Cumulative Impact Assessment- Paradigm Shift

Presented to Workshop on

CIA-Need for better assessment tool…..Time to deliberate

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Cumulative Impact Assessment

Challenge with Project level Impact Assessment based environmental permitting

Demonstrates…..

Baseline(at time x) + Anticipated impacts of project activities → Acceptable Environmental Conditions

Based on this project is permitted in x+1 and project begins operations by x+4 and operates till say x+25

During this period:

Many more projects are permitted and commissioned
Activity levels(habitations, transport etc) have changed/increased which may not be covered by environmental permitting
Environmental stresses have changed

As a result

During its life time, project may face environmental/resource/safety challenges and risks
More importantly, despite diligent environmental permitting practice, environment/resource conditions may deteriorate.

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Cumulative Impact Assessment

Limited CIA? Extension of EIA

- Cumulative impact assessment (CIA) is an approach to environmental impact assessment (EIA) that aims to consider the effects of multiple actions or impacts on the environment. CIAs are conducted across the actual and potential impacts of a number of activities or projects that may combine over time and/or space with appropriate limitations by reference to the action being assessed and its foreseeable impacts.

- CIAs are, undertaken in the following circumstances:
  - as part of project-specific EIA, where there is a likelihood of significant impacts from more than one operation or activity
  - to include impacts of multiple projects/developments anticipated over time and space
  - to inform a broader statutory planning scheme or strategic assessment (often at a regional scale).

Cumulative Impact Assessment

CIA Variants….

Aspect	EIA-driven approaches	Strategic, regionally based approaches
Description	Assessment of single, multiple projects or multi-component activities	Assessment of proposals, plans or programs for a particular region, industrial sector or across sectors
Regulatory characteristics	Single or multiple proponents	Single industry sector, government agency responsible for resource sector, regional planning or administrative authority governing body
Trigger	Cumulative effects of project actions on specified environmental values* in the project locations, or cumulative effects of multiple projects on a region or regional environmental values	Cumulative effects of proposed or existing sector-based plans or development initiatives Cumulative environmental change or regional land use planning initiatives Can include cumulative effects of project actions on specified environmental values, as well as impacts on defined regional thresholds
Scope	Non-strategic, project focused	Strategic and less constrained in focus
Temporal bounds	Project life cycle and past, present and reasonably foreseeable future developments in the project's region	Past, present and reasonably foreseeable activities, plans, and longer term futures of regional environments and economies
Spatial bounds	Site specific, focused on direct on-site and off-site impacts	Boundaries of sector initiatives (e.g. regional expansion of mining activity) or the planning region under consideration as defined by natural features or by regional authority
Environmental objective	Generally to ensure effects are within acceptable levels	To achieve predetermined environmental (and social and economic) objectives. Also to limit more regionally based impacts/system thresholds and provide certainty for future planning

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Cumulative Impact Assessment

IFCs Risk Management Approach

- CIA is evolving and there is no single accepted state of global practice

- 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

  - may contribute to cumulative impacts on valued environmental and social components (VECs)
  - 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.

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Cumulative Impact Assessment

What are VECs

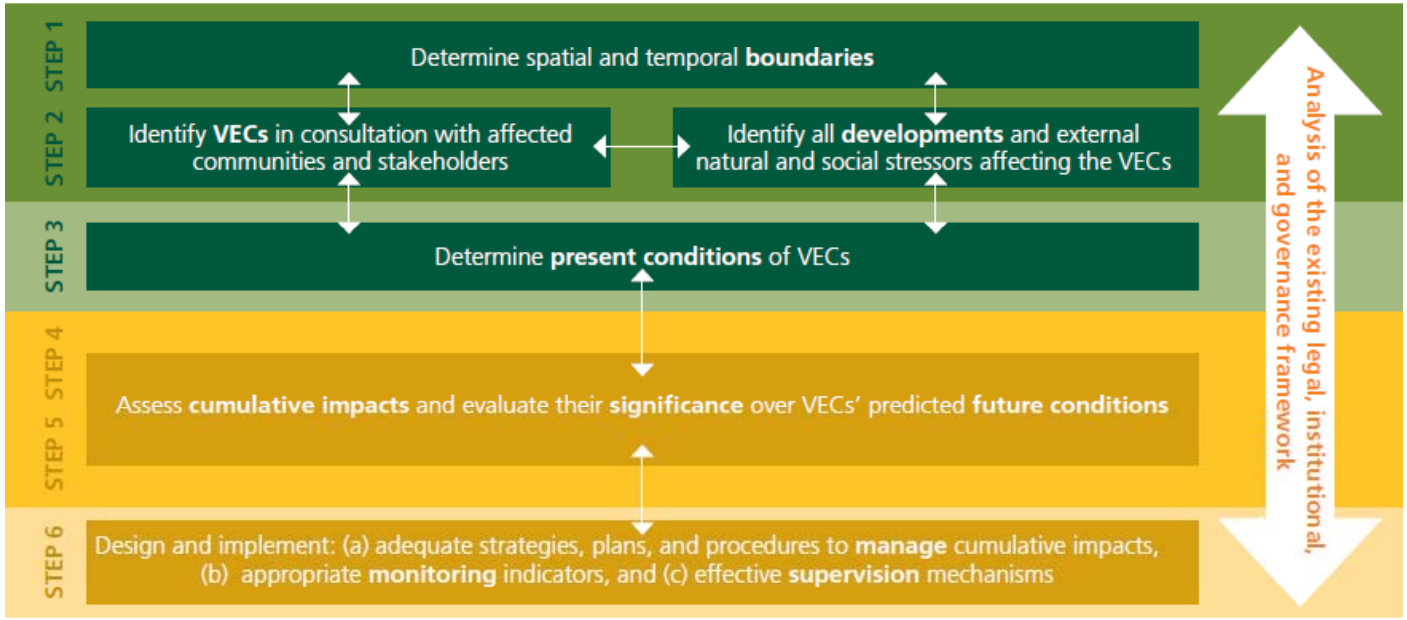
What are VECs?

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).

Methodology- CIA

Six Step Rapid CIA process



Methodology CIA

Determining VECs and Spatial & Temporal Boundaries

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?

Methodology CIA

Determining VECs and Spatial & Temporal Boundaries

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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Methodology CIA

Determining Other Activities and Environmental Drivers

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?

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Environmental Drivers

Summary of cumulative effects scores for four scenarios: total cumulative effect score, footprint, and effect per square kilometer.

Scenario	Total cumulative effect score	Footprint (km^2)	Effect/km^2
Current	1,328,062	1,585,313	0.84
Climate	939,697	452,352	2.08
Planned	1,339,972	1,585,313	0.85
Difference between Planned and Current	11,910	7,583	1.57
Combined current + Climate + Planned	2,279,669	1,585,313	1.44

Methodology CIA

Baseline Status

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?

Methodology CIA- VECs in Tawang CIA

1.Ecosystem Structure, Function and Services: Under this category of effects, the following have been considered: (i) Forest area loss/MW (Ha), (ii) Carbon stock loss/MW, (iii) Ambient air quality, (iv) Periphyton and zooplankton density, (v) NPP, (vi) Change in turbidity (NTU), (vii) Total coliforms (CFU/ml), (viii) IAS invasibility, (ix) Dependency of villagers on hill stream/spring water. In total, 9 (m1) effects.

2. Biodiversity: In this category, the following effects have been considered: (i) Proportion of total plant diversity to be affected, (ii) Proportion of total bird diversity to be affected, (iii) Proportion of total mammal diversity to be affected, (iv) No. of butterfly species to be affected, (v) No. of fish species, (vi) Periphyton richness, (vii) Endemic and/or threatened plants, (viii) Endemic and/or threatened mammals, (ix) Endemic and/or threatened birds, (x) Endemic and/or threatened fish, (xi) Endemic periphyton and zooplankton. In total, 11 (m2)effects.

3. Ecosystem vulnerability: Under this, three effects have been taken into consideration: (i) Soil and landslide vulnerability of impact area (%), (ii) Vulnerability of core area and (iii) Glacial lake outburst discharge. In total, 3 (m3) effects.

4. Hydrology: Under this category, two aspects have been considered: (i) Ecological flow percentage, (ii) Intermediate river length per megawatt, (iii) Ecological flow (lean season in cumec). In total, 3 (m4) effects.

5. Cultural and Livelihood: Under this category the following five aspects have been taken into consideration: (i) Dead body last rites, (ii) Totem worship (iii) Employment opportunities, (iv)Health risks, (v) Quality of life. In total, 5 (m5) effects.

6. Dependency on Natural Resources: Under this category, the following gave been taken into consideration: (i) Forest dependency (%), (ii) Water dependency (%). In total, 2 (m6) effects.

Methodology CIA

Assessment of Impacts

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?

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Methodology CIA

Space crowding

Space crowding occurs when a system is disturbed by several similar activities, or by different activities producing a similar effect, in an area too small to assimilate the combined impacts. (Rees 1995)

Nibbling is an incremental form of space crowding and is the gradual disturbance and/or loss of land and habitat (Court *et al*. 1994).

For example:

Development of two or more mines and supporting infrastructure resulting in vegetation clearance concentrated in a local area.

Time crowding

Time crowding occurs when impacts are so close in time that the impact of one action are not dissipated before the next occurs. (CEARC 1986)

For example:

Sequential and on-going discharge of mine waste water into rivers/creeks.

Interactive effects

Interactive effects can be additive or compounding, reflecting the interactive nature of ecosystems.

Additive is the simple linear addition of one impact on another, whereas compounding is when two or more agents combine to cause an impact.

Antagonistic effects can also occur, where the combined impact of more than one agent is less than the sum of the individual impacts. (Canter and Kamanth 1995)

For example:

Additive dust effects from the construction and operation of adjacent operations

Compounding dust and noise effects combining

Indirect effects

Indirect effects are secondary impacts arising as a result of the direct effect, and include the impacts of activities facilitated by a project, including reasonably foreseeable impacts from downstream users.

For example:

New roads to access a mine provide new invasion pathways for weeds and pest species.

Activities of farmers using irrigation as a result of the construction of a dam.

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Methodology CIA

Prediction of Cumulative Impacts

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 future actions.
- Identify trade-offs.

Methodology CIA

Management of Cumulative Impacts

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?

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Issues for Discussion

Issues for Discussion

- Which deficiencies of EIA could be addressed by CIA ? Could improve in assessing risks/impacts due to project through its life cycle and improvement in credibility of assessment and management of environmental integrity
- Do we need to graduate to Strategic/ Regional Approach to CIA or Limit to Extension of EIA approach?
- Who is responsible for Management Plan that emerges from CIA?
- Data and Information requirements???

THANK YOU!!