Abstract ID#: 19
Title of Paper: Cumulative impact analysis ("CIAM") from a project perspective.
Session: Analysis of cumulative impact and its input for climate change management through ESIA.

Until a couple of years ago, Environmental and Social Impact Assessments ("ESIAs") were the most important evaluation instruments to analyze the potential impacts of a project on the environment. Time has shown, however, that a more comprehensive approach that factors in individual impacts generated by multiple projects with overlapping areas of influence is needed to guarantee comprehensive environmental management.

Cumulative Impact Analysis and Management ("CIAM") was conceived to respond to this need. To systematize such process, the Internacional Finance Corporation ("IFC") produced, in 2015, the "Good Practice Handbook for Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets" (the "IFC Handbook"), which presents the well-known six-step CIAM approach for practitioners.

Even though the IFC Handbook can be applied to practically any case, a more agile (but still thorough) procedure can be used when a CIAM is developed from the perspective of a project. The following paper describes how this simplified analysis can be performed, without leaving aside the rigor suggested by the IFC Handbook.

Methodological simplification when a CIAM is carried out from the perspective of the developer of a specific project.

As has been widely accepted, the main objective of CIAM is, in general terms, to identify the aggregated impacts on predefined valued ecosystem components ("VECs") that may be caused in preestablished physical spaces and time periods by projects that have been abandoned, are in operation, are being constructed, or are planned to be carried out in the future.

There are two approaches to carrying out CIAM and, depending on them, two objectives: i) the *Planner's Approach* (usually by a state body that is responsible for territorial planning, resource management, investment planning, or environmental control agency), which seeks to determine how several actions (projects and stressors) will affect a VEC or VECs in a preestablished area for a defined time; and ii) the *Developer's* or *Project Approach* (usually by a private, public, or mixed body in charge of carrying out a particular project), which aims at determining how other actions may exacerbate future environmental conditions related to its undertaking.

Most cumulative impact analyses for private sector projects are carried out utilizing the *Developer's Approach*. This is mainly because the access to financing resources for projects provided by multilateral development banks (e.g., IDB Invest, IFC) and commercial banks require these studies.

While *Planners* usually perform a CIAM to (a) achieve a good (rational) management of resources, (b) pursue better control of the environmental quality of VECs, (c) prevent the occurrence of environmental contamination, (d) avoid conflicts caused by the demand for resources, optimizing spatial planning processes, and (e) prioritize investments based on their potential residual impact, among others. *Project Developers* perform this process mainly to (a) ensure the availability of resources (raw materials, labour, services) so that their undertaking is not threatened by the lack of them, (b) prevent possible conflicts, especially social ones, due to interference that other projects may bring about, (c) ensure the availability of services (including ecosystem services) so that their activity is not compromised, and (d) maybe the most important, prevent their projects from being "blamed" for impacts that they have not caused. Almost all the incentives for a *Developer* to perform CIAM are linked directly to the project's development, while the motivation for *Planners* is broader and more aligned with environmental management, in general terms.

To systematize the CIAM process, the IFC Handbook provides the following six-step approach: i) determine spatial and temporal boundaries; ii) identify VECs in consultation with affected communities and stakeholders, and of all developments and external natural and social stressors affecting the VECs; iii) determine the current status of the selected VECs; iv) assess the cumulative impacts of the project examined with other projects and activities and external stressors; v) determine the expected cumulative impacts for the viability or sustainability of each affected VEC; and vi) design and apply management measures to mitigate the cumulative impacts on each affected VEC.

Developers normally have an advantage over the *Planners* when doing a CIAM: they usually possess an ESIA or some other type of environmental analysis for their undertakings, as legislation in almost every country in the world today requires such studies before a project can be implemented.

A properly carried out ESIA should have included the following: i) a good delimitation of the project's areas of direct and indirect influence; ii) an adequate definition of the project's development phases (pre-construction, construction, operation and maintenance, and abandonment); iii) a sound evaluation of all relevant project activities that may cause some type of environmental impact; iv) a good baseline of the environmental components prone to be affected; v) a solid environmental impact analysis; vi) a series of measures to prevent, mitigate, restore, and compensate for unwanted effects, and to stimulate positive changes; and vii) a consultation process through which project stakeholders had the opportunity to express their concerns about the project or the proposed measures to manage undesired impacts. Of these aspects, the most relevant for the CIAM process are described below.

a) **Delimitation of the project's area of influence**. A project's area of influence (composed of its area of direct influence and its area of indirect influence) is, by definition, the territory where the project's impacts will manifest. This means that (a) outside this area, its effects should not be perceived and (b) if any impact caused by the project were to be detected outside its area of influence, such area would be poorly defined and should be reassessed (most likely expanded). Therefore, from the *project* perspective, its area of influence automatically becomes the *spatial* limit for the CIAM.

b) **Definition of the project's development phases**. An adequate definition of the timing of the project's development phases helps to ascertain the time interval from the present (date on which the pre-construction phase of the project begins) to the expected end of the project's useful life (date of abandonment). This time should not exceed 15 to 20 years. However, to determine the time interval for the CIAM, to this time gap, a period that occurred in the past (to assess the aggregated residual impacts of past projects) must be added. This period (of normally not more than 3 to 5 years) should extend into the past until a relatively stable condition of the environmental components is found.

c) **Identification of the environmental components prone to be affected**. If the ESIA was well carried out, the identification and analysis of all the environmental components likely to be *materially* affected by the project must have already been done. Hence, the need to include an additional component would imply that the ESIA was not well performed, is incomplete, and needs to be updated. Given that the environmental components that are important to the project are those that can be affected by it, the *preliminary* VECs can only a subset of those components.

d) **Establishing a baseline for the environmental components.** A sound EISA should have already established a baseline for all environmental components prone to be affected but the project. Therefore, there is no need to redo or update it for the CIAM, unless a *material* change in any of the components is found or a time lag between the dates when ESIA was carried out, approved, and the decision to implement the project was made has occurred. Even though a well-prepared baseline is likely to have factored in the effects of past projects (in abandonment or in operation) on such components, it might not have been able to determine the origin of these effects (which may be necessary when structuring the cumulative impact management plan). In any of these cases it may be advisable to update such baselines for the CIAM.

e) **Consultation process with relevant stakeholders**. Currently, it is very unlikely (as it is often required by local legislation) to perform an ESIA without undertaking a consultation process with relevant project stakeholders. Normally, this process is performed in two phases: i) during the preparation of the ESIA, specifically while determining the potential environmental components that could be affected by the project (that can be translated in to VECs for the CIAM); and ii) once the assessment has been completed, to make the community aware of the project's potential impacts as well as of the proposed measures to manage their effects.

   If this consultation was performed correctly, there is no need to do it again for the CIAM, since stakeholders should have already expressed their concerns regarding the environmental components in which they are

interested. However, when possible, holding meetings with the community to refine the list of *preliminary* VECs (environmental components of the ESIA) is always recommended.

From the six steps proposed in the IFC Manual, the only ones that cannot be fulfilled by using the ESIA are: i) the identification of other projects and external natural and social stressors that might affect the VECs; ii) the assessment of the cumulative impacts of each VEC; and iii) the design of management measures to mitigate the cumulative impacts identified. For these, the following procedure can be followed.

The identification of other projects and external natural and social stressors that might affect the VECs includes past projects (abandoned or in operation), present projects (currently being implemented or about to be), and projects with a reasonable probability of being carried out in the foreseeable future. This activity can begin by making a list of the projects that have been abandoned, are in operation, are being carried out, and are reasonably expected to be carried out in the future, that: i) are physically located within the project's area of influence (now geographical space for the CIAM); and ii) are or will be located near this area, given that there is some type of flow (e.g., materials, supplies, products, biomass) that connects them with this geographical space.

A great source of information for past and present projects are their ESIAs or corresponding environmental monitoring reports, if available. However, accessing these documents may not be easy: old projects might not have ESIAs, and monitoring reports, if they exist, are scarce, not accessible, or simply do not include information relevant to the analysis. In these cases, the professional judgement of the team in charge of the CIAM must be relied on and, probably, rapid environmental analyses will be needed to determine if (a) such projects are in fact generating or may generate aggregated impacts on the VECs, and (b) these effects were already considered in the ESIA of the project (to avoid duplication).

The identification of future actions may be more challenging. In fact, although, in theory, this information could be available from the same sources from which the list of past and present projects was prepared, in practice, *Developers* may have restricted access to it because of: i) reservations to avoid disclosing information to potential competitors; ii) precautions in sharing information until certain project milestones have been achieved; iii) political advantages to restricting information; iv) social repercussions; and v) possibility of losing financing, among others.

A project can be considered as reasonably expected to be carried out in the future when, among other indications, it is known that: i) its *Developer* has requested authorization to initiate the environmental licensing process; ii) it is included in the inventory of priority initiatives that the authorities plan to carry out in the coming years; iii) it is part of the political speech of the highest authorities; iv) it has the financing for its implementation; v) there is a credit request to a financial institution, perhaps international, to finance its construction; vi) it has a strong community support; or vii) a timetable has been published for acquisition of goods and services it will require. These factors are not mutually exclusive. On the contrary, the more that apply, the higher the probability (although never absolute) the project will be carried out in the future.

If a matrix is constructed with these criteria in the columns and the list of the projects in the rows, where each interaction is marked with an "x," the more x's a project has, the more probable it is to be implemented in the future. Projects that do not meet any of the analysis criteria (marked in yellow in Figure 1) should be discarded.

Juan Carlos Pérez Zamora 2023

Project Atributes / Projectos to be Considered	a. Environmental licensing process has begun	b. Included in the government's pipeline of projects	c. Is part of the political speech of the authorities	d. Has a secure financing source for its execution	e. A financial request has been sumitted to the international banking system	f. A procurement calendar has been published	g. A bidding process for its execution has been initiated	h. The Project's construction has been awarded	i. The Project's construction has already begun or it's about to begin	j. There is a high community support for the Project	k. Other
Future project 1											
Future project 2											
Future project 3	x		x						x	x	
Future project 4		x	x	x			x				
Future project 5			x		x				x		x
Future project 6											
Present project 1	x	x	x							X	
Present project 2			x			x		x		X	
Present project 3				x				x		X	

Source: Author's own work

Figure 1: Establishing the probability of future projects to be developed.

The list of *preliminary projects* to be included in the CIAM will be composed of the past and present projects identified previously and the set of future projects obtained after evaluating their probability of implementation.

Identifying final lists of VECs and projects to be included in the CIAM. As can be inferred, not all the preliminary projects will *materially* affect the preliminary VECs, and not all preliminary VECs are likely to be affected by the preliminary projects. To come up with the list of final VECs and projects, a matrix where the rows contain a list of *preliminary* VECs (the environmental components used in the ESIA) and the columns the list of *preliminary* projects can be constructed (Figure 2). Any *material* interaction between the projects and the VECs should be marked with an "x," keeping in mind that, at this moment, it is not necessary to quantify such interaction (that will be done later). The result of this activity will reveal projects that have no material interaction with the environmental components (i.e., their whole column is without x's), and VEC's that will not be impacted by any proposed project (i.e., the whole row is empty). Discarding these projects and components (marked in yellow in Figure 2) will lead to a list of final VECs and projects to be used in the CIAM.

Juan Carlos Páez Zamora 2023

Proyects to be cosidered / Environmental Components (EIA)	Past project 1	Past project 2	Past project 3	Future project 3	Future project 4	Future project 5	Present project 1	Present project 2	Present project 3
Mineral resources	x	x				x		x	
Soils	x	x	x		x			x	
Ocean water									
Water quality			x		x	x			x
Water recharge									
Climate (micro, macro)		x			x			x	x

Source: Author's own work

Figure 2: Establishing the final VECs and projects for the CIAM.

Assessment of the cumulative impacts of each VEC. This task can be done using any of the available methodologies (e.g., matrices, check lists, maps) or a combination. However, a good way to <u>display</u> the analysis is by using a matrix where the VECs are displayed in its rows and the projects (including the base project) in the columns (Figure 3).

Valued Ecosystem Components (VECs) / Final Projects	Test Project	Past project 1	Past project 2	Past project 3	Future project 4	Future project 5	Present project 2	Present project 3	Positive effects on the VEC	Negative effects on the VEC	Total effects on the VEC
Mineral resources		7 / 5			7 / 6			7 / 5	3	0	112
Soils			-6 / 6		-8 / 7		-4 / 8		0	3	-124
Water quality	6 / 7	-2 / 8				-7 / 6		3 / 5	2	2	3
Climate (micro, macro)			-6 / 6		-3 / 6			-1 / 5	0	3	-59
Positive effects due to the project	1	1	0	0	1	0	0	2			
Negative effects due to the project	0	1	2	0	2	1	1	1			
Total effects due to the project	42	23	-72	0	-32	-42	-32	45			

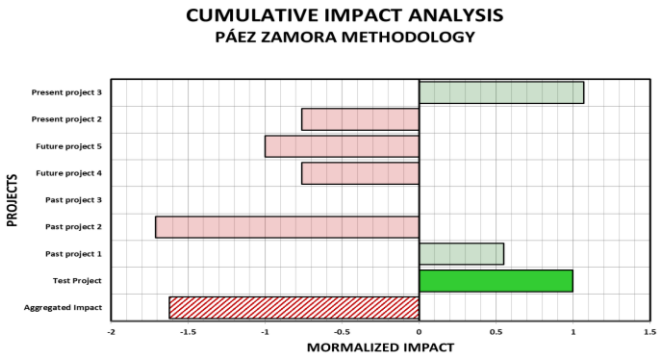
Juan Carlos Páez Zamora 2023

Total: -68

Source: Author's own work

Figure 3: CIAM display matrix.

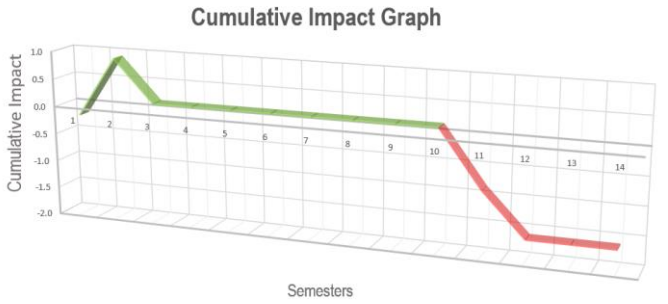
The final effect of each project over the final VECs can be compared to that caused by the project for which the analysis was performed (through a normalization process where the effect of each other project is divided by the effect of the project for which the CIAM was prepared) and displayed in a graph (Figure 4).



Source: Author's own work

Figure 4: Normalized cumulative impacts.

If the dates when future projects will enter their operational phase are known, another graph can be constructed to show how the cumulative impacts will vary through time (Figure 5).



Source: Author's own work

Figure 5: Variation of the cumulative impact over time.

Design of management measures to mitigate identified cumulative impacts. The preparation of a mitigation plan for cumulative impacts follows the same pattern used when developing an environmental management plan for an ESIA. However, when preparing the mitigation plan from the perspective of a *project*, all actions needed by such project to minimize its aggregated effect on the selected VECs need to be clearly identified, as they will have to be incorporated (or reformulated) into the project's management plan.

It is also critical to consider that mitigation plans for cumulative impacts usually contain actions to be performed by other project developers and that for these plans to be successful, a strong enforcement of these actions listed in them and a sound supervision by the authorities will be needed.

Juan Carlos Páez Zamora
IDB Invest 2023