Alternatives Analysis

GEMS Environmental Compliance-ESDM Training Series
Senegal, February, 2014
How do you know what is best?

vs

Both?
Session Objectives:

Alternatives

• Identify
• Define Issues
• Screen and Select
• Analyze and Compare Alternatives

Alternatives are the heart of the Environmental and Social Impact Assessment
Why Alternatives

Inherent to good decision making:

• Helps integrate environmental and social sustainability into project planning

• Reg 216 requires alternatives for an Environmental Assessment
Identify:

Alternatives Analysis:

• Starts during scoping
  • Consultations can lead to reasonable alternatives that meet the need of the affected community—the community know the area
  • Preliminary Alternatives, area and receptors of influence are an output to scoping but may change during the analysis

• Is dependent on a strong purpose and need:
  • A purpose and need statement are the goals and objectives for the project: When, where, what, who, and issues
  • Bounds and narrows the selection of alternatives

• And rigorous background data
  • Amount of data collected should be commensurate with the potential significance
  • Baseline data serves as a benchmark for impacts prediction and future monitoring
Identify: cont’d

• Establish decision criteria for screening and selection final alternative
  • Use both exclusionary and evaluative criteria for selection of alternatives

• Find a range of reasonable alternatives:
  • Reasonable means the alternative is implementable, and/or achieves all or most of the purpose and need
  • Reasonable may also mean financially feasible
  • Financially feasible means a cost benefit analysis should be performed using environmental and social costs as well as the overall project costs
    • Costs may include the cost of lost public goods/non-market (the value of having something like a national park), market value costs (cost of lost fisheries, public health cost) and mitigation costs
# Types of Alternatives

<table>
<thead>
<tr>
<th>No Action</th>
<th>Establishes baseline for comparison of alternatives and for monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy change</td>
<td>Changing policies to achieve the purpose and need</td>
</tr>
<tr>
<td>Location</td>
<td>Change the siting of a project</td>
</tr>
<tr>
<td>Type/Process/Technology</td>
<td>Change the methods, technology or process of a technology to achieve the purpose and need (renewables vs fossil fuels, different road surfaces etc)</td>
</tr>
<tr>
<td>Scheduling of project</td>
<td>Changes to the timing of a project to avoid impacts</td>
</tr>
</tbody>
</table>

To the extent possible: include environmental costs in the comparison of alternatives
What are the potential alternatives to:

Increasing crop yield
- Different location
- Changed techniques
- Irrigation types
- Change seed variety

Getting electricity to the local population
- Renewables
- Fossil Fuels
- Privatization
- Change policies to ensure strong distribution
- Better grids/smart grids

Don’t forget the No Action Alternative
Define the Issues:

• **Using available and collected baseline data:**
  • Finalize receptors of concern and the area of influence
    • Methods such as Matrices and Conceptual models can assist
  • Consider flora, fauna, ground and surface water, air etc. of the project and it’s associated facilities
  • Alternatives may be refined as new data and analyses become available.

• Each alternative must be objectively examined
Impact Identification

**Types of Identification Methods**

<table>
<thead>
<tr>
<th>Checklists</th>
<th>Matrices (Leopold)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networks (conceptual models)</td>
<td>Overlays</td>
</tr>
</tbody>
</table>

- Requires a multidisciplinary technical and experienced team
- Is systematic and transparent
- Uses physical, biological, socio-economic and cultural data
  - Should integrate health, social and ecological analysis into one impact assessment
- Refines the project alternatives:
  - area of influence,
  - vectors of ecological concern/receptors,
  - temporal boundaries
- When feasible, and in proportion to significance of impacts, should be quantitative

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Identification of Impacts: Conceptual Models

- Devilbend Res. stocked with Rainbow & Brown Trout and Australian Bass
  - Prey upon current fish community in Devilbend Res.
  - Compete with current fish community in Devilbend Res.
  - Introduce disease to current fish community in Devilbend Res.
  - Reduce macro-invertebrate biomass in Devilbend Res.
  - Trout/Bass escape to Devilbend Ck and Balcombe Ck (inc. estuary)
    - Reduce macro-invertebrate biomass in Creek systems
    - Bittern Res. stocked with Rainbow & Brown Trout

- Impact on current fish community in Devilbend Res.

- Impact on Blue-billed Duck population

- Impact on Sea Eagle population

- Impact on significant fish species in Devilbend Ck and Balcombe Ck (inc. estuary)
# Identifying Impacts: Leopold Matrix

<table>
<thead>
<tr>
<th>ASPECTS</th>
<th>Port Authority</th>
<th>Port Area</th>
<th>Other Agencies</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emissions to air</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Discharges to water</td>
<td>x</td>
<td>x</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Emissions to soil</td>
<td>x</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Emissions to sediments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Waste production</td>
<td></td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Changes in terrestrial habitats</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changes in marine ecosystems</td>
<td>x</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Odour</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Resource consumption</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Port development (land)</td>
<td>x</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Port development (sea)</td>
<td>x</td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

The matrix represents various impacts associated with port activities, categorized by the port authority, port area, and other agencies. Each box indicates the level of impact, with 'x' denoting a significant impact.
Identifying Impacts:

You may need to collect more data:

- To understand presence/absence
- To define habitats
- To reduce uncertainty
- To clarify significance

When there is uncertainty with the data, decision makers should be precautionary in their decision making.
Analysis:

- Focus on the significant impacts
- Use technical experts for each impacted receptor and media (soil, air, water)
- Be certain to analyze:
  - direct and indirect impacts
  - cumulative impacts
  - associated facilities/connected actions
  - negative and positive impacts of the project
Analysis:

- The analysis is a PREDICTION, against the baseline, of impacts based on scientific evidence
  - May require the use of modelling, statistics etc (air and water quality depending on the significance of the impact)
  - When possible, the analysis should be quantitative
  - Requires technical experts

- Analysis is systematic and balanced between Alternatives

- The consequences of the No Action, and other Alternatives should describe the risks and benefits (e.g. if the no action alternative is chosen, a road will be built through a critical habitat)

The degree of analysis should not to be substantially different from the proposed project
Analysis: Significance

Magnitude of Impact

- Magnitude is a change in a measurable parameter compared to baseline
- Frequency is the number of times it occurs
- Nature of impact
- Duration is the amount of time it occurs
- Extent
- Reversibility is the likelihood that a parameter will recover from an effect

Impact Importance

Impact Significance

Define unacceptable, normally unacceptable, may be acceptable with avoidance or mitigation measures,

- Includes extinction, exceeds legal threshold or carrying capacity, increases public health risks above a certain criteria, decrease in livelihoods
Analyze and Compare:

<table>
<thead>
<tr>
<th>Flora</th>
<th>Fauna</th>
<th>Surface Water</th>
<th>Soil</th>
<th>Surface Water</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 2</td>
<td></td>
<td>Briefly describe (quantify if possible) the potential impacts here</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Action</td>
<td></td>
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<td></td>
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</tbody>
</table>
Compare:

<table>
<thead>
<tr>
<th>Selection Criteria 1</th>
<th>Selection Criteria 2</th>
<th>Selection Criteria 3</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>No Action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Describe the extent that each alternative meets the criteria</td>
<td></td>
</tr>
</tbody>
</table>
Note on Mitigation

• Mitigation measures, where possible, should be integrated into design of alternatives to avoid, and minimize impacts
  
  • Mitigation measures can be assessed as an alternative.
  
  • Costs should be integrated into the analysis
Questions?