;
- is comprehensive and considers all development impacts;
- is evidence-based;
- accountable;
- builds stakeholder confidence;
- provides legitimate opportunities for participation and inclusion;
- is supported by legislation; and
- is open to innovation.

(Hanna & Noble, 2015)

Effective assessment processes are open to accepting and considering multiple types of information including traditional knowledge, community based knowledge, and public opinions and values. And they have the capacity to consider a range of impacts including biophysical, social, economic, health, and cumulative impacts— effectively a comprehensive and ***holistic definition of the environment***.

Environmental assessment is not about stopping development or growth; it is not about limiting opportunities for communities; it is about making projects better and supporting informed decisions. The principles, practices, and case studies we provide here are a guide for the practice and implementation of effective environmental assessment in an important global resource sector. Assessment that supports best practices in mining also supports environmental management and protection.

NOTES

1. In this report we use the term *developing nations*. UN and Canadian agencies and development organizations use the term developing nations. However, the World Bank has moved away from using the term developing nations and instead the Bank's World Development Indicators (2016) provides a distinction between developing countries (defined in previous editions as low- and middle-income countries) and developed countries (previously high-income countries), but does not use a specific term to replace developing nations.

2. Here we use the term *environmental assessment*, but the literature also uses terms *impact assessment* and *environmental impact assessment*. These can be specific to jurisdictions or parts of a process, and in some places they can have well-defined legal or regulatory meanings. We use the term environmental assessment holistically, as a process that defines the environment as encompassing the biophysical and human qualities of the places within which development occurs.

3. *Stakeholders* can be defined as those who have direct interest in or may be affected by the project. The *public* can be defined more broadly and may include those who have an interest in the project but may not be directly or indirectly affected by it.

4. We use the terms *participation* and *involvement* to denote the capacity of the public and stakeholders to meaningfully inform the process and shape the decision. Participation has the capacity to influence the outcomes.

5. These stages have been adapted from Hanna, 2009 and 2016.

6. Social risks encompass the human dimensions of environmental degradation, human or labour rights violations, corruption, increased marginalization and economic disadvantage, gender or other discrimination.

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APPENDIX 1

The International Best Practice Principles series from IAIA provides best practices for practitioners for several EA areas:

- Principles of Environmental Impact Assessment Best Practice
- SEA Performance Criteria
- International Principles for Social Impact Assessment
- Biodiversity in Impact Assessment
- Public Participation International Best Practice Principals
- Health international best practices
- EIA Follow-up
- Publishing EIA-related and Primary Biodiversity Data: GBIF IAIA Best Practice Guide
- Climate Change International Best Practice Principles
- Respecting Indigenous Peoples and Traditional Knowledge

These best practice documents are available at the following Internet link (please note that links may be modified by the hosting organization):
http://www.iaia.org/best-practice.php

APPENDIX 2

EXAMPLE OUTLINE OF A PROJECT DESCRIPTION

This outline is adapted from CEAA, 2015, Guide to Preparing a Description of a Designated Project under the Canadian Environmental Assessment Act, 2012, Minister of Environment: Ottawa.
The outline is modified for application across a range of jurisdictions. This version assumes that the definition of the environment includes the social and economic context.

Project Title and Proponent Name

Summary of the Project

Proponents are to include as part of the project description a standalone section that summarizes the information identified in Sections 1 to 7 below. The EA agency and other regulators may be required to consult the public on a summary of the project description that has to be posted on an agency's Internet site. This section will provide an overview of the project, its impacts, and the process for review and other important information in non-technical language for best communication to broad audiences. In some locations the proponent may be required to provide summary and other information in multiple languages depending on the communities and stakeholders in the regional/locale of the project.

1. General and Proponent Information

1. Describe the nature of the project, and proposed location (in brief; note that additional location details are to be provided in section 3).

2. Proponent information:
   - Name and address of the proponent.
   - Chief Executive Officer or equivalent, or other designated representative.
   - Principal contact person for purposes of the project description.
   - Other ownership information about the company.

3. A list of any jurisdictions and other parties including Indigenous groups and the public that were consulted during the preparation of the project description.

4. Information on whether the project is subject to the environmental assessment and/or regulatory requirements of other jurisdictions.

2. Specific Project Information

Information to the extent that it is available or applicable.

1. A general description of the project, including the context and objectives of the project. Indicate whether the project is a component of a larger project.

2. If applicable, indicate the provisions in the EA legislation or regulations, or other legislation that describe the physical activities that are proposed to be carried out as part of the project.

3. Components and activities:

Provide a description of the components associated with the project, including:

1. The physical works associated with the project (e.g., large buildings, other structures, such as bridges, culverts, dams, marine transport facilities, mines, pipelines, power plants, railways, roads, and transmission lines) including their purpose, approximate dimensions, and capacity. Include existing structures or related activities that will form part of or are required to accommodate or support the project.

2. Anticipated size or production capacity, including a description of the production processes to be used, the associated infrastructure, and any permanent or temporary structures. The production capacity would the maximum production capacity based on the project's design and operating conditions, not the planned output.

3. If the project or one component of the project is an expansion, describe the size and nature of the expansion.

4. A description of the physical activities that are incidental to the project:
- nature of the proposed activities and whether they are subordinate or complementary to the project;
- whether the activity is within the care and control of the proponent;
- if the activity is to be undertaken by a third party, the nature of the relationship between the proponent and the third party and whether the proponent has the ability to "direct or influence" the carrying out of the activity;
- whether the activity is solely for the benefit of the proponent or is available for other proponents as well; and,
- the regulatory requirements for the activity.

4. Emissions, discharges and waste.

A description of waste that is likely to be generated during all phases of the project and plans to manage that waste, including the following:
- Sources of atmospheric contaminant emissions during project phases (potentially focusing on criteria air contaminants and greenhouse gases, or other non-criteria contaminants that are of potential concern) and location of emissions.
- Sources and location of liquid discharges.
- Types of wastes and plans for their disposal (e.g., landfill, licensed waste management facility, marine waters, or tailings containment facility).

5. Economic and social, and other community impacts that are likely during all phases of the project.

6. Construction, operation, decommissioning and abandonment phases and scheduling.

Provide a description of the time-frame in which the development is to occur and the key project phases, including the following:
- Anticipated scheduling, duration and staging of key project phases, including preparation of the site, construction, operation, decommissioning and abandonment.
- Main activities in each phase of the project that are expected to be required to carry out the proposed development (e.g., activities during site preparation or construction might include, but are not limited to, land clearing, excavating, grading, de-watering, directional drilling, dredging and disposal of dredged sediments, infilling, and installing structures).

3. Project Location

1. Provide a description of the project's location including:

    1. Coordinates (i.e. longitude/latitude using international standard representation in degrees, minutes, seconds) for the centre of the facility or, for a linear project, provide the beginning and end points.

    2. Site map/plan(s) depicting location of project components and activities. The map/plan(s) should be at an appropriate scale to help determine the relative size of the proposed components and activities.

    3. Map(s) at an appropriate scale showing the location of the project components and activities relative to existing features, including but not limited to:
        - watercourses and waterbodies with names where they are known;
        - linear and other transportation components (e.g., airports, ports, railways, roads, electrical power transmission lines and pipelines);
        - other features of existing or past land use (e.g., archaeological sites, commercial development, houses, industrial facilities, residential areas and any waterborne structures);
        - location of Indigenous groups, settlement land (under a land claim agreement) and, if available, traditional territory;
        - Government lands (federal/national, state/provincial, regional, county and municipal) including, but not limited to National parks, National historic sites, and other government reserves or facilities;
        - nearby communities;
        - permanent, seasonal or temporary residences;
        - fisheries and fishing areas, hunting areas and guide-outfitter tenures (i.e., Indigenous, commercial and recreational);
        - environmentally sensitive areas (e.g., wetlands, and protected areas, including migratory bird sanctuary reserves, marine protected areas, priority ecosystems); and,
        - intra-jurisdictional and international boundaries.

    4. Photographs of work locations to the extent possible.

    5. Proximity (not shown on the maps above) of the project to:
        - any permanent, seasonal or temporary residences;
        - Indigenous territories, as well as lands and resources currently used for traditional purposes by Indigenous peoples; and,
        - government lands.

2. Land and Water Use

To the extent that is known at this time, describe the ownership and zoning of land and water that may be affected by the project, including the following:

1. Zoning designations or other land use designations.

2. Legal description of land to be used (including information on sub-surface rights) for the project, including the title, deed or document and any authorization relating to a water lot.

3. Any applicable land use, water use (including ground water), resource management or conservation plans applicable to or near the project site. Include information on whether such plans were subject to public participation.

4. Describe whether the project is going to require access to, use or occupation of, or the exploration, development and production of lands and resources currently used for traditional purposes by Indigenous peoples.

4.0 Government Involvement – Financial Support, Lands and Legislative or Regulatory Requirements

1. Describe if there is any proposed or anticipated government financial support for the project.

2. Describe any government lands that may be used for the purpose of carrying out the project. This is to include any information on any granting of interest in government land (i.e., easement, right of way, or transfer of ownership).

3. Provide a list of any permits, licenses or other authorizations that may be required to carry out of the project, and whether these are contingent on the completion of the EA or are already in place.

5.0 Environmental Impacts

The information to be provided in this section is meant to be a brief assessment of the environmental interactions of the project. A detailed examination of the potential environmental effects of the project does not need to be included in the project description. If the proponent is of the opinion that the project is not likely to cause adverse environmental effects, it must provide evidence to support its view.

Using existing knowledge and available information provide an overview of the following:

1. A description of the physical and biological setting, including the physical and biological components in the area that may be adversely affected by the project (e.g., air, fish, terrain, vegetation, water, wildlife, including migratory birds, and known habitat use). A description of any changes that may be caused as a result of carrying out the project to fish, animal or bird habitat;

2. A description of any changes to the environment that may occur, as a result of carrying out the project within the region, or that may affect another jurisdiction.

3. A description of the effects on Indigenous peoples of any changes to the environment that may be caused as a result of carrying out the project, including effects on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes,

4. Impacts on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

5. Impacts on the social, economic, health and other human dimensions of the environment, whether negative impacts or positive. Where applicable provide an understanding of impacts unique to women, and components of a community that may be underrepresented in participation.

6.0 Participation with the Public and Other Parties

Provide the following information to the extent that it is available or applicable:

1. An overview of key comments and concerns expressed to date by stakeholders and any responses that have been provided.

2. An overview of any ongoing or proposed stakeholder participation activities.

3. A description of any participations that have occurred with other jurisdictions that have environmental assessment or regulatory decisions to make with respect to the project.

4. Specific participation and accommodation activities and considerations relevant to Indigenous peoples (if applicable). This may require a separate and distinct approach to participation, depending on the jurisdiction.

APPENDIX 3

Best practices for EA follow-up activities are specific to the type of development project in question, however a number of basic principles have been defined (Arts, Caldwell, & Morrison-Saunders, 2001; Marshall et al., 2005; Morrison-Saunders et al., 2016). The key concepts are well summarized by the set of principles for follow-up best practice developed by Morrison-Saunders and colleagues for IAIA (2007):

1. The proponent is responsible and accountable for implementing follow up.
2. Regulators are responsible for ensuring that EA follow-up occurs.
3. The community should be directly involved in follow-up.
4. All parties, including the proponents, regulators, and the public, should seek to co-operate.
5. Follow-up should promote learning in order to improve future practice.
6. There should be a clear division of responsibilities, roles, and tasks between the parties for follow-up activities.
7. Follow-up should be "objective led and goal oriented." Follow-up should seek to achieve defined objectives or goals and defining these goals should be part of follow-up scoping.
8. Follow-up should be "fit for purpose" and tailored to the proposed activity.
9. Follow-up should include the "setting of clear performance criteria" to evaluate follow-up practice.
10. "Follow-up should be sustained over entire life of activity".
11. "Adequate resources should be provided for follow-up".