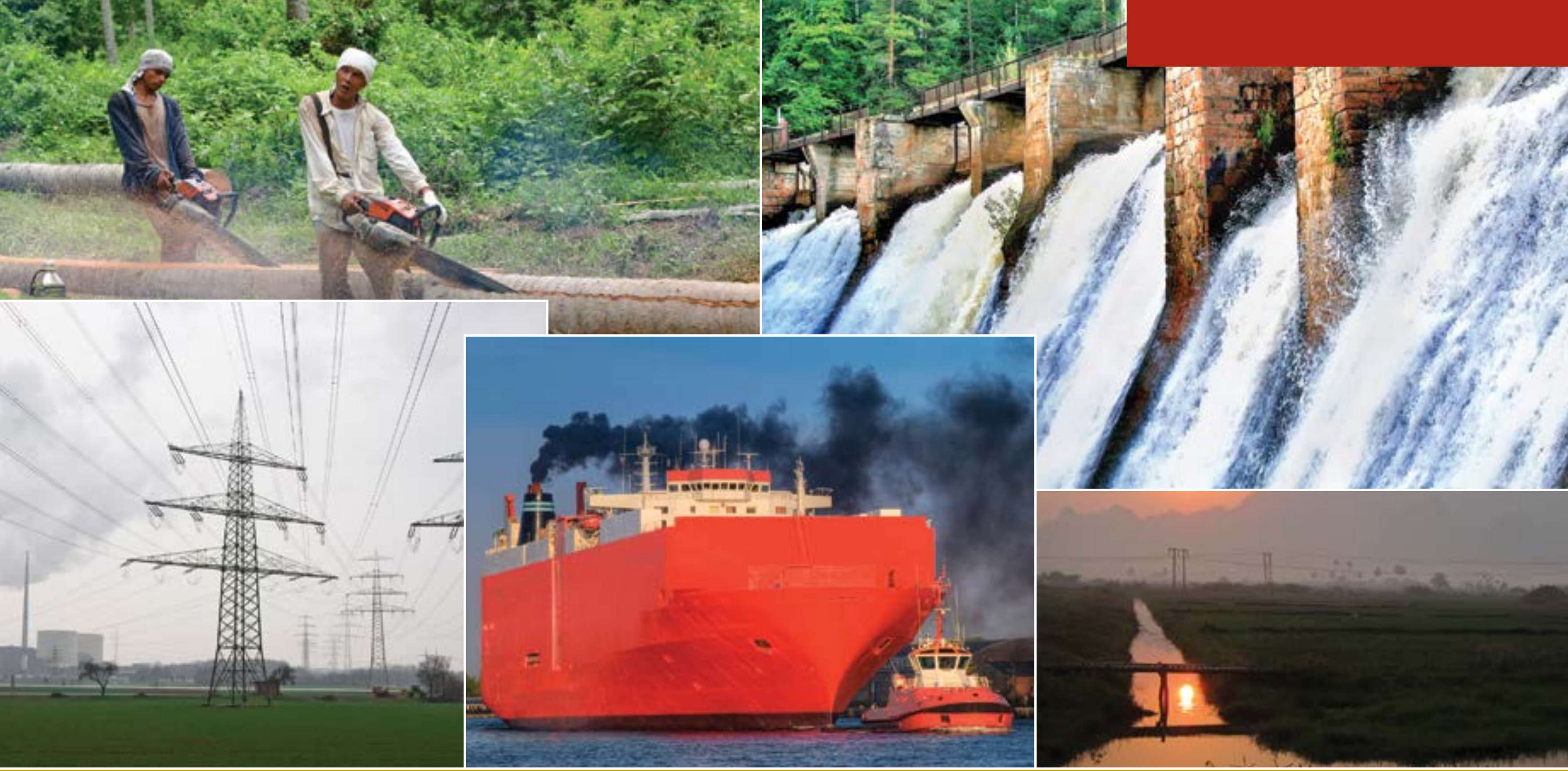

Good Practice Handbook

Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets

IFC International Finance Corporation
World Bank Group

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List of Acronyms

CIA	Cumulative Impact Assessment and Management
DAI	Direct Area of Influence
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
GN1	IFC Guidance Note 1
GPH	IFC Good Practice Handbook
IBRD	International Bank for Reconstruction and Development (World Bank)
IFC	International Finance Corporation
MDB	Multilateral Development Bank
RCIA	Rapid Cumulative Impact Assessment and Management
SEA	Strategic Environmental Assessment
VEC	Valued Environmental and Social Component

Acknowledgments

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The drafting team was composed of Mauricio Athie, Lakhdeep Babra, Susan Botha, Pablo Cardinale, Patricia Miller, Justin Pooley, and Eric Shayer from IFC, Lorne Greig and Samantha Boardley from ESSA Technologies, and their consultants Peter Duinker, Robert R. Everitt and M. Joan Freeman. In addition, this Good Practice Handbook benefited significantly from extensive comments from an internal and external peer review process, which involved diverse people and institutions—too many to acknowledge individually. However, the drafting team is very thankful for their valuable and insightful comments and hopes they find their input reflected in this final version.

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Foreword

IFC prides itself on contributing to the continuing evolution in environmental and social impact and risk management practices, as reflected in our Policy and Performance Standards on Environmental and Social Sustainability and regular publications of good practice guidance.

One of the biggest risk management challenges currently facing project developers in emerging markets is the appropriate assessment and management of cumulative impacts and risks related to their business activities. Factors such as climate change and unpredictability of climate patterns, increasing and competing water use demands, decline of species biodiversity, degradation of ecosystem services, and changing socio-economic circumstances all add complexity to risk assessment and management. Potential system-wide consequences resulting from the combination of individual effects of multiple actions overtime are particularly important to understand better.

Therefore, it is my pleasure to present this Good Practice Handbook (GPH) on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets.

This GPH recognizes the important role of governments in preparing cumulative impact assessment frameworks to assist private sector companies in the identification and management of cumulative impacts. However, the reality is that these frameworks are rarely available in emerging markets, and more often it is left to the private developer to try and take into consideration not only its own contribution to cumulative impacts, but also other projects and external factors that may place their developments at risk.

IFC expects that the six-step process proposed in this GPH will foster the consolidation of this evolving good practice globally, and assist private sector companies in emerging markets to identify their contribution to cumulative impacts and guide them in the effective design and implementation of measures to manage such cumulative effects.

I hope that this handbook will be found useful by practitioners and others having to deal with cumulative impacts, and that it contributes further to IFC's mission of promoting sustainable private sector development.

William Bulmer
Director
Environment, Social and Governance Department

Executive Summary

Executive Summary

The International Finance Corporation (IFC), the private sector arm of the World Bank Group, is committed to ensuring that the costs of economic development do not fall disproportionately on those who are poor or vulnerable. This commitment is implemented through the January 1, 2012 IFC Policy on Environmental and Social Sustainability and its corresponding, comprehensive set of eight Performance Standards that define IFC clients' responsibilities for managing their environmental and social impacts and risks.

Specifically, Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts recognizes that because of the increasing significance of systemwide risk factors such as climate change, water availability, decline of species biodiversity, degradation of ecosystem services, and modification of socioeconomic and population dynamics, among others, cumulative impact assessment and management (CIA) is an essential framework for risk management.

There seems to be significant debate and disagreement among academics, developers, practitioners, and civil society organizations about whether CIA should be an integral component of a good environmental and social impact assessment (ESIA) or a separate stand-alone process.

CIA is evolving and there is no single accepted state of global practice. What is important is that during the process of identifying environmental and social impacts and risks, developers or project sponsors (a) recognize that their actions, activities, and projects—their developments[1]—may contribute to cumulative impacts on valued environmental and social components (VECs)[2] on which other existing or future developments may also have detrimental effects, and (b) avoid and/or minimize these impacts to the greatest extent possible. Furthermore, their developments may be at risk because of an increase in cumulative effects over ecosystem services they may depend on.

Good practice requires that, at a minimum, project sponsors assess during the ESIA process whether their development may contribute to cumulative impacts on VECs and/or may be at risk from cumulative effects on VECs they depend on.

This Good Practice Handbook proposes as a useful preliminary approach for developers in emerging markets the conduct of a rapid cumulative impact assessment (RCIA). The RCIA can be an integral component of the ESIA or a separate process. It entails a desk review that,

1 The term *development* is used throughout this document to refer to projects, actions, or business activities potentially subject to a CIA.

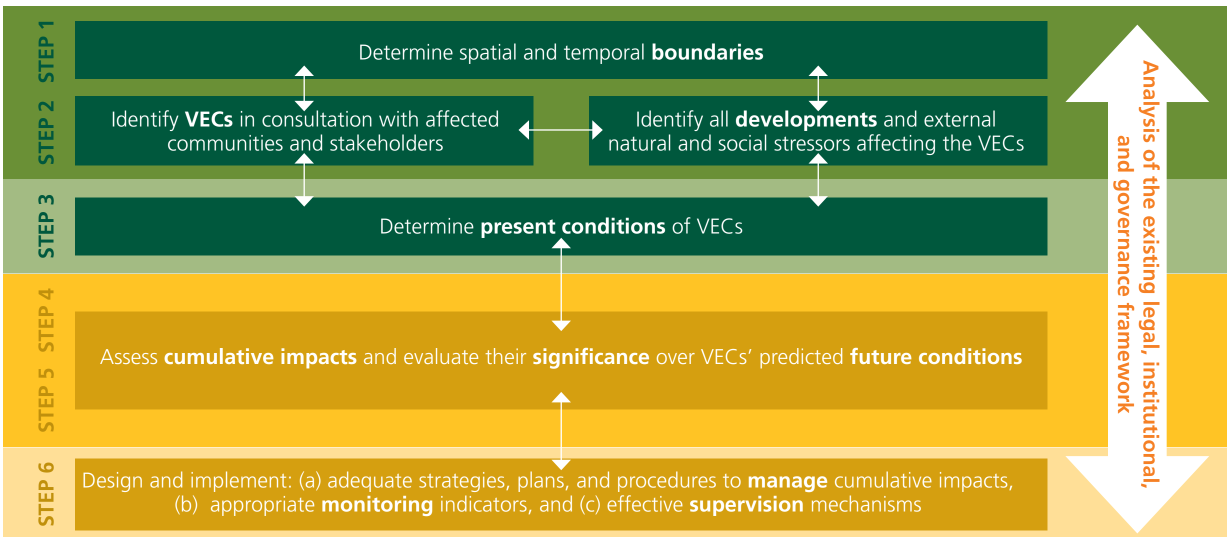
2 See Box 3 for definition of VECs.

in consultation with the affected communities and other stakeholders, enables the developer to determine whether its activities are likely to significantly affect the viability or sustainability of selected VECs. The proposed approach recognizes that, especially in emerging markets, the many challenges associated with managing a good CIA process include lack of basic baseline data, uncertainty associated with anticipated developments, limited government capacity, and absence of strategic regional, sectoral, or integrated resource planning schemes. Given the many challenges, this handbook recommends that developers:

- follow a six-step RCIA process,
- engage stakeholders as early as possible and throughout the decision-making process,[3] and
- clearly record the fundamental reasoning behind each important decision made, supporting it with as much technical evidence as possible.

Figure 1 illustrates the RCIA logical framework, which is an iterative six-step process: scoping (Steps 1 and 2), VEC baseline determination (Step 3), assessment of the contribution of the development under evaluation to the predicted cumulative impacts (Step 4), evaluation of the significance of predicted cumulative impacts to the viability or sustainability of the affected VECs (Step 5), and design and implementation of mitigation measures to manage the development's contribution to the cumulative impacts and risks (Step 6).

FIGURE 1. RCIA: SIX-STEP APPROACH



[3] For good practice, please refer to IFC's *Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets*, available at www.ifc.org/HB-StakeholderEngagement

Depending on the scenario, the RCIA may evolve into a more robust and comprehensive CIA, which requires the participation of many parties and is best led by local governments or regional planners.

CIA processes involve continuous engagement with affected communities, developers, and other stakeholders. In practice, effective design and implementation of complete CIA processes is often beyond the technical and financial capacity of a single developer. CIA thus transcends the responsibility of a single project developer. On occasion, it may be in the best interest of a private sector developer to lead the CIA process, but the management measures that will be recommended as a result of the process may ultimately be effective only if the government is involved. CIAs are multistakeholder, iterative processes that (a) require the involvement of multiple multidisciplinary teams and an effective, efficient governance structure and (b) tend to be time and data intensive. They should follow internationally recognized good practices, such as those in the Canadian Environmental Assessment Agency's *Cumulative Effects Assessment Practitioners' Guide*[4] or those outlined by the U.S. Council on Environmental Quality in its guidance report on how to consider cumulative effects under the U.S. National Environmental Protection Act (NEPA) (CEQ 1997).

There is no fundamental conceptual difference between a RCIA and a CIA; the first is a simplified version of the second. The preliminary screening exercise resulting from a RCIA may evolve into a CIA. The only difference in practice is that typically an RCIA involves only a desk review of available information, including existing ESIAs; strategic, regional, and/or resource planning documents; and reports from nongovernmental organizations (NGOs), the scientific community, and other interested actors. A CIA is likely to involve a complex governance structure and consultation with several parties and stakeholders to determine the VECs to assess, the baseline data requirements and sampling methodology, acceptable future conditions of VECs, indicators and thresholds, mitigation measures, monitoring protocols, and supervision mechanisms.

When a government-led CIA exists, or when there are clear requirements related to a specific management unit (e.g., watershed, airshed, flyway, or landscape) resulting from regional, sectoral, or integrated resource or strategic planning efforts, private sector actors simply need to comply with the overarching requirements of the existing CIA.

Where resource inventories and plans do not exist, this GPH proposes that private sector sponsors should at least perform a RCIA. The initial screening results of the RCIA will provide several potential scenarios (Box 1):

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[4] Available at http://www.ceaa-acee.gc.ca/default.asp?lang=En&n=43952694-1&toc=show.

- *Significant risk for cumulative impacts/significant leverage:* The development under consideration represents a significant contributor to the expected cumulative impacts or will be the first of several future reasonably anticipated developments that will use the same resource and/or potentially affect the same VECs. In these cases, through consultation with stakeholders, the RCIA will help assess potential cumulative impacts that could be expected over time, and guide the developer in defining the required mitigation measures. The private developer can use Step 6 to design a strategy to appropriately manage cumulative impacts and provide advice to the government on the appropriate governance structure to ensure other developers will follow suit. This is an ideal case, where the private sector sponsor can capitalize on the ESIA process, including baseline generation and stakeholder engagement, and the RCIA may organically evolve into a more robust CIA process and contribute to leveraging governments by outlining a strategic approach to managing cumulative impacts.
- *Significant risk for cumulative impacts/limited leverage:* The development under consideration is immersed in an environment where the cumulative impacts are evident but the issues are complex, many actors are already involved, and the solution is clearly beyond any individual project sponsor. In this case, the RCIA will help the developer (a) determine the significance of the overall cumulative impacts and its contribution to these cumulative impacts, and (b) design environmental and social management plans and procedures to appropriately mitigate those contributions. In this case, the developer should be accountable only for the design and implementation of mitigation measures commensurate with the magnitude and significance of its contribution to the cumulative impacts. However, individual sponsors should use their best efforts to engage other developers, governments, and other stakeholders in acknowledging the cumulative impacts and risks and in designing coherent management strategies to mitigate them.
- *Limited to no contribution to cumulative impacts:* The RCIA determines that even though there are clear cumulative impacts, the development's contribution to the cumulative impacts over the affected VECs are negligible or nil. In this case, no measures other than the ones resulting from the ESIA process would be necessary. In this situation, however, if there are cumulative impacts from other sources that are not being addressed, the developer may consider it pertinent to draw this to the attention of the government or other stakeholders, and assess whether its project may be at risk from the unmanaged cumulative effect.

This GPH emphasizes, therefore, that ultimately governments are responsible for preparing CIA frameworks to assist private sector actors in the identification and management of cumulative impacts. Because these frameworks rarely exist in emerging markets, this GPH also recognizes that it is clearly still in the private developer's interest to take into consideration not only its own contribution to cumulative impacts, but also other projects and external factors that may affect similar VECs. Not doing so may place the developer's own efforts at risk and also negatively affect its reputation. However, undertaking this process can be challenging and requires the cooperation of government, other developers, and other stakeholders.

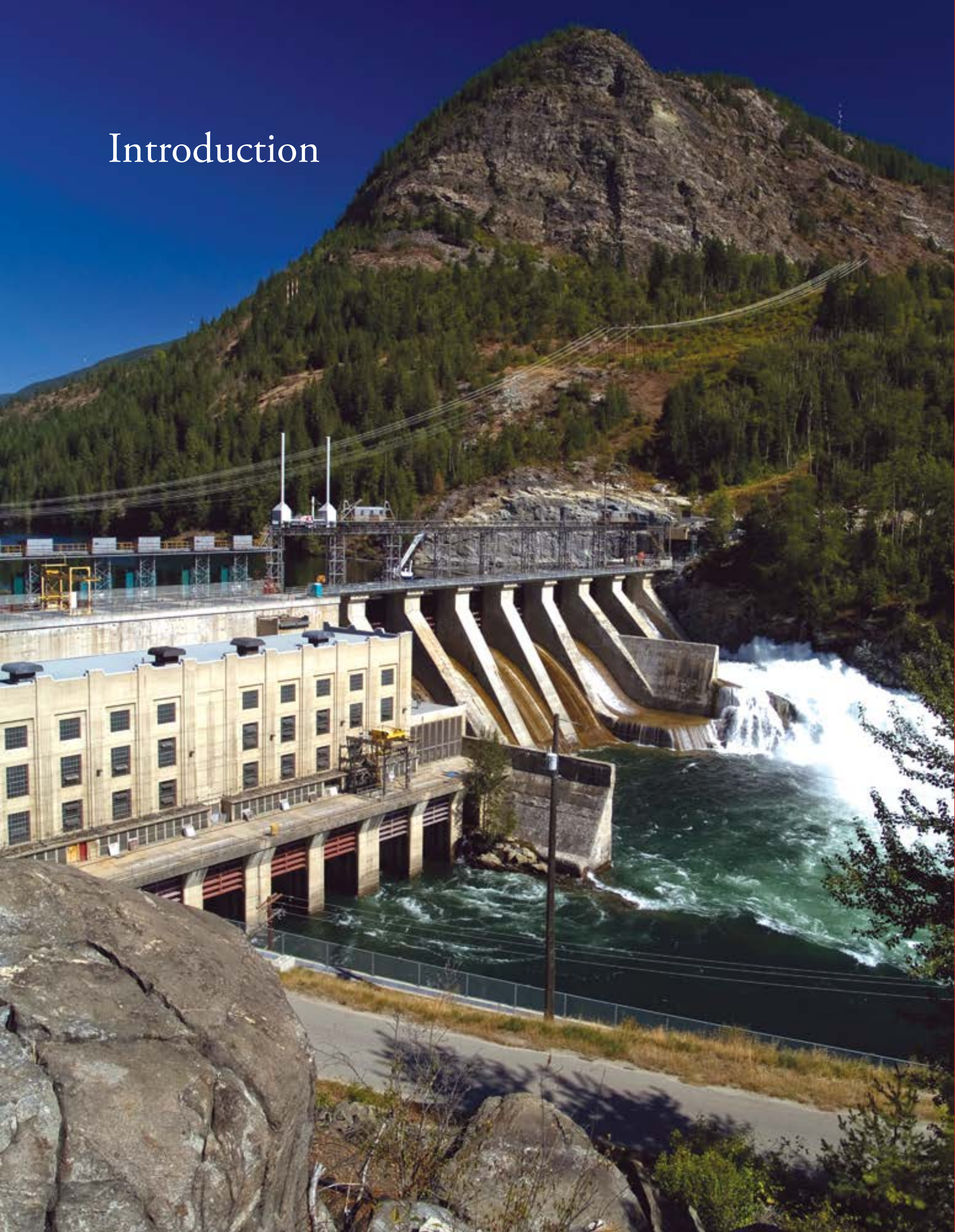
Box 1. Differentiated Approach: Impact versus Leverage

IFC is considering the financing of two hydroelectric power projects in Nepal.

Significant Impact/High Leverage: The first project under consideration is a hydroelectric power plant in the Kabeli River, which is currently requesting cofinancing from the International Development Association (IDA) and IFC. It is a dual purpose peaking, run of river, 37.6 MW hydroelectric power plant, located about 620 km east of Kathmandu. The Kabeli River is an important tributary in the Tamor River watershed. This is expected to be the first power plant constructed in this remote area of the country, but twenty four other hydropower projects are in various stages of consideration to be developed in the Tamor River basin. Six projects will be on the Kabeli River and its tributaries; the remaining ones are to be constructed on Tamor River or its tributaries. All of the projects planned within the Kabeli watershed, are located upstream of the project under IFC consideration. As currently planned, hydroelectric power development of the Tamor River is likely to convert this natural habitat into a fragmented river with regulated flows. Because this HPP is the first project to be constructed in the Tamor River watershed and it is the one farthest downstream in the Kabeli before its confluence with the Tamor River, consideration of cumulative impacts at the Tamor River watershed level is crucial. To proceed with financing, IDA and IFC are working together as the World Bank Group to ensure a CIA is performed at the Tamor River watershed level. This process is just beginning, but it is expected to be led by the government and involve a wide range of stakeholders in the selection of the VECs to focus on, determination of indicators and thresholds, management strategies, and monitoring indicators and supervision mechanisms. A potential management solution includes consideration of an "intact river" approach in which another major tributary of the Tamor would be left untouched. In addition, all projects in the watershed will need to follow design and operational criteria and mitigation measures developed by the project under consideration in order to manage cumulative impacts over the selected VECs.

Significant Impact/Limited Leverage: A very different case is the consideration for financing of another HPP on the Upper Trishuli. This is a 216 MW plant located about 50 km directly north of Kathmandu. Two other HPPs operate in the Trishuli River downstream from the proposed project. Two additional projects are under construction, one upstream from the proposed project and the other between the proposed project and an existing project downstream. The cumulative impacts are evident not only in terms of aquatic habitat fragmentation but also in terms of overall degradation of the catchment area (e.g., deforestation, erosion, multiple access roads, and transmission lines). In this case, for IFC financing to proceed, the company has been asked to update the ESIA, strengthening the ecological and social baselines, improving the stakeholder engagement process, and performing a RCIA to assess cumulative impacts and determine the project's potential contribution to the most significant cumulative impacts, namely fish migration, loss of aquatic and riparian habitat, catchment erosion, and landscape fragmentation. The company will be required to include plans and procedures to mitigate identified cumulative impacts as part of the environmental and social management plan, and with the help of the IBRD, use best efforts to work with the government, other sponsors, the affected community and other stakeholders to coordinate efforts to manage cumulative impacts at the watershed level.

Introduction



Introduction

The U.S. Council on Environmental Quality (1997, Executive Summary page v) defines cumulative effects assessment (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."

Hegmann et al. (1999, Section 2, page 3) define cumulative effects as "changes to the environment that are caused by an action in combination with other past, present and future actions."

The major environmental and social management challenges that we face today—climate change, loss of biodiversity, the decline of ocean fisheries, limitations on food security, the scarcity of usable freshwater resources, displacement of communities with consequent increases in urban poverty, and inviability of traditional local livelihoods—are all the result of cumulative impacts[5] from a large number of activities that are for the most part individually insignificant, but together have had regional or even global repercussions. The importance of understanding the cumulative environmental and social impacts from multiple projects, actions, or activities—or even from the same actions over an extended period of time—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 subsequent social consequences may result not from the direct effects of a particular action, project, or activity but from the combination of existing stresses and the individually minor effects of multiple actions over time (Clarke 1994).

Consequently, although the environmental and social impact assessment (ESIA) process is essential to assessing and managing the environmental and social impacts of individual projects, it often may be insufficient for identifying and managing incremental impacts on areas or resources used or directly affected by a given development from other existing, planned, or reasonably defined developments at the time the risks and impacts are identified.

[5] It should be noted that the terms "impact" and "effect" are used interchangeably throughout this handbook. They both describe any change that a development may cause in a selected VEC.

Cumulative impacts are contextual and encompass a broad spectrum of impacts at different spatial and temporal scales.[6] In some cases, cumulative impacts occur because a series of projects of the same type are being developed; for example, when several hydroelectric projects are constructed or planned on the same river or within the same watershed, when multiple oil and gas projects or mines are developed in close proximity, or when a number of wind farms are constructed or planned within the same flyway or region. In other cases, cumulative impacts occur from the 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 other adjacent land uses.

This Good Practice Handbook is based on IFC's experience in applying its Performance Standards and is nonprescriptive in its approach. It should be used in conjunction with the Performance Standards, their Guidance Notes, and the 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 requirements under the existing IFC Sustainability Framework. Its purpose 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 developments.

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6 A given impact may be generated at a specific site or moment in time, but its consequences may be felt in a different geographical area (e.g., downwind or downstream), or materialize sometime later (e.g., bioaccumulation, attainment of a resilience threshold). This transcends the traditional "direct area of influence" (DAI) concept, and underscores the need for analysis of indirect and cumulative effects, as well as the need to expand the geographical boundaries of the impact assessment and/or the time frame used for the analysis.

IFC's Context

IFC Performance Standard 1, Assessment and Management of Environmental and Social Risks and Impacts, recognizes that in some instances, private sector developers need to consider cumulative effects in their identification and management of environmental and social impacts and risks. Therefore, IFC believes that when a private sector project sponsor faces cumulative environmental and social impacts, it should have mechanisms for identifying the magnitude and significance of its contribution to those impacts and risks, and should include appropriate mitigation measures as an integral component of the project's environmental and social management system (ESMS).

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

- effective application of and adherence to the mitigation hierarchy[7] in environmental and social management of the specific contributions by the project to the expected cumulative impacts; and
- best efforts to engage in, enhance, and/or contribute to a multistakeholder, collaborative approach to implementing management actions that are beyond the capacity of an individual project proponent.

Performance Standard 1, in paragraph 8, 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." Performance Standard 1, in footnote 16, limits 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 airshed; 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."

[7] Defined in Performance Standard 1, paragraph 3, as the strategy to first anticipate and avoid impacts on and risks to workers, the environment, and/or Affected Communities or, where avoidance is not possible, to minimize impacts and risks. Acceptable options for minimizing will vary and include abating, rectifying, repairing, and/or restoring. Finally, where residual impacts remain, these must be compensated for and/or offset. It is important to note that compensation and/or offsets are the mechanisms proposed for managing residual impacts, not cumulative impacts. This is an important clarification as it is impractical for a single sponsor to offset cumulative impacts. However, regional offset of cumulative impacts could still be possible as part of a collaborative CIA mitigation led by the government or a coalition of developers.

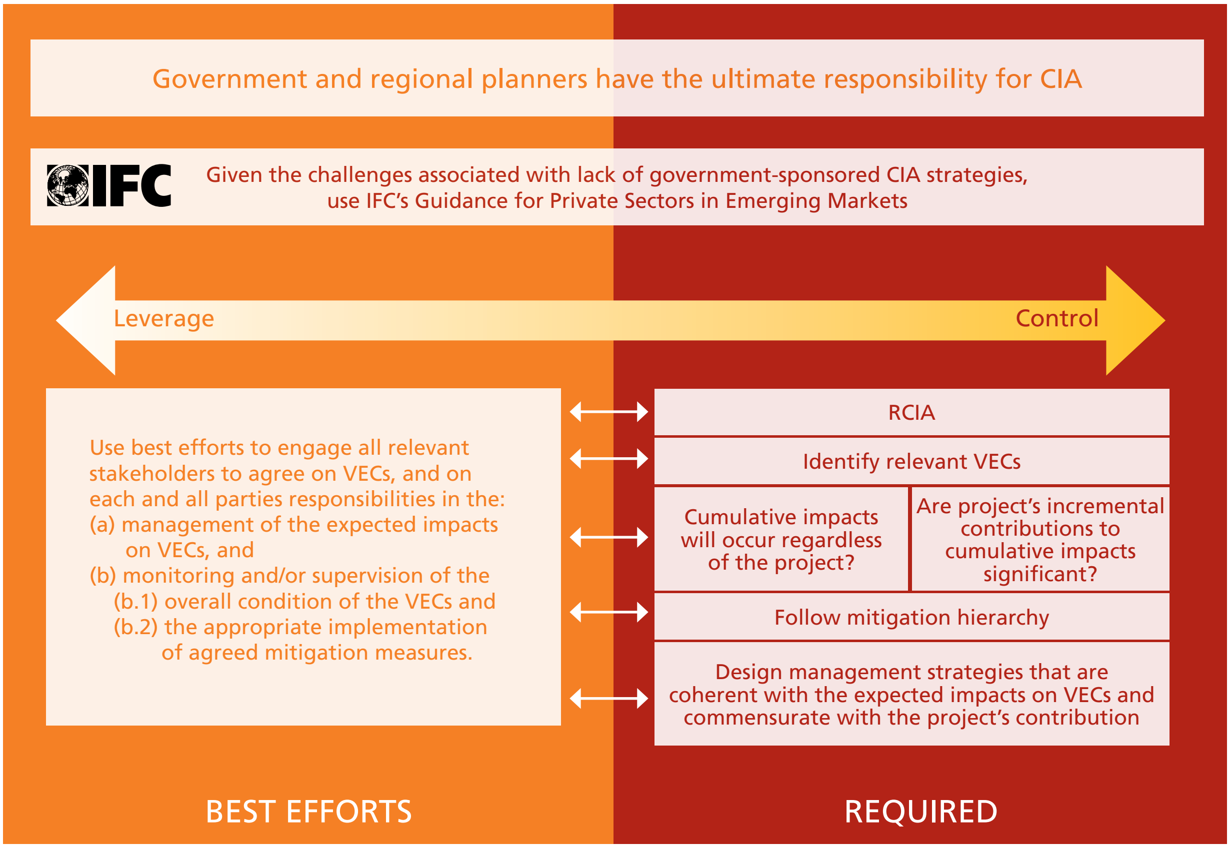
Even though Performance Standard 1 does not expressly require, or put the sole onus on, private sector clients to undertake a CIA, in paragraph 11 it states that the impact and risk identification process "will take into account the findings and conclusions of related and applicable plans, studies, or 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, footnote 17 states, "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, Performance Standard Guidance Note 1 (GN1), in paragraph GN38, states, "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, in paragraph GN41, 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."

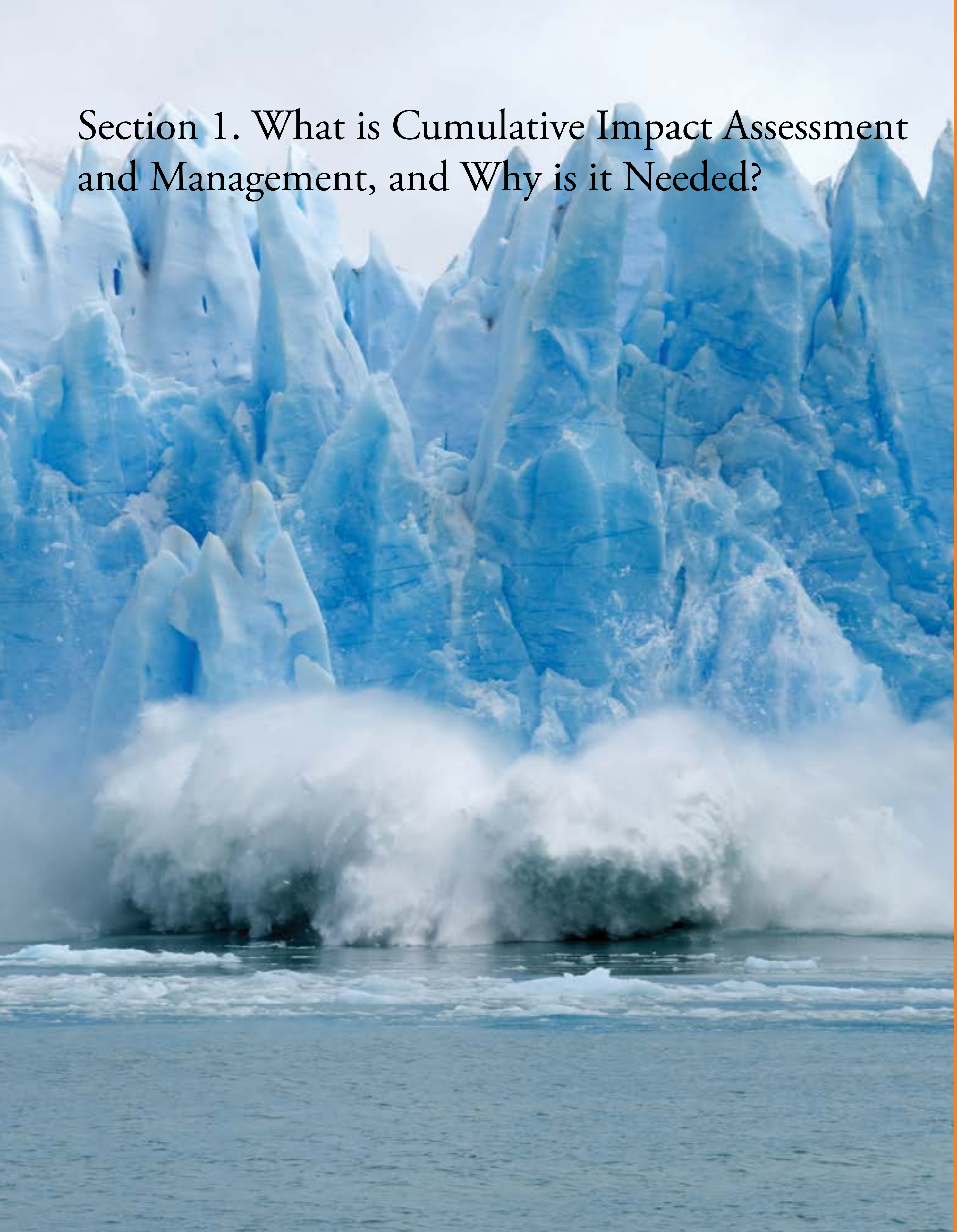
Therefore, although the total cumulative impacts due to multiple projects typically should be identified in government-sponsored assessments and regional planning efforts, according to Performance Standard 1, IFC clients are expected to ensure that their own assessment determines the degree to which each project under review is contributing to the cumulative effects. This handbook acknowledges the importance of differentiating between those actions over which a private sector sponsor has direct control and those for which it may have leverage to influence others to achieve optimal cumulative impact management as part of a multistakeholder effort—an effort that ideally should be led by government agencies, but at a minimum must involve government agencies.[8] Figure 2 illustrates the overall context and proposed approach that exemplifies general compliance with Performance Standard 1.

[8] For further details, see Franks, Everingham, and Brereton 2012.

FIGURE 2. PERFORMANCE STANDARD 1, CIA RECOMMENDED APPROACH



Section 1. What is Cumulative Impact Assessment and Management, and Why is it Needed?



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 successive, incremental, and/or combined effects of an action, project, or activity (collectively referred to in this document as "developments") when added to other existing, planned, and/or reasonably anticipated future ones. For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognized as important on the basis of scientific concerns and/or concerns of affected communities.[9]

Examples of cumulative impacts include the following:

- Effects on ambient conditions such as the incremental contribution of pollutant emissions in an airshed.
- Increases in pollutant concentrations in a water body or in the soil or sediments, or their bioaccumulation.
- Reduction of water flow in a watershed due to multiple withdrawals.
- Increases in sediment loads on 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 an ecosystem.
- Wildlife population reduction caused by 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 owing to increases in transport activity in a project's area of influence.

Multiple and successive environmental and social impacts from existing developments, combined with the potential incremental impacts resulting from proposed and/or anticipated future developments, may result in significant cumulative impacts that would not be expected in the case of a stand-alone development.[10] Box 2 provides an example.

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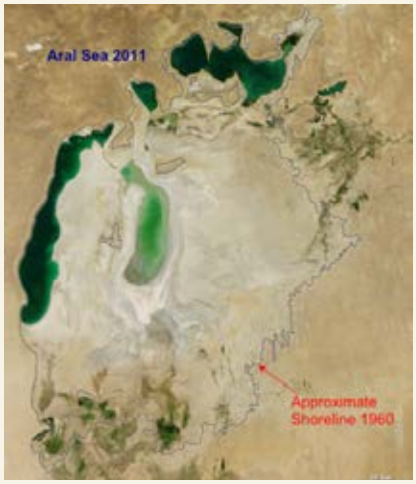
9 Affected communities are defined as local communities directly affected by the project (Performance Standard 1, paragraph 1).

10 See GN1, paragraph GN37.

Box 2. Demise of the Aral Sea



Source: NASA Earth Observatory, http://earthobservatory.nasa.gov/Features/WorldOfChange/aral_sea.php.

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 lake, covering 68,300 km^2 with a volume of 1,006 km^3. In the late 1950s, the lake was teeming with life. It supported fishing ports and a thriving commercial fishery with an annual catch of 46,000 tonnes in the early 1960s. During that decade, water began to be diverted from the two rivers for use in hydropower generation and irrigation systems for growing cotton. The irrigation systems expanded, and today approximately 7 million ha of agricultural land depends on those systems. By the 1980s, the water from the two rivers was nearly completely used before the flow reached the Aral Sea Basin (ADB 2010, 82–84).

The cumulative impacts have aggregated over the past 30 years. By 1986, the Aral Sea had split into two water bodies, the "Southern Aral Sea" and "Northern Aral Sea." By 2002, the level of the Southern Aral Sea had fallen by 22 m. By 2005, the Aral Sea had shrunk to half of its former size and its volume had diminished by 75 percent. Kazakhstan 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. 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 inflow from the Amu Darya. 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 in any previous year except 2009.[a]

The magnitude of the cumulative socioeconomic 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.[b] 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 socioeconomic 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 river 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 (ADB 2010, 154–56).

[a] See "Our Amazing Planet," http://www.ouramazingplanet.com/1805-aral-sea-continues-to-shrink.html.
[b] See NASA Earth Observatory, http://earthobservatory.nasa.gov/Features/WorldOfChange/aral_sea.php.

1.2 What Is Cumulative Impact Assessment and Management?

CIA is the process of (a) analyzing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social external drivers on the chosen VECs over time, and (b) 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 affects their condition and resilience. VECs are integrators of the stressors that affect them. For example, periodic extremes of precipitation (droughts or floods), temperature (extreme cold or heat), or fluctuations in predators all affect the condition of biological VECs. Today and into the future, global warming (climate change) can be expected to have substantial impacts on the condition of VECs. Box 3 provides a further explanation on VECs.

Box 3 . Valued Environmental and Social Components (VECs)

CIAs are complex, and cost time and money. For a CIA to be effective in supporting good overall environmental and social risk management, its scope must be properly defined. Because it is unrealistic to think that every environmental and social aspect that can be subject to cumulative impacts can be appropriately factored into a CIA, it is good practice to focus the assessment and management strategies on Valued Environmental and Social Components (VECs[a]).

What are VECs?

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

- physical features, habitats, wildlife populations (e.g., biodiversity),
- ecosystem services,
- natural processes (e.g., water and nutrient cycles, microclimate),
- social conditions (e.g., health, economics), or
- cultural aspects (e.g., traditional spiritual ceremonies).

While VECs may be directly or indirectly affected by a specific development, they often are also affected by the cumulative effects of several developments. VECs are the ultimate recipient of impacts because they tend to be at the ends of ecological pathways. Throughout this handbook the acronym VECs refers to sensitive or valued receptors of impact whose desired future condition determines the assessment end points to be used in the CIA process.

The identification of assessment end points is a critical step in any risk assessment. To guide subsequent analysis, the identification of end points needs to be initiated during the scoping phase (Section 2, Steps 1 and 2) through social and ecological scoping. Social scoping through participatory, meaningful, and transparent consultation and good-faith engagement with affected communities and/or stakeholders is used to establish the terms in which

[a] Acronym originally coined by Beanlands and Duinker (1983) to refer to "valued ecosystem components."

Box 3 . Valued Environmental and Social Components (VECs) *continued*

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 about social, cultural, economic, or aesthetic values, and also the scientific concerns of the professional community (Beanlands and Duinker 1983). It is important that VECs build from existing definitions of valuable environmental and social components described in the Performance Standards (e.g., critical habitat in Performance Standard 6 and critical cultural heritage in Performance Standard 7). For VECs related to biodiversity, GN6 provides explicit guidance on natural and critical habitat values.

How do VECs influence the CIA process?

CIA is inherently future-oriented. The concern for assessment of cumulative impacts is driven by the need to understand the conditions of VECs that are expected to result from the combination of development impacts and natural forces. For instance, to what extent will a terrestrial habitat be fragmented beyond its ecological functionality by the cumulative impacts of multiple linear infrastructure developments?

Good CIA focuses on understanding whether cumulative impacts will affect the sustainability or viability 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 or limits of acceptable change, within which the VEC condition is considered to be acceptable but beyond which further change in condition is not acceptable. If such thresholds are not established, the significance of cumulative impacts cannot be determined. Step 5 in Section 2 better describes the importance of defining thresholds for assessing the significance of cumulative impacts and designing effective management strategies.

Defining thresholds for VECs

The viability or sustainability of VECs, whether ecological, biological, or related to human communities, is their capacity to endure—i.e., for the ecosystem, community, or population to remain diverse and productive over time. This is reflected in the definition of *sustainable use* in the Convention on Biological Diversity: 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 viability or sustainability of VECs depends upon both the forces that affect them and their social and ecological vulnerability (sensitivity), i.e., 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 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 condition of the VEC (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 in international scientific literature. Thresholds may in some cases be determined from Performance Standards and Guidance Notes (e.g., biodiversity-related critical habitat thresholds in GN6). See Appendix 1 for examples of indicators of cumulative impacts that are required to be addressed in meeting the IFC Performance Standards.

"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 greater than in "normal" project ESIA, and the interactions between human activities and VECs increase in number and complexity.

Project-initiated CIA[11] or RCIA has six objectives:

1. Assess the potential impacts and risks of a proposed development over time, in the context of potential effects from other developments and natural environmental and social external drivers on a chosen VEC.
2. Verify that the proposed development's cumulative social and environmental impacts and risks will not exceed a threshold that could compromise the sustainability or viability of selected VECs.
3. Confirm that the proposed development's value and feasibility are not limited by cumulative social and environmental effects.
4. Support the development of governance structures for making decisions and managing cumulative impacts at the appropriate geographic scale (e.g., airshed, river catchment, town, regional landscape).
5. Ensure that the concerns of affected communities about the cumulative impacts of a proposed development are identified, documented, and addressed.
6. Manage potential reputation risks.

Assessment of cumulative impacts should employ information from a variety of instruments including, regional and local environmental, social and resource studies, programs and/or planning documents; strategic, sectoral, and regional assessments; project impact assessments, cumulative impact assessments, and targeted studies on specific issues.

1.3 Under What Conditions Should a CIA Be Conducted?

Cumulative impact assessment and management is appropriate whenever there is concern that a project or activity under review may contribute to cumulative impacts on one or more VECs.

This concern may be preexisting or a consequence of the potential cumulative impacts of the development and other projects or actions, human activities, or exogenous factors (e.g., natural drivers). CIA is also appropriate whenever a given development is expected

[11] Government-led CIAs may differ on these objectives and focus on ensuring the future health of the VECs.

to have significant or irreversible impacts on the future condition of one or more VECs that also are, or will be, affected by other developments. The other developments may already exist, be reasonably predictable, or be a mix of existing and reasonably anticipated 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.[12] For example:

- when a series of mining developments occur within an area where they will impact the same VECs (perhaps common water bodies or watercourses, wildlife populations, community health, community loss of access to assets, or multiple land takings);
- 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, or on adjacent land uses because of increased access from associated roads; or
- When a series of agricultural developments occur that will cumulatively impact land use patterns, having cumulative impacts on downstream water availability (from withdrawal of water for irrigation), on downstream water quality, or on local community livelihoods.

Good CIA practice is not limited to assessing the impacts of developments of the same type. For example, CIA might be needed for 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 affect local communities, wildlife, or water availability and quality).

In some cases, CIA may be needed to assess and manage the impacts of several new projects, activities, or actions that are being developed or planned. In other situations, CIA of a single new development may be appropriate when it occurs in an area where concerns exist about cumulative impacts—concerns that are either well documented or identified through consultation with affected communities and other stakeholders. In some situations, different components of the same development[13] are assessed in separate ESIAs, and the cumulative impacts from these components should be subject 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.

[12] Cumulative impacts can occur (a) when there is "spatial crowding" as a result of overlapping impacts from various actions on the same VEC in a limited area, (e.g., increased noise levels in a community from industrial developments, existing roads, and a new highway; or landscape fragmentation caused by the installation of several transmission lines in the same area) or (b) when there is "temporal crowding" as impacts on a VEC from different actions occur in a shorter period of time than the VEC needs to recover (e.g., impaired health of a fish's downstream migration when subjected to several cascading hydropower plants).

[13] Including associated facilities and other related infrastructure such as roads, ports, railroads, bridges, or terminals.

Cumulative impacts may also be identified and acknowledged in the ESIA process, and the measures proposed for managing 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 airsheds, watersheds, seascapes, and landscapes, or with widely recognized global issues such as climate change. For instance, methods for assessing the incremental contribution to airshed degradation from the emissions of a new thermoelectric generation plant are well established in the scientific community and are typically an integral component of a good ESIA process. Similarly, the determination of greenhouse gas emissions and their management within the climate change context are well-recognized global practices. Neither of these cases would require a separate CIA process; 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 can be summarized as follows (Section 2 provides greater detail):

- Identification of all VECs that may be affected by the development under evaluation.
- In consultation with stakeholders, agreement on the selected VECs the assessment will focus on.
- Identification of all other existing and reasonably anticipated and/or planned and potentially induced developments,[14] as well as natural environmental and external social drivers that could affect the selected VECs.
- Assessment and/or estimation of the future condition of selected VECs, as the result of the cumulative impacts that the development is expected to have, when combined with those of other reasonably predictable developments as well as those from natural environmental and external social drivers.
- Evaluation of the future condition of the VECs relative to established or estimated thresholds of VEC condition or to comparable benchmarks.
- Avoidance and minimization, in accordance with the mitigation hierarchy, of the development's impact on the VECs for the life of the development or for as long as the impacts continue to be present.
- Monitoring and management of risks to VEC viability or sustainability over the life span of either the development or its effects, whichever lasts longer.[15]

[14] As identified in diverse sources such as sectoral project inventories, regional or resources development plans, and watershed management plans, among others.

[15] Interactions with government and third parties should be included in risk management actions.

- Provision of project-related monitoring data to governments and other stakeholders for the life of the development, and material support for the development of collaborative regional monitoring and resource management initiatives.
- Continuous engagement and participation of the affected communities in the decision-making process, VEC selection, impact identification and mitigation, and monitoring and supervision.

Because cumulative impacts often result from the successive, incremental, and/or combined[16] impacts of multiple developments, responsibility for their prevention and management is shared among the various contributing developments. Because it is usually beyond the capability of any one party to implement all of the measures needed to reduce or eliminate cumulative impacts, collaborative efforts will likely be needed. Governments can play a significant role in ensuring environmental and social sustainability by providing and implementing enabling regulatory frameworks that guide and support the appropriate identification and management of cumulative impacts and risks (See Box 4).

Box 4. Hydro Cascade with No Governmental Requirement for CIA

In one case, 37 hydroelectric projects (2 existing, 9 under construction, and 26 proposed) 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 the specific projects of the two proponents but set the spatial context 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 IBRD 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 with government representatives and consensus was reached 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 hydropower 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 impact assessment.

[16] Combined impacts can be either *additive* (e.g., equal to the sum of individual effects), *synergistic* (e.g., total effect is greater than the sum of the individual effects), or *antagonistic* (e.g., individual effects counteract or neutralize each other).

Over the years, the World Bank has developed extensive documents and guidance tools for governments to design and implement countrywide or sectorwide strategic approaches to environmental and social management. These are described and defined in Operational Policy 4.01[17] (see Annex A of OP 4.01 for definitions)[18] and in publications on strategic environmental management[19] and poverty and social impact analysis.[20] They are invaluable sources of information and good practice for setting appropriate and enabling regulatory environments.

1.5 How Does CIA Compare with Other Environmental and Social Risk Management Tools?

CIA is one of several tools to consider as part of an overall process of environmental and social risk assessment and management. These tools, identified in Table 1, have been developed to inform decision-making processes in different project development and/or sector planning contexts.

TABLE 1. TOOLS FOR ENVIRONMENTAL AND SOCIAL RISK ASSESSMENT AND MANAGEMENT

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 • May include an assessment of the project's contribution to a well-known accumulated impact and propose standard mitigation measures (e.g., greenhouse gas emissions, airshed pollution, depletion of wild fish stocks)
Strategic Environmental Assessment (SEA)[21]	• Relates to potential impacts of governmentwide or sectorwide policies, plans, or programs • Anticipates how instruments such as policies that are not specifically tied to a particular physical development may result in a variety of impacts at different times and places
Regional or Sectoral Impact Assessment	• Assesses 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 SEA)
Cumulative Impact Assessment and Management (CIA)	• Assesses the 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 reflects the geographical and temporal context in which the effects are aggregating and interacting (e.g., airshed, river catchment, town, landscape)

[17] See http://siteresources.worldbank.org/INTFORESTS/Resources/OP401.pdf and 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.

[18] See 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.

[19] See World Bank, 2011, "Strategic Environmental Assessment in Policy and Sector Reform," http://siteresources.worldbank.org/ENVIRONMENT/Resources/244380-1236266590146/Policy_SEA_WB.pdf, World Bank, 2008; and "Strategic Environmental Assessment for Policies: An Instrument for Good Governance," http://siteresources.worldbank.org/INTRANETENVIRONMENT/1705772-1210788188539/21819527/SEA_FOR_POLICIES.pdf.

[20] See 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.

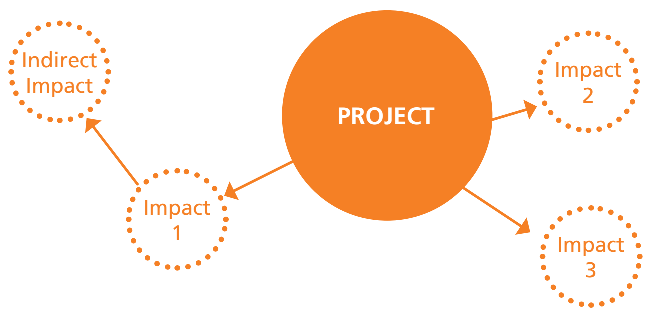
[21] See World Bank, OP 4.01, footnotes 11 and 12.

Unlike government agencies, a private sector developer or project sponsor has no control over the actions undertaken by other developers that affect similar VECs, and therefore it is unlikely to have much leverage to influence any mitigation actions by third parties. However, when faced with cumulative impacts and risks, private sector developers or project sponsors may engage in a simpler RCIA process (see Appendix 3 for an annotated RCIA Terms of Reference) instead of a full CIA. An 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 baseline data on VECs may be needed, and additional new stakeholder engagement may also be necessary (see Step 3 in Section 2).

1.5.1 Comparing ESIAs and CIAs

ESIAs[22] 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, they take different perspectives. The perspectives can be characterized as project-centered (ESIA) or VEC-centered (CIA). As illustrated in Figure 3, in an ESIA the focus of analysis begins with the project. The area where the project will have environmental and social impacts is identified as are the VECs that will be affected. The impacts on the VECs are identified and a mitigation hierarchy[23] is applied to avoid them when possible and to minimize and mitigate them when avoidance is not possible. Where residual impacts remain, impacts and risks to workers, affected communities, and the environment are compensated or offset.

FIGURE 3. ESIA: PROJECT-CENTERED PERSPECTIVE

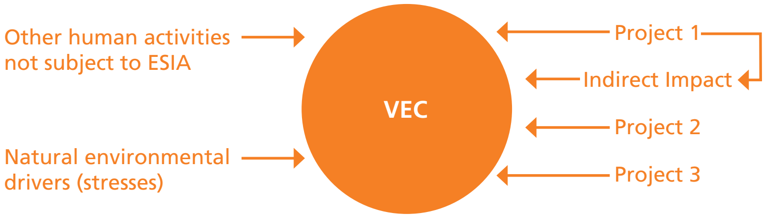


[22] For further details on ESIA and good practices related to the resulting ESMS, please refer to Performance Standard 1 and GN1 as well as Performance Standards 2–8 and their corresponding GNs.

[23] Please refer to footnote 7.

To identify the environmental and social components that may be impacted by the project, CIA also begins with a project-centered view. However, as illustrated in Figure 4, the focus then shifts to the VECs. The area considered is the area in which the VECs occur, which is where other stresses (developments, human activities not subject to ESIA, and natural environmental and external social drivers) may also affect them. Once the other impacts have been identified, the cumulative impacts are assessed as the resulting change in the condition of the VECs.

FIGURE 4. CIA: VEC-CENTERED PERSPECTIVE

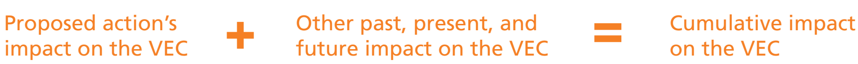


A cumulative impact includes two components:

- The anticipated future condition, which is the total effect of the other existing, and predictable future developments and external natural environmental and social drivers, and
- The contribution of the development under evaluation to the cumulative impacts.

In the CIA context, the incremental impact of a development under review is the difference between the condition of the VEC when impacted only by the other developments in the future baseline and the condition of the VEC when impacted by both the development under review and the future baseline impacts (Figure 5). In the context of ESIA and CIA, a project's incremental impacts are the same but are viewed differently—and the views can give very different assessments of the need for impact management (see Box 5).

FIGURE 5. CIA: VEC-CENTERED PERSPECTIVE



Box 5. 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 context, either project relocation or additional mitigation to reduce the discharge of heavy metals to the maximum extent possible would have been appropriate, together with other mitigations to reduce the loading from existing sources. This case illustrates the importance of informed strategic-level resource planning, such as integrated resources plans, which often are critical to successful CIAs.

The different views can be seen in how indicators are used to characterize an impact. In 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 (a change in the VEC), with indicators that reflect the condition of the VEC. 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 (see Box 6).

The two different views are not always distinct, and as noted before, CIA 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). ESIAs should be conducted in a manner that supports systematic CIA.

Box 6. CIA When Different Project Components Are Subject to Separate ESIAs

For 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, 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 and filling gaps in baseline data.

The scope of the CIA was defined by the value and/or 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 affecting the same VECs. For example, project components will eliminate important wildlife habitat, which will likely diminish the area's 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.

Section 2. What Is the Process for Implementing a CIA?

2. What Is the Process for Implementing a CIA?

Assessment of accumulated impacts may draw on information from a variety of sources including regional environmental, social, and resource studies and programs; strategic, sectoral, and regional environmental assessments; project environmental assessments; CIAs from similar situations; and targeted studies on specific issues.

The following six-step process and the appendices that follow lead users of this handbook from the scoping phase to the management phase, providing key questions to consider along the way. Additional relevant guidance may exist in the Performance Standard Guidance Notes.

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, consideration of potential effects is often repeated, with the findings and analysis refined each time, until a final list of issues is produced.[24]

Step 1: Scoping Phase I – VECs, Spatial and Temporal Boundaries

Objectives:

- Identify and agree on VECs in consultation with stakeholders.
- Determine the time frame for the analysis.
- Establish the geographic scope of the analysis.

Questions to answer:

- Whose involvement is key?
- Which VEC resources, ecosystems, or human values are affected?
- Are there concerns from existing cumulative impacts?

This step is critical to successful CIA because 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 the key participants should be completed early in this step and updated as needed as the overall process proceeds. Best practice involves an open, participatory, transparent, and meaningful consultation with affected communities and other relevant interested parties as early in the scoping phase as possible. As described in Section 3, this is one of the major challenges associated with a CIA process. For a description of an ideal arrangement of stakeholder roles and responsibilities, please refer to Table 3 in that section.

[24] The CIA (or RCIA) should include the entire list of potential effects that were identified during the scoping process, identify any potential effects the CIA will not examine in detail, and describe the rationale for eliminating them from further evaluation. At the start, all potential effects are identified but by the end, the list of issues will have been reduced to a list of key issues to examine in detail in the CIA.

The output of scoping includes identification of the VECs for which 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 the following:

- VECs known or suspected to be affected by the development (based on prior sectoral assessments or the project's ESIA).
- Known cumulative impact issues within the region.
- Concerns for cumulative impacts identified in consultation with stakeholders, including potentially affected communities (these may exist at distance from the planned development).
- Regional assessments prepared by governments, multilateral development banks (MDBs), and other stakeholders.
- CIAs prepared by sponsors of other developments in the region.
- Information from NGOs.

Appendix 1 contains an illustrative list of potential VECs identified for each IFC Performance Standard.

Boundaries for the analysis need to encompass the geographic and temporal extent of impacts (from other past, present, and predictable future developments) that influence VEC condition throughout the time period during which project impacts will occur. This scope is likely to extend beyond a project's direct area of influence (DAI) as typically defined in ESIA (see Box 7).

This is typically an iterative process in which the first boundaries are often set by educated guess but incrementally improved as new information indicates that a different boundary is required for the analysis. 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. For example, in the case of biodiversity values, habitat ranges or migration pathways are often used as boundary-defining variables. By contrast, if landscape fragmentation is at stake in a transportation project, the likely extension of secondary and tertiary roads, along with population growth, are well-established risk factors to consider. In any case, the CIA should explain the basis for the final delineation of the geographic and temporal boundaries. 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 development's contribution to cumulative impacts (see Box 8).

Box 7. Rules of Thumb - How to Set Geographical and Temporal Boundaries[a]

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

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.[b]
d. Consider the distance an effect can travel, and other impacts the VEC may be exposed to within its range.

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

I. Use the time frame expected for the complete life cycle of the proposed development.
II. Specify whether the expected time frame of the potential effects of proposed development can extend beyond (I).
III. Use the most conservative time frame between (I) and (III).
IV. Using professional judgment to balance between overestimating and underestimating, and make sure to document the justification or rationale.
V. Exclude future actions if (i) they are outside the geographical boundary, (ii) they do not affect VECs, or (iii) their inclusion cannot be supported by technical or scientific evidence.

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[a] After CEQ 1997.

[b] As an example, for biodiversity components, see the definition of discrete management unit in Performance Standard 6 and related guidance in GN6, which emphasizes the importance of defining an ecologically relevant boundary. CIA boundaries should be defined by the area occupied by the VEC. The spatial context for CIA can be a mosaic rather than a single area.

Through an evaluation of the regional cumulative impact, 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 development to cumulative impacts can be established quickly, then the emphasis for CIA should be placed on cumulative impact management rather than impact assessment.

Box 8. Establishing the Spatial Boundary for CIA

To assess the impacts of a regional oil pipeline development in an arctic 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. Impacts on the wide-ranging northern caribou herds and grizzly bear, whose ranges included the project study area, were deemed insignificant in both the ESIA and CIA analyses.

Understanding that CIA analysis should be done in the context of the VECs ranges, the regulator that reviewed the proponent's ESIA and CIA required the proponent to redo the CIA analysis to include the potential impacts of the likely future oil-field development along the pipeline route. These proposed developments fell largely within the range of the VECs and would have had potential impacts both within the oil fields themselves and 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 VECs, concluded that the cumulative impacts of the likely future developments and those of the enabling regional pipeline resulted 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 multiparty cumulative impact management program to prevent significant impacts from future developments before they arise.

Step 2: Scoping Phase II – Other Activities and Environmental Drivers

Objectives:

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

Questions to answer:

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

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—past developments whose impacts persist, existing developments, and foreseeable future developments, as well as any other relevant external social and/or environmental drivers (e.g., wildfires, droughts, floods, predator interactions, human migration, and new settlements). Box 9 provides an example. In making this determination, the key question is simply what environmental and social factors may influence the condition of the VEC. In most cases, these factors should be known.

Box 9. 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 midterm flows in the river system.

A separate CIA 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. Modeling 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 to 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 have been held accountable at some point for the unacceptable impacts.

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

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 be more significant 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 and/or natural dynamics of the selected VECs.

Guidance for identifying reasonably predictable projects recommends reference to local, regional, or national development plans and generally recommends that a short time horizon be considered (e.g., three to four years in the European Union) owing to uncertainty about longer-term developments.[25] Where development plans are not available, guidance recommends that emphasis be given to identifying other projects in the planning stage or formal approval process (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 will not proceed while others that are not immediately apparent 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 anticipated. The CIA should clearly justify the reasoning behind the temporal boundary used for the assessment, as well as all the different developments and external stressors included in the analysis (see Box 10).

Box 10. 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 the cumulative impact or be at risk from the cumulative effects of existing projects, or a large number of other reasonably predictable projects.

A regional CIA approach was taken to assess cumulative effects for a region that is the traditional territory of numerous aboriginal groups and which is characterized by extensive unconsolidated sands with dune complexes, open grasslands, 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 gas wells (approximately 70 percent of the area was leased for exploration) and widespread livestock grazing. The development of a significant number of additional gas wells was highly likely, so rather than 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 disturbances. The underlying objectives of the baseline assessment (Step 3 in this handbook) 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, requires the engagement of other proponents and government agencies to develop a coordinated and/or pooled analysis.

* for results of this analysis please refer to Box 11

[25] For a good logical framework of how to define other developments, including certain reasonably anticipated, and/or hypothetical ones, refer to Box 10 of World Bank 2012.

In cases where no data are available from third parties about existing or planned developments, the developer may promote the benefits of CIA to third parties and encourage them to provide information on existing developments and future plans; obtain whatever data government authorities have regarding existing and planned developments; and, in the absence of specific information about projects and their impacts, use generic information about the other projects, their inputs, and their effects for typical developments of similar size.

In addition to other projects, actions, or activities 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 the project under consideration. If 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. Because induced development is not identified on the basis of specific development plans, scenario analysis may be an appropriate approach for examining the potential cumulative impacts that could be associated with such development. 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 3: Establish Information on Baseline Status of VECs

Objectives:

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

Questions to answer:

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

A common concern among developers is the level of effort, time, and resources required to collect adequate data for appropriately assessing cumulative impacts. The availability of relevant data is critical for the success of a CIA, and the methodology to be used to determine VEC baseline conditions should be defined as early as possible.

Generally speaking, data requirements should be determined early on during the scoping phases of the CIA process. A developer may use existing information when such information provides a sufficient basis for a complete assessment of cumulative impacts. However, if during the scoping phases a developer determines that the existing information contains significant gaps that prevent the performance of an adequate assessment of cumulative impacts, it should obtain the information needed using internationally recognized methodologies.

Typically, the new baseline data to be collected for a CIA will not be as detailed as that generated during an ESIA, because of the larger area covered and/or changes in the type of data required for the different scale of the assessment. Data that are needed focus on the most important VECs. Collection of new baseline data tends to be limited and targeted to indicators that would allow determination of any changes in VEC conditions. Practitioners must have a clear understanding of the final use of the data, to be able to technically defend the analysis. It is not good practice to embark on costly collection of new baseline data without careful consideration of the expected cumulative impact to be assessed for specific and well-defined VECs. For instance, during an ESIA, intensive and detailed field surveys of soil, vegetation, and fauna may be required in order to assess direct impacts of a given development on biodiversity and land use. In contrast, because CIA may require expanding the geographical boundary to thousands of hectares, the analysis may rely on satellite imagery or existing vegetation or fauna studies on broader scales.

In some cases, the collection of data for some VECs, such as water quality, air quality, and noise levels, provides a baseline condition that integrates the collective effects of all existing developments and exogenous pressures. For example, to assess the cumulative ambient air quality impacts of a proposal to site a fossil-fueled power plant in a given airshed, a developer may need to collect data on the existing ambient air quality while calculating future impacts where additional power plant capacity is anticipated to be installed in the same airshed.

Other illustrative examples: (a) the construction of an irrigation project that would alter the volume and timing of watershed flows into an estuary, which may require the collection of additional data to assess the cumulative change in flow regime at the estuary and resulting impacts where other proposals would have similar effects, or (b) an expansion of the geographical and temporal scales of data collection, in order to assess the cumulative impacts of a proposed activity on the natural resource base that indigenous peoples, pastoralists, forest dwellers, or other communities depend upon for their livelihoods.

Baseline (historical) information on the condition of VECs establishes the "big picture" context for thinking about changes in VEC condition, can help developers 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 history of a long or steep decline in VEC condition, it may be inferred that there is an increased likelihood that a threshold is being approached. As described in further detail in Step 5, threshold levels (tipping points), at which a VEC's response to additional impacts may change abruptly, are often 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 change that has already occurred; however, this analysis 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 the analysis in Step 4), it may also provide some insight into VEC sensitivity to stresses. Good indicators of condition are important. Historical trend analysis should be approached with some caution because some indicators can be very 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 the collection of historical information about the VEC which can be difficult to obtain. Various sources of information can be explored—reports from governments, NGOs, and MDBs; prior ESIAs; knowledge from resident communities; biodiversity databases such as GBIF[26] or IBAT;[27] information from "controls," or areas with VECs in common that are exposed to differing levels of impact (assessed relative to the impact history developed in Step 2), or scientific literature. Hydro-Québec found that in most cases the best "state of reference" was the time when information became available and when the condition of the VEC could be considered more or less stable, which in its first 12 cumulative effects assessments ranged from 10 to 20 years (Bérubé 2007).

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[26] See http://www.gbif.org.

[27] See https://www.ibatforbusiness.org.

Step 4: Assess Cumulative Impacts on VECs

Objectives:

- Identify potential environmental and social impacts and risks.
- Assess expected impacts as the potential change in condition of the VEC (i.e., viability, sustainability).
- Identify any potential additive, countervailing, masking, and/or synergistic effects.

Questions to answer:

- What are the key potential impacts and risks that could affect the long-term sustainability and/or viability of the VEC?
- Are there known or predictable cause-effect relationships?
- Can these impacts and 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 (see Box 11). 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 environmental variation that may influence VEC condition and not be based solely on expected average conditions (e.g., change in climate patterns and/or predictability).

Box 11. Strategic Approach to Assessing Multiple Small Developments (Analysis)

The analysis for the regional CIA done for the multiple small gas developments referenced in Box 10 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 were identified. Under the conservation scenario, regional biodiversity hot spots would be maintained as protected areas. This would be done by limiting the number of new gas wells in such areas. Production would be maintained, however, through increased use of directional drilling near the biodiversity hot spots.

In CIA, impacts are measured not in terms of the intensity of the stress added by a given development but in terms of the VEC response and, ultimately, any significant changes to its condition. The methods used for analysis are specific to the characteristics of the VEC (e.g., different methods are appropriate for analysis of impacts on physical, environmental, biotic, and social VECs, and their resilience). A wide spectrum of methods has been used for CIA (see Box 12 for an illustrative case); these methods generally can be characterized as impact models, numerical models, spatial analysis using geographical information systems (GIS), and indicator-based approaches.[28] Some specific examples and references are listed here:

- Conceptual modeling, pathways, network analysis[29] (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, Canter, and Mangham 2008; Atkinson and Canter 2011; Blaser et al. 2004; Dutta, Mahatha, and De 2004; Great Sand Hills Scientific Advisory Committee 2007; Houle et al. 2010; Johnson et al. 2005; MacDonald 2000; MacDonald, Coe, and Litschert 2004; Quinn et al. 2004; Scrimgeour, Hvenegaard, and Tchir 2008; Seitz, Westbrook, and Noble 2011; Squires, Westbrook, and Dubé 2010; Sorensen et al. 2008; Strimbu and Innes 2011; Tiner 2005).
- Habitat modeling (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, Westbrook, and Noble 2011; Squires, Westbrook, and Dubé 2010).
- Landscape modeling[30] (Great Sand Hills Scientific Advisory Committee 2007; MacDonald, Coe, and Litschert 2004; Quinn et al. 2004).
- Population viability analysis (Jeffrey and Duinker 2002; Johnson and Boyce 2001).
- Quantitative and/or simulation modeling, including spatially explicit GIS-based models (CEQ 1997; Dutta, Mahatha, and De 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, Svrcek, and Smith 2002; Mitchell and Parkins 2011; Noble 2008; Quinn et al. 2004; Seitz, Westbrook, and Noble 2011; Strimbu and Innes 2011; Weclaw and Hudson 2004)
- Sustainability appraisal (Cooper 2010; Gibson 2011).

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28 For a good overview, see Box 18 and Table 4.1 of "Sample Guidelines: Cumulative Environmental Impact Assessment for Hydropower Projects in Turkey." World Bank, 2012. https://www.esmap.org/node/2964.

29 See http://www.wcslivinglandscapes.org/WhatWeDo/ConservationStrategy.aspx and https://miradi.org.

30 See http://www.wcslivinglandscapes.org/WhatWeDo/LandscapeSpeciesAnalysis.aspx.

Box 12. RCIA of Hydro Impacts on American Eel

The American eel is a species that spawns in the Sargasso Sea and migrates to freshwater rivers and lakes to grow and mature. 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 affect 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 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. Although a better estimate of impact could be obtained with a detailed habitat survey in the watershed, analysis of all developments, not just those on the main stem, revealed that under reasonable assumptions of habitat distribution, the survival rate would be less than 10 percent, an unsustainable impact.

- Thresholds (Bérubé 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 2009; Hegmann and Yarranton 2011; Kilgour et al. 2007; Krzyzanowksi 2011; Mitchell and Parkins 2011; Noble 2010a; Piper 2001, 2002; Quinn et al. 2004; Schultz 2010; Seitz, Westbrook, and Noble 2011; Spaling et al. 2000; Squires, Westbrook, and Dubé 2010; Therivel and Ross 2007; Tricker 2007; Weclaw and Hudson 2004) .
- Visual amenity analysis (Brereton et al. 2008).

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 stresses imposed by all other sources (projects and natural environmental drivers) and the estimated VEC condition in the context of the future baseline plus the development under evaluation.[31] Of concern is not just estimation of the development's impact, but estimation of the 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. By contrast, the estimated overall cumulative impact indicates the need for mitigation to be implemented by the various project owners or proponent parties to ensure that their respective contributions to the overall condition of the VECs is coherent and/or compatible with what is mandated or required by government-led—or government-agreed—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 Steps 4, 5, and 6.

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

Step 5: Assess Significance of Predicted Cumulative Impacts

Objectives:

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

Questions to answer:

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

Significance determination is a normal component of ESIA and CIA and occurs near the end of the assessment process. Significance is typically evaluated after project mitigation measures are factored in.

Determination of significance can be difficult and it is often controversial.[32] Any potential cumulative impact that warrants additional mitigation and/or 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 communities and other relevant stakeholders is to strengthen mitigation measures and monitoring programs, focusing on expected probable cumulative impacts.

In the ESIA process, components of impact significance (magnitude, spatial scale, duration, frequency) are typically factors in deciding whether mitigation is necessary. Consequently, the evaluation of significance and the design of management and/or mitigation are in reality iterative. The significance of a cumulative impact is evaluated not in terms of the amount of change, but in terms of 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.[33] Determining ecological thresholds for biological and social 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 and sociological relationships is essential when thresholds of acceptable VEC condition are being established.[34]

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[32] Significance determination has been a challenge in ESIA and a rich literature has developed (Lawrence Environmental 2002). Little if any guidance for significance determination 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). This work has since been expanded upon and presented in the primary literature (see Lawrence 2007a, 2007b, 2007c). Experience with significance determination in 12 CIAs 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.

[33] Some Performance Standards and Guidance Notes offer a useful basis for such thresholds, for instance, biodiversity-related critical habitat thresholds (see GN6).

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

Current practice indicates that determination of thresholds is an essential component not only for the assessment of significance of cumulative impacts but also for the design of management strategies. To be able to determine the significance of cumulative impacts, some limits of acceptable change in VEC condition are needed to which incremental effects can be compared. In practice, if the cumulative impacts of all combined developments on a VEC do not exceed a limit or threshold, the development would be considered acceptable. Thresholds are limits beyond which changes resulting from cumulative impacts become of concern; they are typically expressed in terms of carrying capacity, goals, targets, and/or limits of acceptable change. These thresholds reflect and integrate scientific data, societal values, and concerns from affected communities. A threshold can be the maximum concentration of a certain nutrient in a body of water beyond which an algal bloom will occur, the concentration of pollutant in an airshed beyond which health of nearby communities could be adversely affected, or a maximum amount of linear infrastructure in a landscape before visual impacts become unacceptable.

In reality, however, since such thresholds are not widely defined or available, the CIA is often hindered. As described in the World Bank's "Sample Guidelines for Cumulative Environmental Assessment for Hydropower Projects in Turkey" (World Bank 2012) and in Hegmann et al. (1999), there is not always an objective technique for determining thresholds and professional judgment must usually be relied upon. Good practice implies making attempts to estimate thresholds for VECs studied, and applying the mitigation hierarchy to manage those impacts that may result in exceeding predicted thresholds.

An alternative is to identify the limits of acceptable change, in consultation with the scientific community and the affected community. This approach focuses on the identification of VEC conditions that are deemed acceptable to stakeholders. The advantage of this approach is that once acceptable VEC conditions have been agreed upon, the appropriate combination of levels of use and management strategies required to sustain those conditions can be determined. Similarly, when carrying-capacity levels or specific thresholds cannot be determined, trend analysis can be very helpful to determine whether a desired VEC condition or limit of acceptable change for a VEC is likely to be achieved or whether unacceptable VEC conversion and/or degradation is likely to occur.

Finally, in the absence of defined thresholds or in the face of an inability to determine limits of acceptable change, practitioners should first acknowledge this lack or inability as part of the CIA process, and use their best efforts to suggest appropriate thresholds or limits, based on available scientific evidence and in consultation with stakeholders, government agencies, and technical experts.

Step 6: Management of Cumulative Impacts – Design and Implementation

Objectives:

- Use the mitigation hierarchy.
- Design management strategies to address significant cumulative impacts on selected VECs.
- Engage other parties needed for effective collaboration or coordination.
- Propose mitigation and monitoring programs.
- Manage uncertainties with informed adaptive management.

Questions to answer:

- How can cumulative impacts be avoided, minimized, and/or mitigated?
- How can the 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 development impacts occur (i.e., the impacts from other projects and natural drivers that affect the VECs) and the characteristics of the development's 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 individual development's 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 impacts. Where cumulative impacts already exist, as in the examples described in Box 13, management actions by other projects may be needed to prevent unacceptable cumulative impacts.

Box 13. 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 the 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 mills together with the 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. Ignoring possible cumulative impacts during project development carries the risk of having unanticipated constraints imposed at a later time.

The analysis phase of the project CIA may indicate the need and/or potential for additional mitigation measures beyond those identified in the project ESIA. The design of such additional mitigation measures for the development, 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 that will prevent unacceptable cumulative impacts can be identified and implemented, then the developer may not need to initiate collaborative engagement of others in impact management. 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 programs 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 include the following:

- Project design changes to avoid cumulative impacts (location, timing, technology).
- Project mitigation to minimize cumulative impacts, including adaptive management approaches to project mitigation.[35]
- Mitigation of project impacts by other projects (not under control of the proponent to further minimize impacts on VECs).[36]
- Collaborative protection and enhancement of regional areas to preserve biodiversity (Kiesecker et al. 2009a, 2009b; McKenney and Kiesecker 2010).
- Collaborative engagement in other regional cumulative impact management strategies.
- Participation in regional monitoring programs to assess the realized cumulative impacts and efficacy of management efforts.

The first two points are clearly the responsibility of the project, the third point is the responsibility of other project proponents to address their contribution to cumulative

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[35] Adaptive management strategies are not a panacea. A common misunderstanding that has emerged in some ESIA practice is that adaptive management is primarily a post-hoc response to developing management responses after problems emerge. In fact, it is a well-developed and rigorous discipline for experimental management used for reducing uncertainty about how to manage effectively. Consequently, adaptive management 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.

[36] Hydro-Québec found this to be particularly important in CIA practice (Bérubé 2007).

impacts (some of which may be discovered during the project CIA process), and the last three points involve collaborative engagement with other stakeholders, including project proponents, government agencies, affected communities, conservation groups, and expert groups. Ultimately, governments should establish cumulative impact assessment frameworks that provide mechanisms to identify parties and contributors to the CIA process, including VECs selection and impact management processes (see Box 14).

Box 14. Mitigation of Panama Hydroelectric Developments

Together with international and local lenders and other MDBs, IFC is financing the development of two cascading hydropower projects on the Chiriqui Viejo River in Chiriqui Province in western Panama. These projects are situated in the upper reaches of the watershed above approximately a dozen other cascading projects being constructed or planned for development by other private sector sponsors. An 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 river.

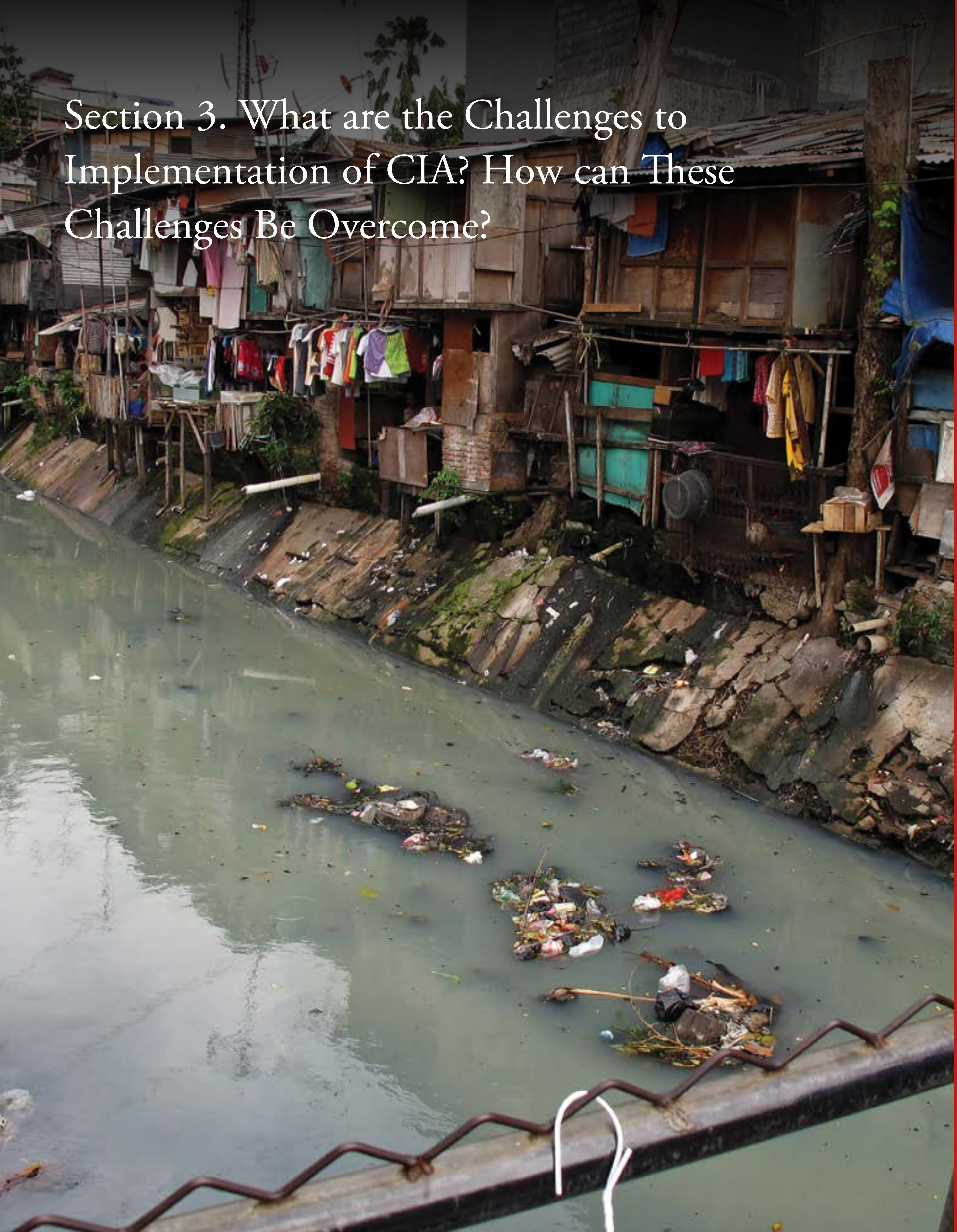
Because these two projects are the highest in the watershed, the natural movement of spawning fish downstream and juveniles upstream would first be impacted by several projects under construction in the lower reaches of the river. Lack of mitigation of this barrier effect by projects downstream from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

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 ensure 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.

They are working with the group of lenders, other project sponsors, and the responsible government agencies in Panama to tackle not only connectivity but also 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 dewatered segments upstream from the different dams.

Section 3. What are the Challenges to Implementation of CIA? How can These Challenges Be Overcome?



3. What are the Challenges to Implementation of CIA? How can These Challenges Be Overcome?

This final section recognizes that the application of this six-step process entails many challenges, as does the implementation of an effective strategy to manage cumulative impacts and risk for multiple projects, actions, and activities. This section provides some key recommendations to consider when trying to overcome such challenges.

The well-described economist's "Tragedy of the Commons" explored by Hardin (1968) illustrates the many challenges that assessment and management of cumulative impacts may face. Some examples:

- Information on proposed developments may be limited by commercial considerations.
- Identifying and describing "predictable future development" and "external natural and social stressors" in sufficient detail to assess their social and environmental impacts and effects can be fraught with difficulty.
- Stakeholders may assign different priorities to VECs.
- VEC baseline conditions and acceptable thresholds are often unavailable because of lack of data or agreed scientific methodologies.
- Attribution of impacts is a process dominated by uncertainties, and getting individual project sponsors to accept responsibilities and impact management is not always a straightforward task.
- Exercising leverage over government and over other developers can be an overwhelming task for private developers, which often may produce negligible results.
- Engaging stakeholders in discussing strategic cumulative impacts, when the discussion is promoted by a specific developer sponsor, tends to be confusing and could be counterproductive.
- Project sponsors may not share data collaboratively or define mitigation strategies jointly.

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? 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).

Deciding why, when, and how to interact with government(s), third parties, and affected communities is not straightforward; it requires considerable thought and expertise.[37] To determine the appropriate type and scope of interactions requires an understanding of constraints on both governance and participants' capacity.

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 are. The principles are *meaningful engagement of affected communities*, *involvement and collaboration with governments*, and *interaction with third parties*. At a minimum, interactions with government, third parties, and affected communities 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 listed in Table 3. See also Box 15.

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 3. Gaps in roles and responsibilities need to be explicitly identified and handled by different management strategies in a CIA or RCIA.

[37] For guidance, please refer to these IFC documents on good practice and guidance on stakeholder engagement, participatory monitoring, and grievance mechanisms:
- www.ifc.org/HB-StakeholderEngagement
- www.ifc.org/GPN-Grievance
- http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_gpn_socialdimensions__wci__1319578072859
- www.ifc.org/HB-WaterFootprint
- http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_handbook_doingbetterbusiness__wci__1319576642349

Box 15. 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 multistakeholder and regional monitoring (Franks, Brereton, and Moran 2010; Franks et al. 2010). 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 attaining efficiencies through information sharing and joint management approaches that should improve CIA quality, thereby reducing risks associated with unmanaged cumulative impacts while being more cost-effective. Such collaborative efforts represent one thrust in the early development of enabling frameworks for CIA.

TABLE 2. CIA GOVERNANCE GAPS

TYPICAL GOVERNANCE CONTEXT	WHAT TO DO?
No policy or legal framework for CIA	Identify and use any sources of partial information about policy or regulatory limits to development (e.g., policy statements, strategic or sectoral assessments, national and/or regional development actions plans and targets, including those referenced under international agreements and conventions); use sustainability, irreplaceability, 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.
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 participating in this process); discuss environmental and social permitting requirements with government authorities and ensure ESIA and CIA/RCIA will provide the government with the information it needs for decision making; assess the level of involvement feasible for the government and third parties and reach agreement with them about their participation and their 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 3 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, affected communities, and the public, and ensure the parties understand their roles. Second, as part of the CIA or RCIA engagement process, make sure to communicate the established roles and responsibilities widely—inform stakeholders, NGOs, and other potentially interested groups from within and outside the project's DAI and region.

TABLE 3 . ROLES AND RESPONSIBILITIES OF PARTICIPANTS IN CIA UNDER IDEAL GOVERNANCE CONDITIONS

ROLES AND RESPONSIBILITIES BY PARTY	SCALE	PURPOSE
Government • Establish policy and legal framework for resource management and cumulative impact management. • Establish and lead regional planning structures and collaborative mechanisms for managing and mitigating (e.g., aggregated offset strategies) resource developments and cumulative impacts. • Implement permitting process that considers cumulative impacts of all developments and pressures, and conforms to values and limits, given regional plans and national frameworks. • Design and conduct CIA study of geographic area which includes the baseline (historical) conditions and predicts the future baseline, based on the carrying capacity of the VECs • Issues approvals to individual private sector projects to be developed on the basis of 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 and/or acceptable limits for resource development.	National, subnational, regional, and/or local.	• 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, and makes sure this information is freely and publicly available.
Private Sector Project Proponent • Design and conduct CIA (or RCIA) study of the incremental impacts of the project building on the CIA study conducted by the government. • Monitor and manage cumulative impacts and risks related to the development for its life span. • 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 from being reached; actively participate as needed in collaborative systems with government, private sector, and public.	Regional, local, and/or site.	• Gives financial institutions and decision makers information about cumulative impact for evaluating the project. • Conforms to CIA commitments and/or permit conditions; manages development to prevent it from causing VECs to reach limits. • Gives the government project-related cumulative impact data it needs to manage the uncertainty of impact predictions and prevent VECs from reaching limits. • Enables effective monitoring and management of cumulative impacts at appropriate scale; supports collaborative multistakeholder solutions for CIA.

TABLE 3 . ROLES AND RESPONSIBILITIES OF PARTICIPANTS IN CIA UNDER IDEAL GOVERNANCE CONDITIONS *continued*

ROLES AND RESPONSIBILITIES BY PARTY	SCALE	PURPOSE
Third Parties (existing and future developments and/or resource users) • Similar to proponent, but covering existing or future developments • Assess and manage cumulative impacts of existing developments. • Assess and manage cumulative impacts of any future developments; prepare ESIA and CIA for permit 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.	Regional, local, and/or site.	• Provides project proponents and other developers, decision makers, and regional monitoring program with details about impacts of existing developments. • Provides proponent and other developers, government, and other stakeholders with details about proposed developments (i.e., project description, impact analysis, ESIA/CIA). • Provides project-level data needed for regional cumulative impact monitoring program. • Enables effective regional management of cumulative impacts; supports collaborative, multistakeholder process.
Affected Communities and Public • Public participates in value setting for policy and/or legal frameworks and regional resource management plans. • Affected communities participate in CIA of individual projects. • Public participates in collaborative management of cumulative impacts.	Regional, local, and/or site.	• 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.

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 or RCIA. Table 4 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 or RCIA process. Where government capacity is low, interactions should occur at a minimum in those areas identified in Table 4; but where capacities are greater it is useful to increase the number and/or scope of such interactions.

TABLE 4. 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; facilitate 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 the 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 during project planning and operations

Conclusions

Conclusions

While the expanded geographical and temporal scope of CIA (relative to ESIA) is often a challenge, the most significant challenge to performing and implementing a good CIA process lies in its multistakeholder 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:

- Creating transparent mechanisms for disclosing available information on proposed developments;
- Establishing regional thresholds for VEC condition;
- Making available information on current states and trends in VEC condition;
- Making available information on the impacts of existing developments;
- Possibly providing regional modeling tools; and
- Developing a framework for regional cumulative impact mitigation and monitoring.

However, these frameworks are generally not well advanced or widely available yet.

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 multistakeholder and/or regional monitoring.[38]

[38] 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.

Furthermore, because the basic logic framework for ESIA and CIA is essentially the same[39] and they share many common standard tools and analytical methods, the key strategy needed in addressing the expanded scope of CIA is to ensure four conditions:

- 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.
- The assessment schedule is appropriate, given the augmented scope and complex multistakeholder context.
- The best and most up-to-date available information is used and expert opinion is consulted.

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 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.

[39] See Appendix 2, Basic Logic Framework for CIA.

Appendixes

Appendix 1. Examples of Indicators for Assessing Incremental Project Impacts and Cumulative Impacts

The following table provides examples of endpoints or indicators typically used on standard ESIAs vis-á-vis those that would be recommended or used in a CIA. The second column represents indicators of incremental change while the third column refers to those that would reflect cumulative impacts over selected VECs. The last column makes reference to the applicable IFC Performance Standard for the impact type.

PROJECT ASPECT	INDICATOR OF INCREMENTAL IMPACT (ESIA)	INDICATOR OF CUMULATIVE IMPACT (CIA)	PERFORMANCE STANDARD
Additional wage employment opportunities	• Incremental numbers of employed and unemployed, participation rates of affected population • Incremental value of subsistence income, wage, and other income to population	• Number, size, skill levels of regional labor 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 and/or discharge • Concentration relative to discharge standard • Load from the project • Characterization of the spatial emission and/or 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 problems, and crime	• Number of additional incidents of sexually transmitted diseases, alcohol and drug problems; 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 and/or proportion of land lost, damaged, or inaccessible because of the project • Incremental change in benefits of affected land users (e.g., lost agricultural production, subsistence use)	• Total land area available, value of land use benefits • Total population affected • Measures for sustainable livelihood and poverty	5

PROJECT ASPECT	INDICATOR OF INCREMENTAL IMPACT (ESIA)	INDICATOR OF CUMULATIVE IMPACT (CIA)	PERFORMANCE STANDARD
Conversion or degradation of natural and critical habitat	• Area and/or proportion of natural and critical habitat converted and/or degraded because of the project • Incremental change in habitat quality and/or condition	• Total area of lost habitat • Change in rates of habitat loss • Measures of habitat fragmentation	6
Regulation of downstream flows Reduction, modification, and/or fragmentation of riparian and aquatic habitats	• Percent reduction of downstream flows as compared to average annual flows • Percent reduction of wetted-perimeter or of usable habitat in the impacted river reaches • Connectivity from the river reaches upstream and downstream of the dam or weir	• River ecological integrity, including natural flow regimes (e.g., quantity, quality, seasonal variability, and predictability) • Viability of migratory fish populations	1,6
Addition of mortality to a wildlife population	• Direct mortality caused by project operations over time • Percentage of local population (or range) lost with relation to global and/or regional population numbers (or range)	• Change in rates of regional and/or global population decline • Measures of population (or range) fragmentation	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 endpoints (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.
- Examine the results of analysis, weight the impacts on VECs, and synthesize the results of analysis into an information package for decision makers.

The experience of CIA practitioners reveals that good practice in CIA has the following characteristics.[40]

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 decision making about project design.

[40] Burris and Canter 1997; McCold and Holman 1995; Baxter, Ross, and Spaling 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, Brereton, and Moran 2010; Franks et al. 2010; Cooper 2011; Gunn and Noble 2011; IFC Performance Standard 1.

Consultation and Collaboration:

- Consultation with affected parties is transparent, meaningful, and ongoing. 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:

- Even though initially all relevant VECs must be evaluated for the CIA to be robust, only some VECs are selected for analysis based on their importance, existing concerns, and/or likelihood of significant cumulative impacts.
- Scoping establishes the environmental context for CIA, including the following:
  - Definition of clear temporal and spatial boundaries and documentation of the rationale.
  - Identification of other developments that affect the chosen VECs, including other types of development that have different but important effects on the selected VECs.
  - Identification of natural drivers that affect the condition of VECs.
  - Identification of variation in natural environmental processes that will affect the cumulative impacts.
  - Consideration of jurisdictional issues and overlapping legislation.

Analysis:

- Assumptions and uncertainties regarding cumulative impacts are clearly stated.
- Thresholds, limits, and/or targets for VEC condition and/or 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 existing developments, other reasonably predictable future developments (i.e., those 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 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, in this scenario the analysis includes assessment of cumulative impacts over the possible range of environmental variation (i.e., it 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 at an average or maximum.
- When appropriate, alternative development scenarios are used to assess the potential environmental and social risks during the lifetime of the project.
- The analysis of different cumulative impacts is done at a spatial and temporal scale that is appropriate for the particular VEC and/or cumulative impact (for example, some wildlife species range over a large area and will be affected by projects throughout the area; diversions and/or withdrawals of water from rivers may have cumulative impacts at considerable distances from a proposed project, where the watercourse converges with other rivers that are similarly affected).
- Analysis and conclusions are based on the scale of measurement appropriate to the impact being assessed. Thus, for example, biophysical impacts are analyzed and reported quantitatively, although conclusions may be summarized qualitatively.
- The difference between a past baseline of observed condition, if known, and the future analytical baseline (of predicted state without the project) is clarified.
- 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.
- 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 and/or 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 coordinated monitoring by other developers and stakeholders.
- In addition to mitigation of the proposed project's impacts, multiparty regional mitigation and/or 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 (e.g., 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, Brereton, and Moran 2010; Franks et al. 2010).

- The project's monitoring of cumulative impacts is used to update its management system and drive future management of impacts.
- 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 an RCIA[41]

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 >*

< Provide background description of project purpose and location>

2. IFC Requirements for CIA

Performance Standard 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." Performance Standard 1 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 airshed; 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 Performance Standard 1 does not expressly require, or put the sole onus on, private sector clients to complete a 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 to state, "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."

[41] Orange text on italics indicate where users may insert text according to project needs.

Similarly, Performance Standard 1 GN1 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 Performance Standard 1, 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 RCIA analysis has two objectives:

- To determine if the combined impacts of: the project, other projects and activities, and natural environmental drivers will 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); and
- 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 provide specific characteristic of the RCIA ToR that are known at the time the ToR are issued. For example, where it is already known that there are regional concerns for the conditions of one or more VECs, these concerns should be identified.>

IFC's Good Practice Handbook, "Cumulative Impact Assessment and Management Guidance for the Private Sector in Emerging Markets" describes a six-step process that should be used in conducting a 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 GPH for additional guidance regarding conduct of the following steps.

4.1 Scoping Phase I – VECs, Spatial and Temporal Boundaries

Tasks:

- Identify the VECs to include in the RCIA.
- Identify the spatial boundaries of the RCIA.
- Identify the temporal extent of the RCIA.

Note:

- VECs to include are those that would be affected by the project. Thus VECs for which an impact 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, then priority for analysis should be given to those for which there is existing regional concern, as 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.
- 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.
- 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. When 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 Section 4.3). 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.

- Estimate the cumulative impact on VECs—the total impact on the VECs when the impacts of the development 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 Anticipated Cumulative Impacts

Task:

- Assess the significance of the foreseen 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 an estimated unacceptable cumulative impact on a VEC to an acceptable level (iteration with the tasks described in Sections 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[42] in environmental and social management of the specific project contributions to the expected cumulative impacts.

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[42] Defined in Performance Standard 1 as the strategy to first anticipate and avoid impacts on and risks to workers, the environment, and/or affected communities, or minimize impacts and risks where avoidance is not possible. Acceptable options for minimizing will vary; they include abating, rectifying, repairing, and/or restoring. Residual impacts must be compensated for and/or offset. It is important to emphasize that offset is the last resource option that should be used to compensate for residual impacts of a given action or project; it should not be used to manage cumulative impacts on a selected VEC. However, regional offset of cumulative impacts could still be possible as part of a collaborative CIA mitigation process led by the government or a coalition of developers.

- 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 at acceptable conditions.
- Undertake best efforts to engage, enhance, and contribute to a multistakeholder collaborative approach for the implementation of management actions that are beyond the capacity of the project proponent.

4.7 Stakeholder Engagement

Stakeholder engagement[43] is critical to the 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. It will be essential to collect 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 is essential when additional mitigation is needed for other projects. Engaging in assigning blame for cumulative impacts is likely to be counterproductive. Cumulative impacts are, by their multiparty nature, a collective responsibility and in this regard maintaining a constructive relationship will be essential.

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[43] For further guidance, please refer to IFC published documents on good practice and guidance on stakeholder engagement, participatory monitoring, and grievance mechanisms:
- www.ifc.org/HB-StakeholderEngagement
- www.ifc.org/GPN-Grievance
- http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_gpn_socialdimensions__wci__1319578072859
- www.ifc.org/HB-WaterFootprint
- http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_handbook_doingbetterbusiness__wci__1319576642349

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