Good Practice Note
Cumulative Impact Assessment and Management
Guidance for the Private Sector in Emerging Markets

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TABLE OF CONTENTS

APPENDIXES

FIGURES

TABLES

BOXES

LIST OF ACRONYMS

CIA	Cumulative Impact Assessment and Management
CEA	Cumulative Effect Assessment
DAI	Direct Area of Influence
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
GN1	IFC Guidance Note 1
IFC	International Finance Corporation
PS	IFC Performance Standards on Environmental and Social Sustainability
RCIA	Rapid Cumulative Impact Assessment
SEA	Strategic Environmental Assessment
VEC, VECs	Valued Environmental Component(s) (ecosystem, social, or cultural)

OPENING PAGE

The major environmental and social management challenges that we face today – loss of biodiversity, the decline of ocean fisheries, limitations on food security, scarcity of usable freshwater resources, increases in urban poverty, and climate change - are all the result of cumulative impacts from a large number of activities that are for the most part individually insignificant, but which together have had regional or even global repercussions. The importance of understanding the cumulative environmental and social impacts from multiple projects or activities located in the same geographic region or affecting the same resource (e.g. watershed, airshed) has been acknowledged for decades. In some cases the most ecologically devastating environmental effects, and its subsequent social consequences, may not result from the direct effects of a particular project or activity but from the combination of existing stresses and the individually minor effects of multiple actions over time (Clark, 1994).

> The US Council on Environmental Quality (1997) defines CEA as follows: "*the impact on the environment which results from the incremental impact of the action when added to their past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other action*". Hegman et al. (1999) define cumulative effects as "*changes to the environment that are caused by an action in combination with other past, present and future actions*".

Consequently, though an environmental and social impact assessment (ESIA) is an essential tool to assess and manage the environmental and social impacts of individual projects, it may be insufficient to identify and manage the incremental impacts on areas or resources used or directly impacted by a project from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.

Cumulative impacts are contextual and encompass a broad spectrum of impacts at different spatial and temporal scales[1]. In some cases, cumulative impacts will occur because a series of projects of the same type are being developed, for example when a series of hydroelectric projects are constructed or planned on the same river or within the same watershed, when multiple oil and gas projects or mines are being developed in close proximity or when a series of wind farms are constructed or planned within the same flyway or region. In other cases cumulative impacts will occur from combined effects over a given resource of a mix of different types of projects, for example the development of a mine site, access roads, transmission lines, and adjacent land uses.

The purpose of this IFC *Good Practice Note* is to provide practical guidance to companies investing in emerging markets to improve their understanding, assessment, and management of cumulative environmental and social impacts associated with their projects.

[1] A given impact may be generated at a specific site or moment in time, but its consequences may be felt at a different geographical area (e.g downwind or downstream), or materialize years after (e.g. bioaccumulation, resilience threshold is reached) – thus transcending the traditional "direct area of influence - DAI" concept, and thus requiring an expansion of the geographical boundaries of the impact assessment and/or the time frame used for the analysis.

IFC'S APPROACH

In the context of Performance Standard on Environmental and Social Sustainability PS1: Assessment and Management of Environmental and Social Risks and Impacts, the IFC recognizes that in some instances, private sector developers need to consider cumulative effects in their environmental and social impact and risk identification and management process. Therefore, the IFC believes that when private sector project sponsors are faced with cumulative impact, it should have mechanisms to identify the magnitude and significance of its contribution to such accumulated environmental and social impacts and risks, and include appropriate mitigation measures as an integral component of the project's ESMS.

IFC considers good practice for private sector management of cumulative impacts to be two pronged:

- Effective application of the Mitigation Hierarchy[2] in environmental and social management of the specific project contributions to the expected cumulative impacts; and

- Best efforts to engage, enhance, and contribute to a multi-stakeholder collaborative approach for the implementation of management actions that are beyond the capacity of an individual project proponent.

PS 1 defines the area of influence to encompass "*cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impact identification process is conducted*". PS1 offers some context to limit the cumulative impacts to be addressed to "*those impacts generally recognized as important on the basis of scientific concerns and/or concerns from Affected Communities"* and provides examples such as *"incremental contribution of gaseous emissions to an air-shed; reduction of water flows in a watershed due to multiple withdrawals; increases in sediment loads to a watershed; interference with migratory routes or wildlife movement; or more traffic congestion and accidents due to increases in vehicular traffic on community roadways*".

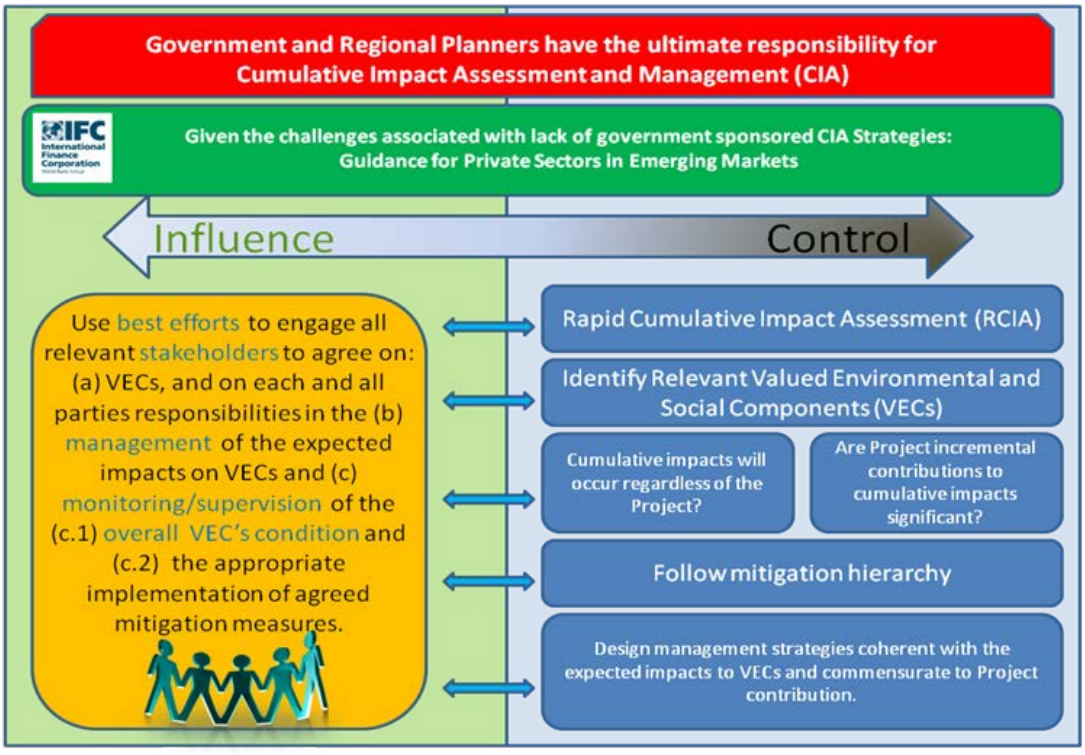
Even though PS1 does not expressly require, or put the sole onus on, private sector clients to complete a full Cumulative Impact Assessment and Management (CIA), it states that the impact and risk identification process "*will take into account the findings and conclusions of related and applicable plans, studies, or assessments prepared by relevant government authorities or other parties that are directly related to the project and its area of influence*" including "*master economic development plans, country or regional plans, feasibility studies, alternatives analyses, and cumulative, regional, sectoral, or strategic environmental assessments where relevant*". Furthermore, it goes on stating that "*the client can take these into account by focusing on the project's incremental contribution to selected impacts generally recognized as important on the basis of scientific concern or concerns from the Affected Communities within the area addressed by these larger scope regional studies or cumulative assessments"*

[2] Defined in PS1 (2012) as the strategy to first anticipate and avoid impacts and risk over workers, the environment and/or Affected Communities, or where avoidance is not possible impacts and risks must be minimized. Acceptable options to minimize will vary and include: abate, rectify, repair, and/or restore. Finally, where residual impacts remain, these must be compensated/offset.

Similarly, PS Guidance Note 1 states that "*in situations where multiple projects occur in, or are planned for, the same geographic area... it may also be appropriate for the client to conduct a CIA as part of the risks and impacts identification process"*. However, it recommends that this assessment should (a) *"be commensurate with the incremental contribution, source, extent, and severity of the cumulative impacts anticipated",* and *(b)* "*determine if the project is incrementally responsible for adversely affecting an ecosystem component or specific characteristic beyond an acceptable predetermined threshold (carrying capacity) by the relevant government entity, in consultation with other relevant stakeholders"*.

Therefore, although the total cumulative impacts due to multiple projects should be typically identified in government sponsored assessments and regional planning efforts, per PS1 IFC clients are expected to ensure that their own assessment determines the degree to which the project under review is contributing to the cumulative effects. This proposed *Good Practice* notes the importance of differentiating between those actions over which a private sector sponsor has direct control vis-à-vis those that it may be able to influence to achieve optimal cumulative impact management as part of a multi-stakeholder effort that should typically be led by government agencies. Figure 1, illustrates the overall context and proposed approach that exemplifies what would constitute general compliance with IFC PS1.

Figure 1: PS1 CIA Recommended Approach



BEST EFFORTS	COMPLIANCE

This *Good Practice Note* is based on IFC's experience in applying the Performance Standards and is non-prescriptive in its approach. It should be used in conjunction with Performance

Standards, their respective Guidance Notes and World Bank Group Environmental, Health, and Safety Guidelines, which contain basic requirements and good international practices to be followed when designing, developing, and/or implementing projects. This document is not intended to duplicate existing IFC environmental and social policy requirements.

1. WHAT IS CUMULATIVE IMPACT ASSESSMENT AND MANAGEMENT AND WHY IS IT NEEDED?

1.1 WHAT ARE CUMULATIVE IMPACTS?

Cumulative impacts are those that result from the incremental impact of a project when added to other existing, planned, and/or reasonably predictable future projects and developments. Cumulative impacts are limited to those impacts generally recognized as important on the basis of scientific concerns and/or concerns from Affected Communities[3].

Examples of cumulative impacts include:

- effects on ambient conditions such as incremental contribution of pollutant emissions in an airshed,
- increase in pollutant concentrations in a water body, in the soil or sediments, or their bioaccumulation,
- reduction of water flow in a watershed due to multiple withdrawals,
- increases in sediment loads to a watershed or increased erosion,
- interference with migratory routes or wildlife movement,
- increased pressure on the carrying capacity or the survival of indicator species in a given ecosystem,
- wildlife population reduction due to increased hunting, road kills, and forestry operations,
- depletion of a forest as a result of multiple logging concessions,
- secondary or induced social impacts, such as in-migration, or more traffic congestion and accidents along community roadways due to increases in transport activity in a project area of influence. [4]

Multiple environmental and social impacts from existing projects, combined with the potential incremental impacts resulting from proposed and/or anticipated future projects may result in significant cumulative impacts that would not be expected in the case of a stand-alone project or business activity.[5]

[3] Affected Communities are defined as local communities directly affected by the project (PS 1, Paragraph 1, 2012).
[4] Direct quote from GN1, para 38
[5] Direct quote from GN1, para 37.

Box 1. Demise of the Aral Sea

The Aral Sea Basin, surrounded by desert, is shared by eastern Kazakhstan and eastern Uzbekistan. It is fed primarily by the Amu Darya and Syr Darya rivers. The Aral Sea was the world's fourth largest freshwater lake covering 68,300 km^2 with a volume of 1006 km^3. In the late 1950s the lake was teeming with life. It supported fishing ports and thriving commercial fishery with an annual catch of 46,000 tonnes in the early 1960s. In the 1960s, water began to be diverted from the Syr Darya and Amu Darya rivers for hydropower and through irrigation systems for growing cotton. With continued expansion of the irrigation systems over time, approximately 7 million ha of agricultural land now depends on irrigation. By the 1980s, the water from the Syr Darya and Amy Darya was completely utilized with little flow reaching the Aral Sea Basin[6].

The cumulative impacts have aggregated over the past 30 years. By 1986, the Aral Sea had split into two water bodies, the so called "Southern Aral Sea" and "Northern Aral Sea" and by 2002, the level of Southern Aral Sea had fallen by 22 m. By 2005, the Aral Sea had shrunk to half of its former size and its volume diminished by 75%. Kazakhstan has built a dam between the northern and southern parts of the Aral Sea. Completed in 2005, the dam was basically a death sentence for the southern Aral Sea, which was judged to be beyond saving. All of the inflow from the Syr Darya now stays in the Northern Aral Sea. Today, the Southern Aral Sea continues to shrink. The shallow eastern basin all but disappeared in 2009 after four years of drought reduced and eventually stopped any Amu Darya inflow. In 2010, the drought ended and water entered the eastern basin once again. But in 2011, less water entered the basin. Water levels in 2011 were lower than any previous year except 2009[7].

Source: http://earthobservatory.nasa.gov/Features/WorldOfChange/aral_sea.php

The magnitude of the cumulative socio-economic impacts is almost unprecedented. The retreat of the Aral Sea shoreline decimated former ports and fishing communities. The once abundant fishery has virtually ceased to exist. The increasingly saline water of the rivers has become polluted with fertilizer and pesticides. The blowing dust from the exposed seabed, contaminated with agricultural chemicals, is a public health hazard as it settles onto fields, degrading the soil[8]. Much of the former Aral Sea Basin has now become desert. Rusted hulks of boats and ships lie abandoned in the desert as a poignant reminder of this once great aquatic ecosystem.

One can argue that the demise of Aral is a trade-off against the socio-economic benefits of irrigated agriculture. Unfortunately, unsustainable land and water management practices combined with poor maintenance of irrigation infrastructure, has led to severe land degradation. Vast stretches of irrigated land in the Amu Darya and Syr Darya basins are now salinized or waterlogged as are many other areas in Central Asia. Estimates are that more than half of the irrigated land in Central Asia is salinized or waterlogged[9]

[6] Asian Development Bank, 2010. Central Asia Atlas of Natural Resources. pp.82-84. Asian Development Bank, Manila, Philippines
[7] Our Amazing Planet. http://www.ouramazingplanet.com/1805-aral-sea-continues-to-shrink.html
[8] NASA Earth Observatory. http://earthobservatory.nasa.gov/Features/WorldOfChange/aral_sea.php
[9] Asian Development Bank, 2010. Central Asia Atlas of Natural Resources. pp.154-156. Asian Development Bank, Manila, Philippines.

Box 2. Valued Environmental and Social Components (VECs)*

Cumulative Impact Assessments and Management are complex and cost time and money. For a CIA to be effective in supporting good overall environmental and social risk management, the scope of the CIA must be properly defined. Since it is unrealistic to think that every environmental and social aspect that can be subjected to cumulative impact can be appropriately factored into a CIA, it is good practice to focus the assessment and management strategies over Valued Environmental and Social Components (VECs).

What are VECs?
VECs are environmental and social attributes that are considered to be important in assessing risk; they may be:

- physical features,
- habitats,
- wildlife populations,
- environmental processes,
- ecosystem conditions (e.g. biodiversity),
- social conditions (e.g. health, economics), or
- cultural aspects.

While VECs may be directly affected by a project, they are often also found at the end of ecological pathways that transfer direct (primary) impacts to higher order impacts on VECs. Throughout this *Good Practice Note* we use the acronym VECs to refer to sensitive or valued receptors which desired future condition determines the assessment endpoints to be used in the CIA process.

The identification of assessment endpoints is a critical step in any risk assessment. To guide subsequent analysis identification of endpoints needs to be initiated during the scoping phase (Section 2 – Steps 1 and 2). This is done through social and ecological scoping. Social scoping through consultation with Affected Communities/stakeholders is used to establish the terms in which cumulative impacts should be expressed (i.e. which environmental attributes or components of the environment will be the subject of CIA). Ecological scoping is used to identify how impacts can be studied and predicted. VECs should reflect public concern for social, cultural, economic or aesthetic values, and also the scientific concerns of the professional community (Beanlands and Duinker, 1983).

How do VECs impact the CIA process?
CIA is inherently future-oriented and the concern for assessment of cumulative impacts is driven by the need to understand the condition of VECs that is expected to result from the combination of development impacts and natural forces that will affect them. For instance, to what extent will terrestrial habitat be fragmented beyond its ecological functionality vis-à-vis the cumulative impacts from multiple linear infrastructure developments?

Good CIA focuses on understanding whether cumulative impacts will affect the sustainability of a VEC as indicated by the predicted condition of the VEC. Consequently the significance of cumulative impacts is judged in the context of thresholds (limits of acceptable change), within which VEC condition is considered to be acceptable but beyond which further change in VEC condition is not acceptable. If such thresholds are not established, the significance of cumulative impacts cannot be determined.

Defining thresholds for VECs
The sustainability of VECs, whether ecological, biological or related to human communities, is their capacity to endure – for the ecosystem/community to remain diverse and productive over time. This is reflected in the definition of *sustainable use* given in the Convention on Biological Diversity as using the "components of biological diversity in a way and at a rate that does not lead to the long term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of future generations."

The sustainability of VECs depends upon both the forces that affect them and their social-ecological vulnerability (sensitivity), the degree to which they are susceptible to, and unable to cope with injury, damage, or harm.

Defining thresholds of acceptable VEC condition involves social and ecological scoping informed by scientific understanding. In setting them, one considers thresholds, points at which there is an abrupt change in a VEC condition, where small changes in a given environmental or social driver produce large responses in the VEC condition (after Groffman et al. 2006). Ecological thresholds for physical VECs such as air, water, and soil quality are often readily available in either government established ambient quality standards or on international scientific literature. See Appendix 1 for examples of indicators of cumulative impacts that are required to be addressed by IFC Performance Standards.

*Acronym coined by Beanlands and Duinker (1983) to refer to “valued ecosystem components”.

1.2 WHAT IS CUMULATIVE IMPACT ASSESSMENT AND MANAGEMENT?

CIA is the process of analyzing the potential impacts and risks of proposed developments in the context of potential effects of other human activities and natural environmental drivers on the chosen VECs over time, and proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible.

The key analytical task is to discern how the potential impacts of a proposed development might combine, cumulatively, with the potential impacts of the other human activities and other natural stressors such as droughts or extreme climatic events. VECs are immersed in a natural ever-changing environment that impacts their condition and resilience. For example, periodic extremes of precipitation (droughts or floods), temperature (extreme cold or heat), or fluctuations in predators, all impact the condition of biological VECs. Today and into the future, global warming (climate change) can be expected to have substantial impacts on VECs condition.

"Other human activities" of greatest importance in CIA are those that (a) will occur in the future, or, if already existing, have ongoing influences on the environment in the future, and (b) are expected to interact with the same VECs in the future as does the development under assessment. CIA represents an analytical complication in ESIA because the spatial horizon of impact assessment is usually expanded, compared to "normal" project ESIA, and the interactions between human activities and VECs increase in number and complexity.

The objectives for CIA are to:

- Ensure that the proposed development's cumulative social and environmental impacts and risks will not exceed a threshold that could compromise the sustainability of VECs;
- Ensure that the proposed development's value and feasibility are not limited by cumulative social and environmental impacts and risks; and
- Support development of regional governance structures for decision making and managing cumulative impacts.

Assessment of accumulated impacts should employ information from a variety of instruments including, regional environmental studies and programs; strategic, sectoral and regional environmental assessments; project environmental assessments, cumulative impact assessments, and targeted studies on specific issues.

1.3 UNDER WHAT CONDITIONS SHOULD A CIA BE CONDUCTED?

Cumulative impact assessment is appropriate whenever there is concern for the cumulative impacts on one or more VECs. This concern may be pre-existing or as a consequence of the potential cumulative impacts of the project and other projects, human activities or natural drivers. CIA is also appropriate whenever a project is expected to have significant or irreversible impacts on the future condition of one or more VECs that also are, or will be, impacted by other developments. The other developments may already exist, be reasonably predictable, or a mix of existing and reasonably predictable developments. In circumstances where a series of developments of the same type is occurring, or being planned, the need for CIA can be fairly obvious, for example:

- when a series of mining developments occur within an area where they will impact the same VECs (perhaps common water bodies or water courses, wildlife populations, community health, community loss of access to assets, or multiple land take);

- when a series of hydroelectric developments occur within the same river or within the same watershed with cumulative impacts in common on flora and fauna, on downstream water availability or quality, on watershed sediment dynamics, on navigation, on local communities livelihoods, on adjacent land uses due to increased access from associated roads; or

- a series of agricultural developments occur that will cumulatively impact land use patterns, have cumulative impacts on downstream water availability (from withdrawal of water for irrigation), on downstream water quality or on local community livelihoods.

Good CIA practice, however, is not limited only to assessing the impacts of developments of the same type. For example, the development of a mine in association with increased access from road construction that will bring further induced development (perhaps in association with developments in adjacent forest management, hydroelectric power developments, agriculture or other activities all of which may impact local communities, wildlife, or water availability and quality) is also cause for CIA.

In some cases it may be that CIA is needed to assess and manage the impacts of several new projects that are being developed and or planned. In other situations, CIA of a single new project may be appropriate when the project occurs in an area where there are existing concerns regarding cumulative impacts that are either well documented or are identified through consultation with Affected Communities. Also, in some situations different components of the same project are assessed in separate ESIAs and the cumulative impacts from these components should be subjected to CIA. The key point in determining the need for CIA is that one or more VECs will be cumulatively impacted by different developments, whatever they may be.

It must be highlighted, however, that accumulated impacts may be identified and acknowledged in a standard ESIA process, and the proposed management measures of the incremental contribution of a given project can be covered by the project's ESMS. This is often the case when dealing with well studied air-sheds or watersheds, or with widely recognized global issues such as climate change. For instance, methods to assess the incremental contribution to airshed degradation from exhaust emission of a new thermoelectric generation plant are well established by the scientific community, and are typically an integral component of a good ESIA process. Similarly the determination and management of its GHG emission and climate impacts are well recognized practices. Neither of these cases would require separate CIA process and the inclusion of standard pollution prevention and control measures as an integral component of ESMS would typically suffice.

1.4 WHAT ARE THE EXPECTED OUTCOMES OF CIA?

The expected outcomes of a good CIA will be further detailed in section 2.0, but generally speaking these are:

- Identification of all VECs that may be potentially affected by the development;

- Assessment/estimation of the future condition of affected VECs, as the result of the cumulative impact of the project with other reasonably predictable projects and natural environmental drivers;
- Evaluation of the future condition of the VECs relative to threshold(s) of VEC condition;
- Avoidance and minimization of the development's impact on the VECs for the life of the development;
- Monitoring and management of the risks to the project over its life-span from VECs reaching their limits[10]; and
- Provision of project-related monitoring data to governments and other stakeholders for the life of the development; and material support for development of collaborative regional monitoring and resource management initiatives.

Because cumulative impacts typically result from the combined impacts of multiple developments, responsibility for their prevention and management is shared among the various developments that contribute to them. In this regard it is usually beyond the capability of any one party to implement all of the measures needed to reduce or eliminate cumulative impacts, and therefore collaborative efforts will likely be needed. Governments can play a significant role in ensuring environmental and social sustainability within their jurisdiction by providing enabling regulatory frameworks that guide and support the appropriate identification and management of cumulative impacts and risks.

Over the years, The World Bank has developed extensive documents and guidance tools for governments to design and implement country-wide or sector-wide strategic approaches to environmental and social management, described and defined in Operational Policy 4.01[11] (see Annex A for definitions)[12] and other publications on strategic environmental management[13] and

Box 3. Hydro Cascade with no governmental requirement for CIA

In one case, thirty-seven hydroelectric projects (2 existing projects, 9 under construction and 26 proposed projects) would occur within a single river basin where the host country had no regulatory requirement for CIA. IFC supported two clients who were involved with several projects -- some in close proximity and others located in another part of the basin. Despite the lack of a regulatory requirement for CIA, IFC worked with the proponents to develop a collaborative CIA and coordinated impact monitoring program, which was implemented through a steering committee composed of companies and government agencies. The CIA was not limited to considering the specific projects of the two proponents but set the spatial context for the CIA as the entire river basin. The CIA found that without management there would likely be significant cumulative impacts on the water flow regime, water quality, and the aquatic environment.

In addition, IFC collaborated with the International Bank for Reconstruction and Development (World Bank) to raise the awareness of the host country to the issue of cumulative impacts. A workshop was organized at which the intensity of development and results of the CIA were discussed government representatives and consensus developed that: development of a formal CIA requirement was imperative; that there was a clear need for basin management planning; and that there was still time for effective CIA. In addition it was proposed that when multiple small-scale hydro projects were being planned (which would not individually trigger an ESIA requirement) CIA for the overall set of projects would be an appropriate alternative to project specific EA.

[10] interactions with government and third parties should be included in risk management actions.
[11] http://siteresources.worldbank.org/INTFORESTS/Resources/OP401.pdf;
http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/CSO/0,,contentMDK:20064724~pagePK:220503~piPK:220476~theSitePK:228717~isCURL:Y~isCURL:Y~isCURL:Y~isCURL:Y~isCURL:Y,00.html
[12] http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/CSO/0,,contentMDK:20066691~pagePK:220503~piPK:220476~theSitePK:228717~isCURL:Y~isCURL:Y~isCURL:Y,00.html
[13] Strategic Environmental Assessment in Policy and Sector Reform (2011) http://siteresources.worldbank.org/ENVIRONMENT/Resources/244380-1236266590146/Policy_SEA_WB.pdf:
Strategic Environmental Assessment for Policies: *An Instrument for Good Governance (2008)* http://siteresources.worldbank.org/INTRANETENVIRONMENT/1705772-1210788188539/21819527/SEA_FOR_POLICIES.pdf;

poverty and social impact analysis[14], which are invaluable sources of information and good practice for setting appropriate and enabling regulatory environments.

1.5 How does CIA compare to other E&S Risk Management Tools?

Cumulative impact assessment and management is one of several tools to consider as part of an overall environmental and social risk assessment and management process. These tools have been developed to inform the decision-making processes in different project development and/or sector planning contexts, and include:

Environmental and Social Impacts Assessment (ESIA)	• Applies to the potential impacts of a particular development proposal. • Done in the context of a well-defined development proposal for which the construction and operational details of the development alternatives are known. • It may include an assessment of the project's contribution to a well known accumulated impact and propose standard mitigation measures (e.g. GHG emissions, airshed pollution, depletion of wild fish-stock).
Strategic Environmental Assessment (SEA) [15]	• Relates to potential impacts of government or sector wide policies, plans, or programs. • Instruments such as policies are not specifically tied to a particular physical development, they may result in a variety of impacts at different times and places -- the challenge of SEA lies in anticipating how this may occur.
Regional Environmental Assessment (REA) or Sectoral EA.	• Used to assess the impacts of the potential developmental future of a geographic region or of an overall sector or industry (sometimes referred to as Regional or Sectoral Strategic Environmental Assessment).
Cumulative Impact Assessment and Management (CIA)	• Used for assessing the full ecological and social impacts that determine the status of environmental components and affected communities (VECs) • Requires consideration of past, present, and future projects and natural drivers that affect them. • Assessment is done in a broader geographical and temporal context than in ESIA.

Unlike government agencies, a private sector developer or project sponsor has no control over the actions undertaken by other project developers affecting similar VECs and therefore it is unlikely to have much leverage to influence any mitigation acctions from third parties. However, when faced with cumulative impacts and risks, private sector developers or project sponsor may engaged in a simpler Rapid Cumulative Impact Assessment (RCIA) process (see Appendix 3 for an annotated RCIA Terms of Reference) instead of a full CIA. RCIA follows the same logical and analytical framework as a CIA, but the analysis is based on a desk review of readily available information and previous environmental and social assessments. Very focused new VEC baseline data may be needed and additional new stakeholder engagement may also be necesary.

[14] http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPSIA/0,,contentMDK:21717714~menuPK:6145452~pagePK:148956~piPK:216618~theSitePK:490130~isCURL:Y~isCURL:Y~isCURL:Y~isCURL:Y,00.html

[15] See foot note 11 and 12 ref World Bank OP 4.01

1.5.1 Comparing ESIAs and CIAs

ESIAs[16] and CIAs share the same basic logical framework and analytical process and tools (See Appendix 2 for a Basic Logic Framework for a CIA); however, different perspectives are taken in ESIA and CIA. They can be characterized as being project-centered or centered on the condition of valued environmental or social components (VEC[17]-centered) respectively. As illustrated in Figure 2, in an ESIA the focus of analysis begins with the project. The area where the project will have environmental and social impacts is identified together with identification of the VECs that would be impacted. The impacts on the VECs are identified and a Mitigation Hierarchy[18] is applied to avoid impacts when possible, and if not possible, to minimize and mitigate impacts. Furthermore, where residual impacts remain, impacts and risks to workers, Affected Communities and the environment are compensated or offset.

Figure 2. ESIA: Project-centered perspective

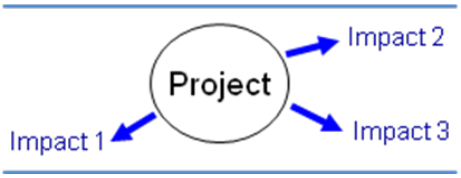
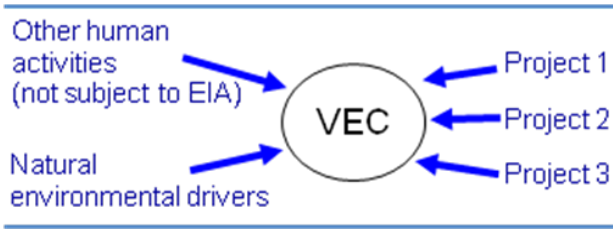


Figure 3. CIA: VEC-centered perspective



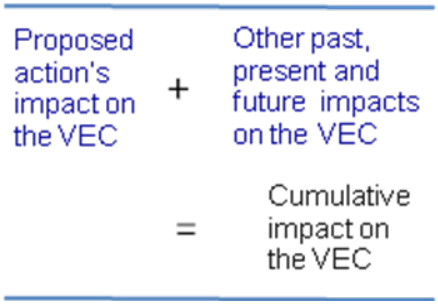
CIA also begins with a project centered view to identify the environmental and social components that may be impacted by the project. However, as illustrated in Figure 3, the focus then shifts to the VECs. The area considered is the area over which the VECs occur, which is where other stresses (projects, developments, human activities not subject to ESIA and natural environmental drivers) may also impact them. Once the other impacts have been identified, the cumulative impacts are assessed as the resulting change in the condition of the VECs.

A cumulative impact includes two components:

- a future "baseline impact" that is the total impact of the other existing and predictable future projects and developments, and
- the project impact – the project contribution to the cumulative impact.

In the CIA context, the incremental impact of a project under review is the difference between the condition of the VEC when impacted only by the other projects and developments in the future baseline and the condition of the VEC when impacted by both the project and the

Figure 4. CIA Components (After Farris 2008)



[16] For further details on ESIA and good practices related to the resulting Environmental and Social Management System (ESMS) please refer to Performance Standard 1 (PS1) and Guidance Note 1 (GN1) as well as PSs 2-8 and their corresponding GNs.
[17] See Box 2 for VECs definition
[18] Please refer to IFC PS1.

future baseline impacts (Figure 4). In the context of ESIA and CIA a project's incremental impacts are the same but are viewed differently and the views taken in ESIA and CIA can give very different assessments of the need for impact management.

Box 4. Contrasting Views of the Need for Impact Management

The ESIA for a metals refining operation in an emerging market country concluded simply that because the concentration of heavy metals in the discharge to a river would be lower than the country's discharge standard that the project should proceed as designed. No additional mitigation was identified. However, the river was already badly degraded; the ambient concentrations of heavy metals already exceeded the ambient water quality standards, human health was being compromised and officials in the city downstream were struggling to find ways to improve water quality. In this later context, either project relocation or additional mitigation to reduce discharge of heavy metals to the maximum extent possible would be appropriate together with other mitigations to reduce the loadings from existing sources

The different views taken in ESIA and CIA can be seen in how indicators are used to characterize an impact. In the case of ESIA, indicators may be chosen to reflect the incremental change in a VEC, while in CIA indicators are chosen to reflect the resulting *condition* of the VEC. Appendix 1 lists comparisons of indicators that reflect an incremental project impact (change in the VEC), with indicators that reflect the condition of the VEC. As it will be noted in the following sections, during the CIA Scoping Stages (Section 2 – Steps 1 and 2) the choice of VECs and their indicators is critical to the success of the assessment.

Box 5. CIA When Different Project Components Are Subject to Separate ESIAs

For the development of a large mining project, under host country regulatory requirements the proponent was required to submit separate ESIAs for the various project components: the mine site, the transmission line that will provide power to the site, and the road that was upgraded and extended to the site. The ESIAs were not only submitted separately but also submitted in different years and did not address cumulative impacts.

At a later date and in order to meet the requirements of the Equator Principles and IFC Performance Standards, the proponent was required to complete a CIA of the project's components with other projects and activities in the area. This included updating baseline data and filling baseline data gaps.

The scope of the CIA was defined by: the value/significance of the potential cumulative effect to stakeholders (based on the valuation of the environmental and social elements that are relevant to the stakeholders); the potential significance of cumulative impacts to biological receptors and/or habitats; and the temporal and physical boundaries for potential cumulative effects for those elements.

Cumulative impacts were deemed to occur when the effects of project components, other projects, and / or other land use activities (i.e. not just other mining projects) overlap with each other by impacting the same VECs. For example, project components will eliminate important wildlife habitat which will likely diminish the carrying capacity for key species. Together these project impacts will have a cumulative impact on the status of the species, even though the impacts are of different types and result from very different activities.

The different views described above are not always necessary, and as noted before, cumulative impact analyses and management can be fully integrated throughout a good ESIA process. This approach has been advocated by many practitioners (see Duinker 1994 or Duinker and Greig 2006).

2. What is the Process for Implementing Cumulative Impact Assessment and Management?

Assessment of accumulated impacts may employ information from a variety of instruments including regional environmental studies and programs; strategic, sectoral and regional environmental assessments; project environmental assessments; cumulative impact assessments from similar situations; and targeted studies on specific issues.

The following six-step process and the appendices that follow lead users of this *Good Practice Note* from the scoping phase through to the management phase, providing key questions to consider along the way.

Keep in mind that the process for CIA must be flexible; the steps may not proceed in sequence and may need to be implemented iteratively – with some steps revisited in response to the results of others. For example, in the issue identification (scoping) step of CIA, consideration of potential effects is often repeated with the findings and analysis refined each time, until a final short list of issues is produced[19].

STEP 1: SCOPING PHASE I – VECS, SPATIAL AND TEMPORAL BOUNDARIES

Objectives:

- Identify and agree on VEC consulting with all *relevant stakeholders.*
- Include past, present, and foreseeable future activities.
- Establish the geographic scope of analysis.
- Focus on meaningful impacts/ effects.

Questions to answer:

- Who needs to be involved?
- Which are the resources, ecosystems, or human activities affected (i.e. VECs)?
- Which of these effects may be important from a cumulative impact assessment perspective?

This step is critical to successful CIA as it establishes the scope of the analysis of cumulative impacts. Critical to the success of scoping is that it appropriately characterizes the context for the analysis (i.e. context scoping as identified by Baxter *et al*, 2001). If not already done identification of who should be involved will be done early in this step and updated as needed as the overall process proceeds. As it will described in Section 3 this is one of the major challenges associated with a CIA process. For a description of an ideal arrangement of stakeholders roles and responsibilities please refer to Table 1.

The output of scoping includes identification of the VECs whose cumulative impacts will be assessed and managed, and the spatial and temporal boundaries for the assessment. Information to consider in establishing the scope of CIA includes:

- VECs known or suspected to be impacted by the project (based on prior sectoral assessments or by the project's own ESIA),
- Known cumulative impact issues within the region,
- Concerns for cumulative impacts identified in consultation with potentially Affected Communities (these may exist at distance from the planned development),
- Regional assessments prepared by governments or multi-lateral development banks (MDBs),
- CIAs prepared by other developments in the region, and
- Information from non-governmental organizations (NGO's).

Appendix 1 provides a non-exhaustive illustrative list of potential VECs identified for each IFC Performance Standards 1 through 8.

[19] At the start of issue identification all potential effects are identified, but by the end the list of issues will have been reduced to a short list of key issues to examine in detail in the CIA.

Boundaries for the analysis need to encompass the geographic and temporal extent of impacts (from other past, present, and predictable future projects and developments) that influence VEC condition throughout the time period that project impacts will occur. This scope is likely to extend beyond a project's DAI as typically defined in ESIA.

Box 6. Rules of Thumb - How to Set Geographical and Temporal Boundaries[20]

The suggested *rules of thumb* to determine the geographic boundaries for the analysis are:

a. Include the area that will be directly affected by the project or activity (DAI - in the traditional ESIA sense),
b. List the important resources (VECs) within the DAI,
c. Define if these VECs occupy a wider area beyond the DAI, and
d. Consider the distance an effect can travel.

The proposed basic *rules of thumb* to determine the temporal boundaries for the assessment are:

a. Define the expected timeframe of the potential effect of proposed action.
b. Balance between overestimate/underestimate.
c. Exclude futures action if (i) outside geographical boundary, (ii) does not affect VEC, or (iii) its inclusion seems arbitrary.

Boundaries are expanded to the point at which the VEC is no longer affected significantly or the effects are no longer of scientific concern or of interest to the Affected Communities. VECs for which the project will have no direct or indirect impact do not need to be the subject of CIA. Priority should be given to those VECs that are likely to be at the greatest risk from the project's contribution to cumulative impacts.

Box 7. Establishing the Spatial Boundary for CIA

To assess the impacts of a regional oil pipeline development in a northern environment, the study area for the ESIA was defined as several kilometers on either side of the pipeline along its route. The CIA for the project adopted the same study area. While it was well known that the pipeline would likely induce future development of additional oil fields along the pipeline route, such developments would occur outside the defined study area and thus were not included as reasonably predictable future projects for inclusion in the CIA analysis. Few other existing or likely future projects were identified within the study area and impacts on the wide ranging northern caribou herds whose range included the project study area were concluded to be insignificant in both the ESIA and CIA analyses.

Understanding that CIA analysis should be done in the context of the VEC (caribou) range, the regulator on review of the proponents ESIA and CIA required the proponent to redo the CIA analysis to include the potential impacts of the likely future oil development along the pipeline route. These likely developments fell largely within the range of the caribou herds and would have potential impacts both within the oil fields themselves as well as along the routes of connector pipelines that would link to the regional pipeline. This analysis, done in the appropriate context for analysis of cumulative impacts on the caribou herds, concluded that the cumulative impact of the likely future developments with those of the enabling regional pipeline would result in a cumulative impact that would require a regional cumulative impact management strategy. While this would not prevent approval of the regional pipeline, it clearly created the opportunity for the development of a multi-party cumulative impact management program to prevent significant impacts from the future developments before they arose.

Through evaluation of the regional cumulative impact context the scoping stage of CIA should not only establish the dimensions of the cumulative impact study (VECs of concern, spatial and temporal assessment scales) but also assess how well cumulative impacts have already been identified and analyzed.

If the condition and trends of VECs are already known and the incremental contribution of the project to cumulative impacts can be quickly established, then the emphasis for CIA should be placed on cumulative impact management rather than impact assessment.

[20] After CEQ. 1997

STEP 2: SCOPING PHASE II – OTHER ACTIVITIES AND ENVIRONMENTAL DRIVERS

Objectives:

- Identify other past, existing, or planned activities within the analytical boundaries.
- Assess potential presence of natural influences/ stressors. (e.g. droughts, extreme climatic events).

Questions to answer:

- Are there any other existing or planned activities affecting the same VEC?
- Are there any natural forces / phenomena affecting the same VECs?

The purpose of this step is to identify the totality of stresses that determine the condition of VECs selected for CIA. Estimation of the magnitude of impacts will likely occur in step 4. What is important in Step 2 is identification of the sources of stress on VECs which will include past developments whose impacts persist, existing developments, predictable future developments, as well as any other relevant natural environmental drivers (e.g. wildfires, droughts/floods, predator interactions, etc). In making this determination the key question is simply what environmental and social factors may influence the condition of the VEC. In most cases this should be known.

An important part of this step is determining an appropriate strategy for identification of stresses that result from activities other than the proposed project. Detailed identification of other projects / activities that are likely to have significant impacts and which can play an important role in management of cumulative impacts is appropriate. However, in environments impacted by a large number of small developments, creating an inventory of all sources may not be the best approach and some form of statistically stratified estimation may be appropriate. In this regard it may be helpful to classify different developments according to common characteristics of their impacts. The amount of detail required is determined by what is needed for credible estimation of the types and intensity of impacts that influence the condition of the selected VECs.

Box 8. Cumulative Impacts of Climate and Hydropower

The ESIA for a hydropower development that would provide peaking power predicted no significant impacts on lakes immediately downstream of the development. The ESIA analysis was based on the recent mid-term flows in the river system.

A separate cumulative impact assessment properly took into account the contribution of the natural driving force of longer-term climatic variation in water availability reflected in the long term records. Modelling analysis of lake levels in the region, based on the long-term precipitation patterns showed that there could be a sharp decline in water levels during extended periods of drought that historically had occasionally lasted for periods of 10 – 20 years. The project effects at such times would significantly worsen an already difficult situation for some of the Affected Communities, as during such extended droughts the shorelines of downstream lakes receded considerable distances. While only a fraction of the drop in lake level would be attributable to the project impact this additional impact was considered unacceptable.

The analysis highlighted the need for mitigation measures that could manage the lake levels during such periods, providing a net benefit to the downstream communities and their fisheries during extended droughts. Had the CIA not properly taken into account the natural driving impact of climate cycles on the hydrological regime, the company might at some time have been held accountable for the unacceptable impacts.

In addition to other human activities natural drivers that exert an influence on VEC condition should be identified and characterized. Natural environmental processes, for example drought or flooding, have significant impacts on a variety of environmental and social components. Project impacts that discharge pollutants to lakes or rivers, or that withdraw water for industrial or agricultural purposes are likely to have more significant impacts during periods of drought. The fire regime in forested areas is a major driver that shapes social, ecological, and economic systems. For the purposes of CIA, identification of such processes is not a question of new research, but is based on existing knowledge of the ecology of the selected VECs.

Existing guidance for identifying reasonably predictable projects recommends reference to local, regional or national development plans and generally recommends a short time horizon be considered (e.g. European Union - 3 to 4 years) due to uncertainty about longer term developments. Where development plans are not available guidance recommends emphasis be given to identifying other projects that are known to be in the planning stage or for which formal development approval is being sought (e.g. through preparation of ESIA documents or permit submissions). This short term view does not provide certainty regarding which developments will actually occur. Some developments in the planning stage at the time of CIA scoping will not proceed while others that are not immediately apparent at this time will be developed and go ahead. Proponents clearly cannot know for certain what specific developments will occur but in some circumstances where rapid development is occurring a general pattern of development may be able to be foreseen.

Box 9. Strategic Approach to Assessing Multiple Small Developments (Scoping)

CIA may be relevant and considered appropriate even if a project is expected to have only a small impact, whenever the project will contribute to cumulative effects from already existing projects, or a large number of other reasonably predictable projects.

A regional CIA approach was taken to assess cumulative impacts for a region that is the traditional territory of numerous aboriginal groups and which is characterized by extensive unconsolidated sands with dune complexes, open grass lands, patches of trees and shrubs with several game species including species that are rare, threatened or endangered; and numerous areas of historical spiritual significance. The dominant activities within the region included: a high density of existing gas wells (approximately 70 % of the area was leased for exploration); and widespread livestock grazing. The development of a significant number of additional gas wells was highly likely and rather than approach CIA with a well-by-well approach a regional CIA was undertaken.

The CIA was done in three phases: baseline assessment; impacts and trends identification; scenario analysis and recommendations. Aggregation of impacts by livestock grazing and gas well development was facilitated by treating both as surface disturbance and the underlying objectives of the baseline assessment (Step 3 in this GPN) were to identify activities that have the greatest potential for surface disturbance impacts on ecological integrity and sustainability, and to identify key issues and concerns with biological, economic and social VECs.

Whenever there is potential for a large number of similar developments a regional analysis should be considered. This is not, however, the responsibility of an individual proponent. This strategy, if pursued, will require engagement of other proponents and government agencies to develop a coordinated / pooled analysis.

In addition to other projects that are known to be under development or identified in planning documents good practice also considers future developments that are likely to be induced by a project under consideration. If past experience has shown that projects of the same type as the one being assessed cause further associated development to occur, then such developments are reasonably predictable. Since such developments are not identified based on specific development plans, scenario analysis may be an appropriate approach for examining the potential cumulative impacts that could be associated with induced development.

STEP 3: ESTABLISH INFORMATION ON BASELINE STATUS OF VECS.

Objectives:

- Define existing condition of VEC.
- Understand its potential reaction to stress - resilience / recovery time.
- Assess trends.

Questions to answer:

- What is the existing condition of the VEC?
- What are the indicators used to asses such condition?
- What additional data is needed?
- Who may already have this information?

Baseline (historical) information on the condition of VECs establishes the "big picture" context for thinking about changes in VEC condition, can help to avoid the pitfalls associated with shifting baselines (Pauly 1995) and can be used in a variety of ways.

The determination of the trend of change in the baseline condition of a given VEC over time may indicate the level of concern for cumulative impacts. If there is a long or steep history of decline in VEC condition it may be inferred that there is an increased likelihood that a threshold is being approached. It is often the case that threshold levels (tipping points), at which a VEC's response to additional impacts changes abruptly, are not known with any degree of certainty. A simple analysis of the overall change in condition relative to a "baseline" can at least provide some indication of the amount of change that has already occurred, however this must be approached with caution if the "baseline" condition is recent and thus possibly representative of an already shifted baseline.

If sufficient information is available to establish the natural range of variation in a given VEC condition, it can be used for comparison with the estimated future state developed in step 4 and when assessing significance in step 5. When compared with information about the past time trend in development pressures (part of analysis in step 4) it may also provide some insight into VEC sensitivity to stresses. Good indicators of condition are important and historical trend analysis should be approached with some caution as some indicators of VEC condition can be hyper-stable, essentially hiding impact responses. Consistent use of indicators is important (Bérubé 2007).

Estimating the past condition of a VEC is often a challenging task requiring collection of historical information about the VEC which can be difficult to obtain. Various sources of information can be explored – reports from governments, NGOs, MDBs, prior ESIAs, knowledge from resident communities, information from "controls" – areas with VECs in common that are exposed to differing levels of impact (assessed relative to the impact history developed in step 2). Hydro-Québec found that in most cases their best "state of reference" was determined as the time when information became available and when the condition of the VEC could be considered more or less stable, which in their first 12 CEA's ranged from 10 to 20 years (Bérubé 2007).

In cases where there is no data available from third parties about existing or planned developments, the developer may promote benefits of CIA with third parties and encourage

them to provide information on existing developments and their future plans; obtain whatever data government authorities have regarding existing and planned developments; in the absence of specific information about projects and their impacts use generic information about the other projects, their inputs and emissions for typical developments of similar size.

Scenario analysis should be considered for assessment of other predictable future developments that are not already in the planning stage. This is especially relevant to predictable types of future developments that are likely to be induced by the project in question. Each scenario must be possible. The objective of scenario analysis is not to predict a most likely future but to help to assess the consequences of uncertainty so that the need for cumulative impact management under different future conditions can be anticipated.

STEP 4: ASSESS CUMULATIVE IMPACTS ON VECS

Objectives:

- Identify potential environmental and social impacts and risks.
- Address expected impacts over the condition of the VEC (i.e. sustainability).
- Identify any potential additive, countervalling, and/ or synergistic affects.

Questions to answer:

- What are the key potential impacts and risks that could affect the long term sustainability/ viability of the VEC?
- Are there known/predictable cause-effect relationships?
- Can these impacts/risks interact with each other?

Analysis of cumulative impacts on VECs involves estimating the future state of the VECs that may result from the impacts they experience from various past, present, and predictable future developments. The objective is to estimate the state of VECs as it results from the aggregated stresses that affect them. In this context, in addition to the stresses imposed by developments, the assessment should encompass the potential range of variation in environmental conditions that influence VEC condition and not be based solely on expected average conditions.

In CIA, impacts are not measured in terms of the intensity of the stress added by projects but in terms of the VEC response, its condition. The methods used for analysis will be specific to the characteristics of the VEC (e.g. different methods are appropriate for analysis of impacts on physical environmental, biotic, or social VECs, or their resilience). A wide spectrum of methods have been used for CIA, including:

- Conceptual modelling / pathways / network analysis (Bernard et al, 1993; Brismar., 2004; Canter, 2008; Cooper, 2008; Perdicoúlis and Piper, 2008; Tricker, 2007);
- Cost Benefit Analysis (Crookes and de Wit, 2009);
- Decision Support Systems (King and Pushchak, 2008);
- GIS analysis (Atkinson et al.,2008; Atkinson and Canter, 2011; Blaser et al., 2004; Dutta et al., 2004; Great Sand Hills Scientific Advisory Committee, 2007; Houle et al., 2010; Johnson et al., 2005; MacDonald, 2000; MacDonald et al., 2004; Quinn et al., 2004; Scrimgeour et al., 2008; Seitz et al., 2011; Squires et al., 2010; Sorensen et al., 2008; Strimbu and Innes, 2011; Tiner, 2005);

- Habitat modelling (Cantor and Atkinson, 2008; Canter and Atkinson, 2011; Blaser et al., 2004; Houle et al., 2010; Johnson et al., 2005; Strimbu and Innes, 2011);
- Information compilation with simple checklists, or more complex layered or matrix formats (Canter and Kamath, 1995; Canter and Torney, 2008; Cooper, 2011; MacDonald, 2000);
- Indicators and indices of VEC condition (Cantor and Atkinson, 2008; Dubé, 2003; Gonzales-Sanson and Aguilar, 2010; King and Pushchak, 2008; Mitchell and Parkins, 2011; Seitz et al., 2011; Squires et al., 2010);
- Landscape modelling (Great Sand Hills Scientific Advisory Committee, 2007; MacDonald et al., 2004; Quinn et al., 2004);
- Population Viability Analysis (Jeffrey and Duinker, 2002; Johnson and Boyce, 2001);
- Quantitative / simulation modelling including spatially explicit GIS-based models (CEQ, 1997; Dutta et al., 2004; Hegmann et al., 1999; Krzyzanowksi, 2011; MacDonald, 2000; Van Damme et al, 2003, 2008; Weclaw and Hudson, 2004; Walters, 1986; Yang et al., 2010);
- Scenario Analysis (Blaser et al., 2004; CCME, 2009; Cavalcanti and la Rovere, 2011; Crookes and de Wit, 2009; Duinker and Greig, 2007; Ehrlich, 2010; Great Sand Hills Scientific Advisory Committee, 2007; Greig et al., 2004; Harriman and Noble, 2008; Hegmann and Yarranton, 2011; Jeffrey and Duinker, 2002; Johnson et al., 2011; Lindsay et al., 2002; Mitchell and Parkins, 2011; Noble, 2008; Quinn et al., 2004; Seitz et al., 2011; Strimbu and Innes, 2011; Weclaw and Hudson, 2004);
- Sustainability Appraisal (Cooper, 2010; Gibson, 2011);
- Thresholds (Berube, 2007; Bonnell and Storey, 2000; Canter and Atkinson, 2010; Damman, 2002; Deverman, 2003; Dubé, 2003; Duinker and Greig, 2006; Groffman et al., 2006; Gunn and Noble, 2009b; Hegmann and Yarranton, 2011; Kilgour et al., 2007; Krzyzanowksi, 2011; Mitchell and Parkins, 2011; Noble, 2010; Piper, 2001; 2002; Quinn et al., 2004; Schultz, 2010; Seitz et al., 2011; Spaling et al., 2000; Squires et al., 2010; Therivel and Ross, 2007; Tricker, 2007; Weclaw and Hudson, 2004); and
- Visual Amenity Analysis (Brereton et al., 2008).

Box 10. Strategic Approach to Assessing Multiple Small Developments (Analysis)

The analysis for the regional CIA done for the multiple small gas developments referenced in Box 9 developed three alternative GIS-based land use scenarios: Business as usual; Enhanced Development; and Conservation. Rather than focusing on a fixed prediction about the most likely future impacts, emphasis was placed on developing a set of plausible accounts of cumulative change under each scenario. This approach allowed decisions to be based not only on past trends, but also on potential future trends, which may include a number of surprises.

Core biodiversity hot spots with a high priority for conservation where identified where under the conservation scenario regional biodiversity would be maintained in these protected areas. This would be done by limiting the number of new gas wells. Production would be maintained, however, through increased use of directional drilling near the biodiversity hot spots.

As discussed previously, CIA analysis is futures oriented. The 'impact of the project' is not assessed as the difference between the expected future condition of VECs and that of a past "baseline" condition. It is assessed as the difference between the estimated future condition of VECs in the context of the stress imposed by all other sources (projects and natural

environmental drivers - the "future baseline") and the estimated VEC condition in the context of the future baseline plus the project[21]. Of concern is not just estimation of the project impact, but the estimated future condition of VECs in the context of all stresses – which is the cumulative impact – and can be evaluated in reference to an established threshold level of acceptable condition if known, or in reference to a past baseline.

The estimate of the cumulative project impact, together with ESIA results, indicates the need for project specific mitigation, whereas the estimated overall cumulative impact indicates the need for mitigation to be implemented by the various project owners or proponent parties to assure that their respective contributions to the overall condition of the VECs is coherent/compatible with what is mandated or required by government led regional cumulative impact management initiatives, or as a minimum compliant with ambient quality standards for the desired use.

A key part of the assessment step is estimation of the effectiveness of project mitigation and other cumulative impact management measures to reduce impacts, and this is done iteratively between Step 4 and Step 5.

Box 11. RCIA of Hydro Impacts on American Eel

The American Eel is a catadromous species which spawns in the Sargasso Sea and migrates to freshwater rivers and lakes for growth and maturation. When mature it migrates downstream and returns to the Sargasso Sea. In a northern segment of its range this large, long-lived species declined substantially following construction of hydropower dams and is now listed as endangered.

Human activities that impact the species include: harvesting by fisheries, hydropower developments (inhibition of upstream migration, mortality during downstream migration), barriers to migration by other water control dams, habitat alteration, changes in water quality and contaminants. Natural drivers that impact the species include: changes in the food web, parasites, and potential changes in ocean currents associated with climate change. A published study indicated that of the various impacts, fisheries and hydropower development likely had the greatest impact. As a consequence fisheries in the region were closed.

To develop a rapid estimate of the impact of the mortality caused by hydro developments during downstream migration a RCIA was developed in the form of a quantitative spreadsheet model for one watershed in the region where 11 hydropower developments were located on the main stem of the river, other developments were located on tributary rivers. Without a detailed inventory of the distribution of eel habitat in the watershed or specific studies of eel mortality at the individual stations the model was designed to permit scenario analysis to explore scenarios of habitat distribution (simply the proportion of habitat in the watershed located in areas between the different developments) and estimates of the mortality rate for eels passing through stations of similar size and design drawn from the scientific literature. The model simply estimated the escapement (survival rate) for the population of mature eels that would migrate downstream for spawning as a result of the cumulative mortality from the 11 main-stem developments. While a better estimate of impact could be obtained with a detailed habitat survey in the watershed, and analysis of all developments, not just those on the main-stem, revealed that under reasonable assumptions of habitat distribution, the escapement would be less than 10%, an unsustainable impact.

STEP 5: ASSESS SIGNIFICANCE OF PREDICTED CUMULATIVE IMPACTS

Objectives:

- Determine impact and risk magnitude and significance in the context of past, present, and future actions.
- Define appropriate "threshold" and indicators.
- Identify trade-off.

Questions to answer:

- Do these impacts affect the sustainability/ viability of the resource / VEC?
- What are the consequences / trade-offs of action/ no action?

[21] In CIA it is critical to not confuse past and future baselines (Bérubé 2007).

Significance determination is a normal component of ESIA and typically occurs near the end of the assessment process as significance is typically evaluated after project mitigation is factored in. However, in ESIA components of impact significance (magnitude / duration) are typically a factor in deciding if mitigation is necessary. Consequently evaluation of significance and design of management / mitigation (Step 6) are in reality iterative.

The significance of a cumulative impact is not evaluated in terms of the amount of change, but the potential resulting impact to the vulnerability and/or risk to the sustainability of the VECs assessed. This means evaluating cumulative impacts in the context of ecological thresholds. Determining ecological thresholds for biological VECs has proven to be difficult. In many cases, such thresholds may not be clearly identified until they are actually crossed, at which point recovery may take a long time with considerable cost, or may simply not be possible. Consequently, a precautionary approach that explicitly considers uncertainty in ecological relationships is essential when thresholds of acceptable VEC condition are being established.[22]

Determination of significance can be difficult and it is often controversial[23]. Any potential cumulative impact that warrants additional mitigation / monitoring beyond that identified in the ESIA should be considered significant. A key good practice for the appropriate determination of impact significance, and overall agreement among Affected Community and other relevant stakeholders, is to strengthen mitigation measures and monitoring programs focusing on expected probable cumulative impacts.

STEP 6: MANAGEMENT OF CUMULATIVE IMPACTS – DESIGN AND IMPLEMENTATION

Objectives:

- Use mitigation hierarchy.
- Design management strategies to address significant cumulative impacts over selected VECs.
- Propose monitoring program.
- Manage uncertainties with informed adaptive management.

Questions to answer:

- How can cumulative impacts be avoided, minimized, and/or mitigated?
- How can effectiveness of proposed management measures be assessed?
- What are the triggers for specific adaptive management decisions?

The management measures needed to prevent cumulative impacts will depend on both the context in which the project impacts occur (i.e. the impacts from other projects and natural drivers that affect the VECs) and the characteristics of the project impacts. Since cumulative impacts typically result from the actions of multiple stakeholders, the responsibility for their management is collective, requiring individual actions to eliminate or minimize project contributions. At times, cumulative impacts could transcend a regional threshold and therefore collaboration in regional strategies may be necessary to prevent or effectively manage such

[22] Databases of ecological thresholds can be found at http://www.resalliance.org/

[23] Significance determination has been a challenge in ESIA and a rich literature has developed (Lawrence 2000). Little if any guidance exists specifically for CIA, however a review of ESIA significance determination in the context of sustainability was prepared for the Canadian Joint Review panel for the Mackenzie Gas Project (Lawrence 2005). Experience with significance determination in 12 CIA's prepared by Hydro-Québec (Bérubé 2007) was that application of significance determination methods normally used in ESIA was very difficult. In the context of regional trends in VEC condition driven by multiple developments, the standard matrix used in ESIA was found to be useless, and level of significance was not always determined in CIA.

impacts. Where cumulative impacts already exist, as in the examples describe in Box 12, management actions by other existing projects may be needed to prevent unacceptable cumulative impacts.

Box 12. Shared Responsibility for Management of Cumulative Impacts

Significant cumulative effects on a predatory wildlife species resulting from existing forest harvesting, mines, oil and gas operations and recreational activities (managed by the government) were revealed when the CIA for a new mine proposal was completed. The proposed management response was the creation of a "carnivore compensation program" to be jointly supported by the new mine, the dominant forestry company in the area, some oil and gas interests, and the government.

In another case, concern for cumulative effects of the biochemical oxygen demand from the discharge of a proposed pulp mill together with the discharges of existing mills resulted in a requirement for a joint monitoring program implemented by the operators of the existing pulp mills together with operators of the new mill. In addition, should dissolved oxygen drop below a specified limit, immediate corrective action is required to be taken jointly by the parties (Therivel and Ross, 2007).

Management of cumulative impacts therefore, does not rest solely with developments that come later in the development sequence and ignoring possible cumulative impacts during project development carries the risk of unanticipated constraints imposed at a later time.

The analysis phase of the project CIA may, or may not, indicate the need / potential for additional mitigation measures beyond those identified in the project ESIA. The design of such additional mitigation measures for the project, if needed, is an early part of the work in this step of managing cumulative impacts. Iteration of the Analysis (Step 4), Significance Evaluation (Step 5) and Management (Mitigation) Design (this step) may be needed.

If specific project mitigation can be identified and implemented that will prevent unacceptable cumulative impacts then collaborative engagement of others in impact management may not need to be initiated by a project proponent. When prevention of unacceptable cumulative impacts by project mitigation alone is not possible, collaborative engagement in regional management strategies will be necessary. In all cases, collaborative engagement in regional efforts to manage cumulative impacts (e.g. design of project monitoring to fit with regional monitoring programmes where they exist) may help to reduce the risk of additional unanticipated management commitments at a later time, as regional development proceeds. Specific actions that may be needed to effectively manage cumulative impacts may, for example, include:

- Project design changes to avoid cumulative impacts (location, timing, technology);
- Project mitigation to minimize cumulative impacts, including adaptive management approaches to project mitigation[24];
- Mitigation of project impacts by other projects (not under control of the proponent to further minimize impacts on VECs)[25];
- Collaborative protection and enhancement of regional areas to preserve biodiversity (Kiesecker et al. 2009a,b; McKenney et al. 2010);
- Collaborative engagement in other regional cumulative impact management strategies, and;

[24] Adaptive management (AM) strategies are not a panacea. A common misunderstanding of adaptive management has emerged in some ESIA practice that AM is primarily a post-hoc response to developing management responses after problems emerge. AM, however, is a well developed and rigorous discipline for experimental management for reducing uncertainty about how to effectively manage. Consequently AM is not appropriate if impacts may not be reversible. In addition it is best employed to assess management strategies to which VECs are responsive over a relatively short term.
[25] Hydro-Québec found this to be particularly important in CIA practice (Bérubé 2007).

- Participation in regional monitoring programs to assess the realized cumulative impacts and efficacy of management efforts.

The first two points above are clearly the responsibility of the project, the third point is the responsibility of other project proponents to address their contribution to cumulative impacts (some of these needed contributions may be discovered during the project CIA process), and the last three points involve collaborative engagement with other stakeholders, including project proponents, government agencies, and Affected Communities, among others.

Box 13. Mitigation of Panama Hydroelectric Developments

Together with international and local lenders and other multilateral development banks, the IFC is financing the development of two cascading hydropower projects on the Chiriqui Viejo River (CVR) in the Chiriqui Province in Western Panama. These projects are situated in the upper reaches of the watershed above approximately twelve other cascading projects being constructed or planned for development by other private sector sponsors. A Rapid Cumulative Impact Assessment (RCIA) was conducted with the support of the lenders group. Results from the RCIA indicated that in addition to the barrier effect caused by the dams, dikes and levees, the reduced downstream flows between the different projects could significantly impair aquatic habitat connectivity in the dewatered segments and jeopardize the ultimate viability of the mountain mullet, a catadromous fish currently present in the CVR.

As these two projects are the highest in the watershed, natural movement of spawning fish downstream and juveniles upstream would first be impacted by several projects under construction in the lower reaches of the CVR. Lack of mitigation of this barrier effect by projects downstream from the IFC financed projects, would likely compromised the viability of juvenile and adult fish populations in the higher sections of the CVR.

To address this situation, these two projects have taken a two tiered approach:

- First, they have developed a comprehensive downstream ecological flow management plan that will assure that these two projects release enough water in the dewatered segments downstream, to maintain not only aquatic habitat connectivity, but also enough usable habitat for key indicator fish and invertebrate species.
- Work with the group of lenders, other project sponsors, and the responsible government agencies in Panama, to tackle not only connectivity but other cumulative issues (e.g. sediment load) at a watershed level. These solutions are still being negotiated, but include fish hatcheries, as well as catch-and-release of juvenile and adult fish to repopulate the stream in the dewater segments upstream from the different dams.

3. Are there any Challenges with Implementation of Cumulative Impacts Assessment and Management? How can these Challenges be overcome?

This final section of the GPN recognizes that there are many challenges with the application of the proposed six step process and with the implementation of an effective strategy to manage cumulative impacts and risk for multiple projects and activities, and provides some key recommendations to consider when trying to overcome such challenges.

CIA requires interactions with numerous organizations and individuals from government, third parties, Affected Communities and other stakeholders. Numerous groups have an interest in CIA because of its wider geographic scope and focus on impacts from multiple developments. But what should their role be in a project level CIA or RCIA? The type of interactions that project proponents should have with interested parties will vary, depending on the development and its location. In locations where third parties are organized (e.g. farmer or industry association) and concerned about environmental impacts, third parties may become very involved in some parts of the assessment (e.g. scoping, provision of data, development of mitigation) or in ongoing management actions. Also, in locations where governments have established regional planning processes and means of managing natural resources regionally, they too may become actively

involved in parts of the assessment (scoping, provision of data, determination of significance of impacts) or in implementation of management actions (e.g. regional monitoring program)[26].

Deciding why, when and how to interact with government(s), third parties and Affected Communities is not straightforward and requires considerable thought and expertise. To determine the appropriate type and scope of interactions, an understanding of both governance constraints and of participants' capacity constraints is required.

3.1 Recommendation 1: Clarify Roles and Responsibilities

A wide range of roles and responsibilities are possible. The principles and purpose for involving different parties in CIA or RCIA should not change, no matter what the circumstances of government, third parties or Affected Communities. The principles are *meaningful engagement of Affected Communities*, *involvement and collaboration with governments* and *interaction with third parties*. Interactions with government, third parties and affected communities at a minimum should accomplish the purposes that relate to a client's project–specific CIA or RCIA. The ideal roles and responsibilities of different parties and the purpose of these roles/responsibilities are shown in Table 1.

As illustrated in Table 2 significant gaps typically exist between the actual governance context for a development and the ideal roles and responsibilities shown in Table 1. Gaps in roles and responsibilities need to be explicitly identified and handled by different management strategies in a CIA or RCIA.

Table 1. CIA Governance Gaps

Typical Governance Context	What to do?
No policy or legal framework for CIA.	Identify and use any existing sources of partial information about policy or regulatory limits to development (e.g. policy statements, strategic or sectoral assessments, national/regional development actions plans and targets); use sustainability and vulnerability as proxies to define acceptable limits for all policy and regulatory gaps. Technical expertise will be needed to understand and apply sustainability and vulnerability concepts in CIA.

[26] For guidance please refer to IFC published documents on good practice and guidance on Stakeholder Engagement, Participatory Monitoring, Grievance Mechanisms

- http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_handbook_stakeholderengagement__wci__1319577185063
- http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_gpn_grievances
- http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_gpn_socialdimensions__wci__1319578072859
- http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_handbook_waterfootprintmanual__wci__1319577922803
- http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_handbook_doingbetterbusiness__wci__1319576642349

No regional planning or collaborative resource management mechanisms.	Share CIA / RCIA purpose, process and requirements with government and third parties early-on and discuss their participation in CIA / RCIA (including implications and benefits of them participating in this process); discuss environmental and social permitting requirements with government authorities and ensure ESIA and CIA/RCIA will provide government with the information it needs for decision-making; assess the level of involvement feasible for government and third parties and reach agreement with them about their participation and roles and responsibilities; encourage the participation of government, third parties and representatives of affected communities in scoping, review of CIA / RCIA findings, proposed management strategies and impact monitoring.

Gaps can be identified by comparing the ideal given in Table 1 with the actual situation for a proposed development. In general, there are two approaches for managing gaps in roles and responsibilities. First, clarify and gain acceptance for all roles and responsibilities – clearly define the roles and responsibilities of the client as opposed to those of government, third parties and Affected Communities/the public and ensure the different parties understand their respective roles. Second, communicate the established roles and responsibilities widely – inform stakeholders, NGOs and other potentially interested groups from within and outside the project's DIA and region.

3.2 Recommendation 2: Establish and Maintain a Constructive Relationship with Government and Other Stakeholders

Establishing and maintaining a constructive relationship with government and other stakeholders over the life of a project is an integral part of CIA. Table 3 provides specific details about the place for and objectives of interactions. However, limitations in capacity can inhibit governments and other stakeholders from participating as needed in a proponent's CIA process. Where government capacity is low, interactions should occur at a minimum in those areas identified in ***bold*** in Table 1; but where capacities are greater it is useful to increase the number/scope of such interactions.

Box 14. Regional Collaboration in CIA

Various groups have been working in different contexts to establish collaboration between developments for regional CIA. For example collaborative initiatives have been developed in Australia with regard to impacts of the coal mining industry, including: strategic and regional planning led primarily by government; information exchange – networking and forums; pooling of resources to support CIA initiatives and programs; and multi-stakeholder and regional monitoring (Franks *et al* 2010a, 2010b). These approaches vary in complexity with each demanding a different degree of maturity in the collaborative relationship. Given the expected challenges of conducting CIA in emerging market contexts collaboration among project proponents offers the prospect of efficiencies through information sharing and joint management approaches that should improve CIA quality, thereby reducing risks associated with unmanaged cumulative impacts while at the same time being more cost effective. Such collaborative efforts represent one thrust in the early development of enabling frameworks for CIA.

4. CLOSING REMARKS

While the expanded geographical and temporal scope of CIA relative to ESIA is often a challenge, the most significant challenge to perform and implement a good CIA process lies in its multi-stakeholder nature. To facilitate the assessment and management of cumulative impacts, practitioners have called for, and in some developed countries governments are now beginning to develop, regional enabling frameworks for CIA. Such frameworks would support CIA by:

- establishing regional thresholds for VEC condition;
- making available information on current state and trends in VEC condition;
- making available information on the impacts of existing developments;
- possibly providing regional modelling tools; and
- developing a framework for regional cumulative impact monitoring.

However, as of the first quarter of 2013 these frameworks are generally not well advanced or widely available.

The creation of a regional enabling framework for CIA is beyond the capacity of individual proponents. However, good practice for cumulative impact assessment and management includes supporting the development of such frameworks. This may take several forms: working to engage other parties in the CIA or RCIA process; sharing the results of the project CIA or RCIA including recommendations for project-specific and regional management actions needed by others to effectively manage cumulative impacts; and supporting the implementation of collaborative approaches to cumulative impact management through information exchange networking, pooling resources for implementation of shared management initiatives, and participation in multi-stakeholder / regional monitoring[27].

Furthermore, since the basic logic framework for ESIA and CIA is essentially the same[28], and since they share many common standard tools and analytical methods, the key strategy needed to address the expanded scope of CIA is to ensure that:

- The CIA team has adequate qualifications and skills;
- The budget for the proponent's CIA is specified and included in the project budget with the amounts allocated appropriate for the likely scope and level of detail of the CIA; and
- The assessment schedule is appropriate given augmented scope and complex multi-stakeholder context.

Preliminary estimates of monitoring and mitigation costs may be developed early on in project development, but the full costs will likely need to be reassessed once the CIA or RCIA is complete.

It is critical to the success of CIA or RCIA, as applicable, that the individual project mitigation and, where needed, regional cumulative impact management strategies be implemented as designed. At the same time, estimates of cumulative impacts are often uncertain. The management approach to implementation thus needs to be adaptive, monitoring both the

[27] Even when a project specific CIA is not required, good environmental management practice, supports regional efforts to assess and manage cumulative impacts. This would include making project ESIA reports and project impact monitoring results available to others who are working to manage cumulative impacts within the regional context.
[28] See Appendix 2 Basic Logic Framework for CIA.

impacts and the effectiveness of management approaches, and adjusting the management to ensure avoidance of unacceptable cumulative impacts. As with management of impacts identified in ESIA, this works best when management of cumulative impacts is integrated into company business plans and strategies.

Table 2. Roles and Responsibilities of Participants in CIA under Ideal Governance Conditions

Roles and Responsibilities of Different Parties in Ideal Conditions	Scale	Purpose (the minimum roles/responsibilities interactions should accomplish are shown in ***italics***, other recommended interactions are shown in <u>underline</u>)
Government • Establish policy and legal framework for resource management and cumulative impact management • Establish and lead regional planning structures and collaborative mechanisms for managing resource developments and cumulative impacts • Implement development permitting process that considers cumulative impacts of all developments/pressures and conforms to values and limits given regional plans and national frameworks • Design and conduct CIA study of a geographic area which includes the baseline (historical) conditions and predicts the future baseline based upon the carrying capacity of the VECs • Issues approvals to individual private sector projects to be developed based upon this information • Lead development and implementation of regional cumulative impact monitoring program that analyzes development pressures and impacts at regional scale and compares results to values/acceptable limits for resource development	National/ sub-national Regional Local Regional	• Defines values and acceptable limits for resource development • Defines locations for acceptable types and limits of developments • Identifies contribution of each development to cumulative impacts in region, gives public and ***proponent assurance that proposed developments are within acceptable limits*** set by legal framework and regional plans and processes • Gives information on state of VECs in region and assurance that cumulative impact values and development objectives are being met; provides database for project level CIA
Private Sector Project Proponent • Design and conduct CIA (or RCIA) study of the incremental impacts of the project building upon the CIA study conducted by the government • Monitor and manage cumulative impacts and risks related to development for life of development • Provide project- level cumulative impact monitoring data to regional cumulative impact monitoring program • Support regional planning structures and collaborative mechanisms for managing cumulative impacts to prevent their limits being reached; actively participate as needed in collaborative systems with government, private sector and public	Site-regional Local-regional Site-local Regional	• ***Gives financial institutions and decision-makers, cumulative impact information to evaluate the project*** • ***Conforms to CIA commitments/permit conditions; manages development to prevent it causing VECs to reach limits*** • ***Gives government project-related cumulative impact data*** it needs to manage uncertainty of impact predictions and prevent VECs reaching limits • Enables effective monitoring and management of cumulative impacts at appropriate scale; ***supports collaborative multi-stakeholder solutions for CIA***
Third Parties (other developers /resource users) Similar to proponent above, except it also covers existing developments •Assess and manage cumulative impacts of existing developments •Assess and manage cumulative impacts of proposed developments; prepare ESIA and CIA for permitting-decision-makers if needed •Collect and provide data for regional cumulative impact monitoring program •Participate in regional planning structures and collaborative mechanisms for managing CIA at regional or larger scales	Site-Local Site-Local Site-regional Regional	• <u>Provides project proponents</u> and other developers, decision-makers and regional monitoring program <u>with details about impacts of existing developments</u> • <u>Provides proponent</u> and other developers, government and other stakeholders with details about proposed developments (i.e. project description, impact analysis, ESIA/CIA) • Gives project-level data needed for regional cumulative impact monitoring program • Enables effective regional management of cumulative impacts; supports collaborative multi-stakeholder process
Affected Communities and Public •Public participates in value setting for policy/legal frameworks and regional resource management plans •Affected communities participate in CIA of individual projects •Public participates in collaborative management of cumulative impacts	National - regional Site-local Regional	• Ensures regional resource development limits and conditions reflect public values • ***Allows values of affected people to be reflected in scoping and valuation of project-level CIAs*** • Fosters public ownership of cumulative impact management objectives and results

Table 3. Interactions with Stakeholders in CIA

Parties	Places in CIA Process Requiring Interactions with Parties		Objectives of Interactions
	Minimum	Ideal	
Government	Assessment – Scoping, baseline data collection, review of impact findings Management – collection and review of cumulative impact monitoring data	Government leading collaborative CIA program of planning, permitting, monitoring and managing cumulative impacts	Provide project proponent with government standards, data, views, expertise, concerns and validation for assessment; facilitates government role in collaborative monitoring and management
Third Parties	Assessment – informed about CIA study and results Management – informed about cumulative impact monitoring and management program and relevant results	Provide information about existing and proposed projects, participate in collaborative mitigation, monitoring and management	Provide proponent with third party information needed for CIA; promote third party participation in collaborative monitoring and management
Affected Communities and Public	Assessment – Scoping, Assessment of Significance Management – Collection and review of cumulative impact monitoring data	As many steps in the CIA process as possible – e.g. data collection, formulation of mitigation, ongoing monitoring	Include values and concerns of affected people in CIA; gain public support and insights in project planning and operations

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Appendix 1. Examples of indicators to assess incremental project impacts and indicators for cumulative assessment of the same impacts

The following table provides examples of indicator selection for representing incremental change and for cumulative impact for different types of impacts, together with reference to the applicable IFC Performance Standard for the impact type.

Project Impact	Indicator of Incremental Impact	Indicator of Cumulative Impact	Performance Standard
Additional wage employment opportunities	• Incremental number of employed, unemployed and participation rates of affected population • Incremental value of subsistence income, wage and other income to population	• Number, size, skill levels of regional labour force • Measures for shifts in livelihood and sustainability of livelihoods	1 & 2
Addition of a pollutant to the environment (air, water)	• Concentration of the pollutant in the emission / discharge • Concentration relative to discharge standard • Load from the project • Characterization of the spatial emission / discharge plume from the project	• Concentration of the pollutant in the receiving environment • Concentration relative to ambient standard • Total loading (from all sources) of the pollutant • Characterization of the spatial pattern of the concentration of pollutants in the downstream environment	3
Additional incidents of disease, alcohol and drugs and crime	• Number of additional incidents of STD diseases, alcohol and drug problems and crime rates • Incremental changes to demands on health, social and policing services	• Total number of incidents, Proportion of population affected • Measures for community and regional health and wellness; safety and security	4
Loss of Land (land alienation)	• Area/proportion of land lost, damaged or inaccessible due to project • Incremental change in benefits of affected land users (e.g. lost agricultural production, subsistence use, etc.)	• Total land area available, Value of land use benefits • Total population affected • Measures for sustainable livelihood and poverty	5, 7
Elimination of terrestrial habitat	• Area / fraction of habitat lost due to the project • Incremental change in population carrying	• Total area of lost habitat • Population size supported by	6, 7

Project Impact	Indicator of Incremental Impact	Indicator of Cumulative Impact	Performance Standard
	capacity	remaining available habitat • Measures of habitat fragmentation	
Addition of mortality to a wildlife population	• Number killed per time period • Incremental change in mortality rate	• Range of natural variation population total mortality rate	6

Appendix 2. Basic Logic Framework – Lessons from CIA Practice

CIA shares the same basic analytical process of an ESIA, and thus it involves the following steps:

- choose a set of development alternatives and variants to assess;
- choose end-points (VECs) for comparative analysis of the development alternatives, and the terms in which performance of each alternative will be expressed (indicators);
- assess the expected impact of each development alternative in terms of each VEC's indicators;
- if no alternative performs adequately, redesign one or more alternatives (e.g. mitigation measures) with the express intention to improve performance; and
- examine the results of analysis, weight the VECs according to decision-makers' preferences, and synthesize the results of analysis into an information package for decision-makers.

Given the objectives for CIA, the experience of CIA practitioners reveals that CIA good practice has the following characteristics[29]:

Process Management

- Ideally, regional CIA is conducted by the government prior to issuing approval (a concession, a license, etc.) for private sector developments, or the government will have established a CIA framework to support and enable good CIA practice by private sector developers;
- If the government or some other authority designated by the government has not conducted a regional CIA then the project proponent should take into account the findings and conclusions of related and applicable plans, studies, or assessments to develop a process of CIA; and
- The CIA may be linked to the ESIA and is begun early enough in project development that consideration of cumulative impacts can inform risk-based project decision making about project design.

Consultation and Collaboration

- Consultation with affected parties is transparent. Information about the proposed development should be provided to affected parties, including the results of the CIA. Where possible, collaboration is established with other developers and government regulators to facilitate joint efforts for cumulative impact management; and
- The results of the CIA, including the details of any future scenario used to explore the consequences of uncertainty, are made available to others working in the area to support future CIAs or regional CIA frameworks.

Scoping

- A relatively small set of VECs are selected for analysis based on their importance, concern for and / or likelihood of cumulative impacts; and

[29] Sources: Burris and Canter (1997); McCold and Holman (1999); Baxter et al (2001); Cooper and Sheate (2002); Antoniuk (2002); Kennett (2002); Duinker and Greig (2006, 2007); Bérubé (2007); Therivel and Ross (2007); Canter and Ross (2010); Franks and his colleagues (2010a, 2010b); Cooper (2011); Gunn & Noble (2011); IFC PS1 (2012).

- Scoping establishes the environmental context for CIA including:
    - Clear temporal and spatial boundaries are defined and the rationale documented;
    - Identification of other developments that impact the chosen VECs. This includes other types of development that have different but important impacts on the selected VECs
    - Identification of natural drivers that impact the condition of VECs
    - Variation in natural environmental processes that will affect the cumulative impacts is identified
    - Consider jurisdictional issues and overlapping legislation.

Analysis

- Assumptions and uncertainties regarding cumulative impacts are clearly stated;
- Thresholds / limits / targets for VEC condition / status are defined and the rational for their designation clearly documented;
- Determination of significance is adapted to each VEC;
- Analysis of cumulative impacts is done in the context of: the project, other already existing developments, other reasonably predictable future developments (i.e. in the planning stage and others that are reasonably predictable including other developments that could be induced by the project), and natural environmental drivers. Analysis is not limited only to impacts from projects of the same type but includes all reasonable foreseeable impacts on the chosen VECs;
- Analysis may be limited to a single future projection of reasonably predictable future developments, however, within this scenario analysis includes assessment of cumulative impacts over the possible range of environmental variation (i.e. is not focused only on expected average conditions, for example: a critical concern with regard to the discharge of pollutants may be the rate of dilution and the associated impacts can be expected to be at a maximum when natural river flows are at a minimum, rather than average or maximum flows);
- When appropriate, alternative development scenarios are used to assess the potential environmental and social risks during the life time of the project;
- The analysis of different cumulative impacts is done at a spatial and temporal scale that is appropriate for the particular VEC / cumulative impact (for example, some wildlife species range over a large area and will be impacted by projects throughout this area, diversions/withdrawals of water from rivers may have cumulative impacts at considerable distances from a proposed project, where the impacted water course converges with other rivers that are similarly impacted – see example of the Aral Sea).
- Analysis and conclusions are based on the scale of measurement appropriate to impact being assessed. Thus, for example, biophysical impacts are analyzed and reported quantitatively, although conclusions may be summarized qualitatively;
- Clarify the difference between a past baseline of observed condition, if known, and the future analytical baseline (of predicted state without the project);
- Identification of the project contribution to cumulative impacts is based on a comparison of the predicted environmental condition resulting from other existing and future developments (the future baseline) and the environmental condition that results when the project impacts are added to the future baseline; and
- Consideration of the significance of cumulative impacts may be done either: a) in regard to the change in environmental (VEC) condition relative to a past or present baseline, or b) relative to an established threshold / objective for VEC condition.

Impact Management

- Effects monitoring needed to assess the realized cumulative impacts is clearly defined and implemented. Monitoring recommendations may extend beyond what will be done by the proponent to identify co-ordinated monitoring by other developers and stakeholders;
- In addition to mitigation of the proposed project's impacts, multi-party regional mitigation / management (e.g. additional mitigation of other developments, offsets, management programs) that may be needed to effectively manage cumulative impacts is also identified and support from other stakeholders (governments, developers and communities) is sought to implement it (for example: by an existing authority such as a watershed coordinating agency, if it exists; or if no such agency exists, by a collaborative initiative established by the various proponents – see Franks, 2010a;2010b);
- The projects monitoring of cumulative impacts is used to update their management system and drive future management of impacts; and
- Ideally, the government updates the CIA report to incorporate the results of the project monitoring program to inform future decision making.

Appendix 3. Standard Annotated ToR for a Rapid Cumulative Impact Assessment (RCIA)

Terms of Reference for < the project >

1. Introduction

These Terms of Reference (ToR) describe the requirements for Rapid Cumulative Impact Assessment and Management for < the project > (the project).

< Provide background description of project purpose and location>

2. IFC Requirements for RCIA

The US Council on Environmental Quality (1997) defines CEA as follows: "*the impact on the environment which results from the incremental impact of the action when added to their past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other action*". Hegman et al. (1999) define cumulative effects as "*changes to the environment that are caused by an action in combination with other past, present and future actions*".

PS 1 defines the project area of influence to encompass "*cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impact identification process is conducted*". PS1 offers some context to limit the cumulative impacts to be addressed to "*those impacts generally recognized as important on the basis of scientific concerns and/or concerns from Affected Communities"* and provides examples such as *"incremental contribution of gaseous emissions to an air-shed; reduction of water flows in a watershed due to multiple withdrawals; increases in sediment loads to a watershed; interference with migratory routes or wildlife movement; or more traffic congestion and accidents due to increases in vehicular traffic on community roadways*".

Even though, PS1 does not expressly require, or put the sole onus on, private sector clients to complete a full Cumulative Impact Assessment (CIA), it states that the impact and risk identification process "*will take into account the findings and conclusions of related and applicable plans, studies, or assessments prepared by relevant government authorities or other parties that are directly related to the project and its area of influence*" including "*master economic development plans, country or regional plans, feasibility studies, alternatives analyses, and cumulative, regional, sectoral, or strategic environmental assessments where relevant*". Furthermore, it goes on stating that "*the client can take these into account by focusing on the project's incremental contribution to selected impacts generally recognized as important on the basis of scientific concern or concerns from the Affected Communities within the area addressed by these larger scope regional studies or cumulative assessments"*

Similarly, PS Guidance Note 1 states that "*in situations where multiple projects occur in, or are planned for, the same geographic area... it may also be appropriate for the client to conduct a*

CIA as part of the risks and impacts identification process". However, it clearly recommends that this assessment should (a) *"be commensurate with the incremental contribution, source, extent, and severity of the cumulative impacts anticipated",* and *(b)* "*determine if the project is incrementally responsible for adversely affecting an ecosystem component or specific characteristic beyond an acceptable predetermined threshold (carrying capacity) by the relevant government entity, in consultation with other relevant stakeholders"*.

Therefore, although the total cumulative impacts due to multiple projects should be typically identified in government sponsored assessments and regional planning efforts, to comply with PS1, IFC clients are expected to ensure that their own assessment determines the degree to which the project under review is contributing to the cumulative effects.

3. Objective

The objectives of the RCIA analysis are:

- to determine if the combined impacts of: the project, other projects and activities, and natural environmental drivers with result in VEC condition that may put the sustainability of a VEC at risk (i.e. exceed a threshold for VEC condition which is an unacceptable outcome);
- to determine what management measures could be implemented to prevent unacceptable VEC condition, this may include additional mitigation of the project being assessed, additional mitigation of other existing or predictable future projects, or other regional management strategies that could maintain VEC condition within acceptable limits.

4. Conduct of the RCIA

<in the following sections – add additional text as needed to characterize specific characteristics of the RCIA ToR that are known at the time the ToR is issued, for example, where it is already known that there are regional concerns for the condition of one or more VECs the VECs should be identified in the notes included in Section 4.1).

IFC's Good Practice Note Cumulative Impact Assessment and Management Guidance for the Private Sector in Emerging Markets (the CIA GPN) describes a six step process for CIA that should be used in conducting CIA for <the project>:

- Scoping Phase I – VECs, Spatial and Temporal Boundaries
- Scoping Phase II – Other Activities and Environmental Drivers
- Establish information on baseline status of VECs
- Assess cumulative impacts on VECs
- Assess significance of predicted cumulative impacts
- Management of Cumulative Impacts – Design and Implementation

The following ToR sections provide a brief outline of the work to be undertaken in conducting the RCIA for the project. Refer to the CIA GPN for additional guidance regarding conduct of the following steps.

4.1 Scoping Phase I – VECs, Spatial and Temporal Boundaries

Tasks:

- Identify the Valued Environmental and Social Components to include in the RCIA,

- Identify the spatial boundaries of the RCIA; and
- Identify the temporal extent of the RCIA.

Note:

- VECs to include are those that would be impacted by the project, with any degree of residual impact. Thus VECs for which there is an impact that was deemed insignificant in the ESIA are not to be included in the CIA.
- If the number of VECs is too large to conduct an analysis of all, priority for analysis should be given to those for which there is existing regional concern – reflected in the regional baseline information (see section 4.3).

4.2 Scoping Phase II – Other Activities and Environmental Drivers

Tasks:

- Identify other existing and reasonably predictable projects and human activities that do/would affect the VECs to be included in the RCIA; and
- Identify natural environmental drivers that also impact the condition VECs identified in section 4.1.

Note:

- developments that could be reasonable expected to be induced by the projects are considered to be reasonably predictable
- where there is a significant potential for further development, but not specific development proposals in place, a scenario of potential development may be considered

4.3 Establish information on baseline status of VECs

Tasks:

- Collect available information on the impacts of the other activities and natural drivers on the condition of the VECs;
- Collect available information on trends in VEC condition; and
- Collect available information on regional thresholds for VEC condition.

Note:

- If regional thresholds for VEC condition have not been established, they may have to be estimated based on estimates from other regions. As feasible, the estimation should be peer reviewed.

4.4 Assess cumulative impacts on VECs

Tasks:

- Establish indicators for expression of VEC condition – this may already be reflected in the information collected on VEC baseline status (in 4.3 above). If not, then indicators will need to be established that can be estimated from the baseline information;
- Estimate the “future baseline” for condition of the VECs – i.e. the condition of VECs as affected by the other projects, human activities, and natural drivers;
- Estimate the project impact on VEC condition – this estimation is done with the effects of planned project mitigation included; and

- Estimate the Net Cumulative Impact on VECs – the total impact on the VECs when the project impacts are combined with the future baseline.

Note:

- a wide variety of methods have been used for CIA analysis, methods chosen for the analysis should be chosen to be compatible with the information available for the analysis and that can provide, whenever possible, a quantitative estimate of cumulative impact.
- if qualitative estimates of cumulative impact are to be developed, they should be based on the consensus estimate of a panel of experts rather than on the opinion of an individual expert.

4.5 Assess significance of predicted cumulative impacts

Tasks:

- Assess significance of the predicted cumulative impacts on the VEC.

Note:

- When the cumulative impact on VEC condition will approach, be near to, or exceed a threshold, the impact is significant.
- The analysis may reveal that significant cumulative impacts will exist without the project.

4.6 Management of Cumulative Impacts – Design and Implementation

Tasks:

- Identify, when necessary, additional project mitigation (beyond that identified in the project ESIA) to reduce and estimated unacceptable cumulative impact on a VEC to an acceptable level (iteration with the tasks described in 4.4 and 4.5 will be necessary to assess the value of such additional mitigation. This should represent effective application of the Mitigation Hierarchy[30] in environmental and social management of the specific project contributions to the expected cumulative impacts;
- If necessary, identify the potential, or need for, additional mitigation of other existing or reasonably predictable future projects;
- Identify the potential for other regional strategies that could maintain VECs within acceptable condition; and
- Undertake best efforts to engage, enhance, and contribute to a multi-stakeholder collaborative approach for the implementation of management actions that are beyond the capacity of the project proponent.

[30] Defined in PS1 as the strategy to first anticipate and avoid impacts and risk over workers, the environment and/or Affected Communities, or where avoidance is not possible impacts and risks must be minimized. Acceptable option to minimize will vary and include: abate, rectify, repair, and/or restore. Finally, where residual impacts remain, these must be compensate/offset.

4.7 Stakeholder Engagement[31]

Stakeholder engagement is critical to success of RCIA. Engagement should start early in the process, i.e. in Scoping (sections 4.1, 4.2) and continue throughout the RCIA process. Stakeholder engagement will be essential for collection of the information needed for the RCIA analysis, and likely also to secure cooperation in implementation of mitigation of the impacts of other projects, and or identification and design of regional cumulative impact management strategies that may be needed to avoid unacceptable cumulative impacts.

Stakeholder Engagement should be designed and implemented to:

- clarify stakeholder roles and responsibilities in the RCIA process, and to
- establish and maintain a constructive relationship with government and other stakeholders.

The second point above is essential when additional mitigation is needed for other projects. Engaging in assigning blame for cumulative impacts is likely to be counter-productive. Cumulative impacts are by their multi-party nature a collective responsibility and in this regard a maintaining a constructive relationship will be essential.

[31] For further guidance please refer to IFC published documents on good practice and guidance on Stakeholder Engagement, Participatory Monitoring, Grievance Mechanisms

- http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_handbook_stakeholderengagement__wci__1319577185063
- http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_gpn_grievances
- http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_gpn_socialdimensions__wci__1319578072859
- http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_handbook_waterfootprintmanual__wci__1319577922803
- http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_handbook_doingbetterbusiness__wci__1319576642349