Core EIA Skills I:
Characterizing the baseline situation, Identifying Environmental Impacts & Principles of Environmental Mitigation

USAID/Sudan Staff & Partners
Environmental Compliance/ESDM Training
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Core EIA Skills for Implementing IEE/EA conditions

Baseline Characterization

Employed in developing the IEE---but also critical to making mitigation responsive to local environmental conditions

Identifying Impacts of Concern

Mitigation & Monitoring Design

Obvious key skills for implementing IEE conditions

Therefore, we cover all 3 core skills. . .
Impact evaluation process: **theory**

1. **Understand** the activities being proposed

2. **Research** the potential adverse impacts typical of these activities & know how they arise

3. Based on the potential impacts, **identify** which elements of the baseline situation are important

4. **Characterize** these elements of the baseline

And then

5. **Given:**
   1. the baseline conditions,
   2. the project concept/design, and
   3. how the adverse impacts arise, decide which impacts are of concern

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Impact evaluation process: example

1. Proposed intervention: irrigation scheme (wing dam diversion type • water-intensive crops • high fertilizer use, unlined canals & open-channel irrigation)

2. Key potential impacts:
   - Excessive diversion of water
   - Salinization of soils
   - Contamination of groundwater & downstream surface water

3. Key elements of baseline:
   - River flow volume, variability
   - Soil & water characteristics & groundwater depth
   - Downstream uses
Impact evaluation: example

Baseline characterization

- River flow volume, variability
  - Will divert 3% of normal flow
  - low-year flows are 50% of normal
  - River is not over-utilized downstream

- Soil characteristics & groundwater depth
  - Soils are well-drained but relatively high in salts; groundwater 2m depth

- Downstream uses
  - Key water source for community domestic use & livestock, immediately downstream.

Therefore:

Impacts of Concern:
- Salinization
- Downstream contamination

Little Concern:
- Excess Diversion

Why?
Why is this relevant to me?
I thought the IEE for my project already identified all the “impacts of concern”?

IEE conditions are often very general.
- They require IPs to identify issues of concern particular to a site & respond with appropriate, specific mitigation measures.

For example...
Medium scale construction.

**Activity:**
Development of institutional compound/ training facility
(perimeter wall, offices & classrooms, canteen, genset & fuel storage, latrine block, etc.)

**IEE Conditions:**

1. No construction permitted in protected areas or relatively undisturbed ecosystem areas.

2. Construction & facilities operation may not (a) result in significant adverse impacts on ecosystem services or (b) adversely affect the quality of surface or groundwater tapped for domestic use.

Etc.

The baseline situation determines the relevance of these conditions & specific issues of concern mitigation must address.

Proposed site
Inspection of baseline conditions at the site identifies issues of concern for mitigation.

1: Site is in area already allocated for development—ecosystem integrity already disrupted.

2a: Key ecosystem service provided by the land is area drainage

*Implication:* design must assure no reduction in stream capacity/alteration to local drainage patterns.

2b. likely domestic use of surface water just downstream of the facility; potentially shallow groundwater also.

*Implication:* must prevent additional siltation of stream, gray and brown water discharge, fuel leaks.
How do I learn about potential impacts and how they arise?

Covers more than 20 typical development sectors

Each sectoral write-up identifies potential impacts & discusses how they arise.

Impacts are matched to mitigation actions.

The annotated bibliographies provide links to key additional resources

Hardcopy provided.

Available in your e-materials and at www.encapafrica.org.

USAID’s Environmental Guidelines for Small-Scale Activities in Africa
Where do I obtain information about the baseline situation?

1. YOUR ORGANIZATION TALK to staff who know the project, and know the sites.
   
   OBTAIN project documents and information

2. DIRECT OBSERVATION
   Go to the site(s)! (look up publicly available satellite imagery before you go.)

3. UTILIZE OTHER LOCAL TALENT & KNOWLEDGE
   communities, government, counterparts

Aren’t we forgetting something?

What about reports by donor organizations and international agencies?
What about government statistics? GIS databases?

All these sources can be useful (and sometimes necessary)

But good local information is the most important input

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Why direct observation?

We need to **SEE**

- Are latrines close to water supplies?
- Is there a drainage problem?

*Visual inspection is the quickest and best way to check issues of location, scale and proximity that determine many impacts.*

We need to **LISTEN**

- Is there a land tenure problem?
- How often does the river flood?

*Stakeholders and local communities have local knowledge that you need.*

And, impacts depend on what those affected value and need!

Talk to men **AND women.** Women’s perceptions on environmental matters are critical and distinct.
Wait!

What if I can’t travel to the sites?

If at all possible, DON’T make the site characterization a desk exercise.

But if you can’t visit the sites/area, you need:

→ **MAPS** and **PHOTOS** to help you visualize the environment.

→ to **TALK** to people who have been there
Do I need tools to evaluate impacts?

A number of simple tools exist to systematize field observations, think through potential impacts, and to help evaluate their significance.

- Checklists
- Matrices
- Networks
- Overlays

A number of more complex tools exist to predict and assess the significance of impacts in full EIA studies. (Used by specialized consultants.)

But in this workshop...

We focus on the simple logical process of impact evaluation, supported by the Small-Scale Guidelines. This is sufficient for most Sudan IP needs.
Mitigation and Monitoring

A critical part of the EIA process—and of environmentally sound design and management

Mitigation is . . .
- The implementation of measures designed to reduce the undesirable effects of a proposed action on the environment

Monitoring . . .
- Environmental and activities measurements to tell you if your mitigation measures are:
  1. Being implemented
  2. Sufficient and effective
How does mitigation reduce adverse impacts?

<table>
<thead>
<tr>
<th>Type of mitig measure</th>
<th>How it works</th>
<th>Examples</th>
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| Prevention and control measures | Fully or partially prevent an impact/reduce a risk by:  
- Changing means or technique  
- Changing or adding design elements  
- Changing the site  
- Specifying operating practices | PREVENT contamination of wells, by SITING wells a safe distance from pollution sources  
Add wastewater treatment system to the DESIGN of a coffee-washing station and train in proper OPERATIONS |
| Compensatory measures | Offset adverse impacts impacts in one area with improvements elsewhere | Plant trees in a new location to COMPENSATE for clearing a construction site |
| Remediation measures | Repair or restore the environment after damage is done | Re-grade and replant a borrow pit after construction is finished |

... and sometimes you may need to redesign the project to modify or eliminate problem components
SITING & DESIGN FEATURES to **PREVENT** impacts

- **Water Supply** (Well provision)
  - **Potential impacts:** Contamination of water supplies; spread of disease
  - **Mitigations needed:** Fence to keep out livestock
    - Site away from contamination sources
    - Provide separate water point for livestock

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Proper treatment system OPERATIONS

- Agric Processing (Coffee Washing)
  - Potential impacts: Contamination of water supplies; excessive water draw
  - Mitigations: Wash water recycling

Basic wastewater treatment (pictured)

→ Proper treatment system operation is essential
Must I mitigate EVERY impact?

Mitigation specified by the IEE/EA must be implemented

But often IEE conditions are general & require the IP to exercise judgment in designing specific mitigations. In this case, apply the following principle:

- **Potentially serious impacts/issues**
  - These must **ALWAYS** be mitigated to the point that the impact is non-significant

- **Easily mitigated impacts**
  - Then, there may be other impacts for which mitigation is easy and low-cost

Prioritize!
Effective mitigation usually requires a **mix** of mitigation techniques

**Example:** ROAD REHABILITATION

**Some typical adverse impacts:**
- Alteration of natural watershed drainage
- Erosion of road surface materials into habitats, productive agricultural land
- Roadside Gully formation → damage to adjoining land
- Dust → respiratory problems, crop damage
- Inappropriate Extraction of materials for road surfacing
- Increase in disease transmission (HIV)
- Increased non-sustainable logging, charcoal extraction

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Combining mitigation techniques:
Road rehabilitation

Some typical good-practice mitigations

**Siting**
- Avoid steep grades, Follow contours
- Culverts or Rolling dips for water drainage and diversion
- Side drainage to prevent flooding washout
- Slope stabilization via plantings, grading/terracing & riprap
- Dust reduction barriers
- Paving of vulnerable stretches

**Design elements**

**Operating Practice**

**Remediation**

**Community Maintenance**

Grading/planting/draining borrow pits

Photo: LOW-VOLUME ROADS ENGINEERING
Best Management Practices Field Guide
Gordon Keller & James Sherar
Prevention is best

- Where possible, PREVENT impacts by changes to site or technique.

CONTROL of impacts with Operation & Maintenance practices (O&M) is more difficult to monitor, sustain.
What is the best resource for mitigation design?

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