Environmental and Social Baseline Studies

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Biodiversity Specialist
My Experiences

1998-2011

• 13 years as Director of Rapid Assessment Program (RAP) at Conservation International (NGO)
  – Baseline biodiversity and socio-economic surveys
  – To guide conservation planning
  – >40 field surveys worldwide

Currently:

• Consultant to IFC to review biodiversity aspects of projects (hydro, mining, oil, roads, infrastructure, chemicals etc.)
  – particularly baseline biodiversity surveys

• Global Wildlife Conservation NGO) - Director of Global Biodiversity Exploration

NGO – Lender – Client perspectives
What are Baseline Studies?

• Studies to determine the current environmental and/or social condition of an area

• Studies to evaluate how these conditions will develop in the absence of a “project”

• Baseline Information needed for ESIA

• Forms the basis for planning, decisions, and mitigation
When to do Baseline Studies?

• General studies should be ongoing to provide data for conservation and planning
• BEFORE project impacts start to identify environmental and social values
• BEFORE project to select best site for hydropower that has least impacts
Large reservoir (160,000 ha) hydropower plant produces only 30 MW. Plans to dam additional rivers to the south to increase power output. Will flood indigenous villages and rainforest.
ESIA Process

1. Scoping
   - Consideration of Alternatives
   - Baseline studies (existing data collection and new surveys)

2. Assessment
   - Predict magnitude of impacts
   - Evaluate their significance
   - Investigate options for mitigation

3. Assess residual impacts

4. Social and Environmental Management Plan
5. SEIA Report
6. Disclosure
7. Approval
Steps for a Baseline Study

1. Compile existing data:
   – Review existing literature, reports and datasets
   – Consult experts and stakeholders
   – Identify gaps

2. Collect new data as needed
   – Field studies
   – Stakeholder consultations
   – Consult and involve experts

3. Analyze data
   – Compare to other sites
   – Feed into project planning and decision making
   – Data management and storage

4. Distribute of data
   – Publications
   – Project reports
   – Stakeholder presentations
Environmental and Social Aspects for which baseline studies are needed

- Water/ecological flow
- Water quality
- Sediments
- Biodiversity (habitats and species)
  - Aquatic
  - Terrestrial
- Ecological services such as fisheries
- Socio-economic parameters
- Human and ecosystem health
Baseline studies need good*:

- Objectives (why)
- Geographic scope (where)
- Background Research
- Time (when and how long)
- Selection of parameters/measurements (how)
- Internationally accepted methodologies
- Expertise (who)
- Analysis

*Follow and meet international standards and good practice
Why do Baseline Studies?

• Provide quality information to make best planning decisions for an area
• Evaluate global importance of a site
• Comply with national and international laws and standards
• Comply with lenders requirements
International Finance Corporation (IFC) Performance Standards

Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts

Performance Standard 2: Labor and Working Conditions

Performance Standard 3: Resource Efficiency and Pollution Prevention

Performance Standard 4: Community Health, Safety, and Security

Performance Standard 5: Land Acquisition and Involuntary Resettlement

Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

Performance Standard 7: Indigenous Peoples

Performance Standard 8: Cultural Heritage
Why do Baseline Studies

- Assess potential impacts of planned projects on environmental and social parameters
- Develop mitigation plans to reduce impacts
<table>
<thead>
<tr>
<th>Value of Resource/Sensitivity</th>
<th>Magnitude of Impact</th>
<th>Negligible</th>
<th>Small</th>
<th>Medium</th>
<th>Large</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible</td>
<td>No specific value or sensitivity</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Low</td>
<td>Locally valued, slight sensitivity</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Minor</td>
<td>Moderate</td>
</tr>
<tr>
<td>Medium</td>
<td>regional/national value, moderate</td>
<td>Not Significant</td>
<td>Minor</td>
<td>Moderate</td>
<td>Major</td>
</tr>
<tr>
<td>High</td>
<td>National/international value, high</td>
<td>Not Significant</td>
<td>Moderate</td>
<td>Major</td>
<td>Critical</td>
</tr>
</tbody>
</table>
Why do Baseline studies

Assess and mitigate impacts on the project

– Sedimentation
– Community relations
– Water flow and quality
– Invasive species
– Global biodiversity issues
Kihansi Gorge, Tanzania

Kihansi Spray Toad
Extinct in the Wild (2004)

180 mega-watt Lower Kihansi Hydropower Project (LKHP)
No baseline biodiversity studies before project started
Habitat re-created with mist sprinkler system
Population rebounded but then hit by chytrid fungus
Captive breeding started with 499 individuals
Reintroduced 1700 to the wild in 2012
Where - Geographic scope

- Regional/national level ongoing data collection is best
- Potential project footprint at all stages (pre-project, feasibility, construction, operations)
- Area of influence - direct and indirect impacts
- Terrestrial and Aquatic Areas
- Each habitat type – multiple sampling in each
- Surrounding area on an ecological and/or socially relevant scale
- IFC’s PS6 requires biodiversity assessment at an ecological scale that encompasses an entire habitat type area or watershed
- Other watersheds for potential offset sites
Many projects use Watershed scope

Sampled all habitat types in each area
At 4,350km it is the 12th longest river in world, and the 7th longest in Asia

Watershed:
795,000 sq km

Starting in Tibetan Plateau, from China along Myanmar, Thailand, Lao PDR, through Cambodia to Vietnam

One of the richest areas of biodiversity in the world

90 million people depend on Mekong River
Unexpected geographic impacts
Reventazon River, Costa Rica

Meso-American Biological Corridor (Jaguars)
When and How long

If additional field studies are needed, adequate time must be devoted to obtain quality data to be able to measure and assess changes

- Start before project impacts begin
- Quick walk-through of area not sufficient
- Terrestrial - min. 5 days for biodiversity survey
- Aquatic – need repeated sampling
- Seasonal and periodic sampling needed to assess natural variation
- If possible, continue studies through project
How to do Baseline Studies
Parameters informative to decision making

<table>
<thead>
<tr>
<th>Environmental or Social Aspect</th>
<th>Example Parameters to Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water/Ecological Flow</td>
<td>Flow rate and volume, water depth, temporality</td>
</tr>
<tr>
<td>Water Quality</td>
<td>pH, oxygen, turbidity, minerals, pollutants</td>
</tr>
<tr>
<td>Sediments</td>
<td>Deposition rate, level, source, seasonality</td>
</tr>
<tr>
<td>Terrestrial Biodiversity</td>
<td>Habitat extent, threatened species, diversity, endemic species, corridors</td>
</tr>
<tr>
<td>Aquatic Biodiversity</td>
<td>Habitat diversity, species diversity, indicator groups, migratory species</td>
</tr>
<tr>
<td>Fisheries</td>
<td>Commercial species biology, volume of catch, frequency, number of fishers</td>
</tr>
<tr>
<td>Socio-economic</td>
<td>Population size, distribution, age classes, economic profile, livelihoods, natural resources use</td>
</tr>
<tr>
<td>Human and ecological health</td>
<td>Health issues, local diseases, frequency, vectors</td>
</tr>
</tbody>
</table>
Now a few examples of baseline studies approaches

More examples and details will be presented today and tomorrow from around the world
Water Quality

Centrales Hidroeléctricas La Higuera, Chile
At each sampling point (2 control and 2 impact) they measured:

- **Habitat** (water velocity, substrate, width, depth)
- **Water quality** (conductivity, dissolved oxygen, pH, temperature, turbidity)
- **Biological Community** (6 Surber samples of 0.09 m²)
- **Calculated index using SIGNAL 2**
**Biological Indicators**

**Invertebrate Families recorded:**

Chironomidae. Family tolerant of adverse conditions (e.g. Low oxygen)

Plecoptera. Family indicator of good quality water
Make Vegetation Map to select sampling sites in different habitat types
- 5 sampling locations
- 5 days at each location
- Different habitat types

**Terrestrial sampling**
- Plants
- Mammals
- Birds
- Reptiles and Amphibians
- 4 insect groups

**Aquatic sampling**
- Fishes
- Aquatic plants
- Aquatic invertebrates
- Water Quality
Socio-economic aspects of AmerIndian Village

- Population size
- Age structure
- Livelihoods
- Fisheries
- Natural Resource Use and Mapping
Sampling methods
Aquatic Biodiversity
Mekong Delta
Over 1200 fish species (maybe 1700 species)
High endemism in hill streams (upper reaches)
Fisheries - Cambodia

Cambodian inland capture fisheries ranks 4th in the world in terms of total catch

Most intense inland capture fishery in the world in terms of fish caught per capita

Over 400,000 tonnes of freshwater fish caught annually – more than that of USA and Canada combined

Fish are a major natural asset for Cambodia, essential for food security, contributing around 12% of Cambodia’s GDP in recent years
Camera-trap image of Saola *Pseudoryx nghetinhensis* in Annamite Mountains, Lao PDR. Species was discovered in 1993 and is Critically Endangered.
Methodologies to Determine Ecological Flow (EF)

Hydrological/Hydraulic Methods

1960’s

Present

Habitat Simulation / Holistic (requires biological information)
Who - Expertise

Who does the studies is very important

Qualified individuals needed to ask the right questions and collect quality data and analyze results

Consulting firms may need to bring in outside expertise

Expert guidance is essential- either direct involvement or as advisors

Partnerships with NGOs and other groups encouraged
Baseline Studies Data Analysis

Analyze the baseline data to determine:

1. Feasibility of the projects
2. Best sites for projects
3. Environmental and social needs
4. Significance of impacts of project
5. Mitigation measures
   - Avoid
   - Minimize
   - Remedy
   - Offset remaining impacts
Baseline studies and Monitoring

• Are they the same?
• No, baseline studies need to establish a good dataset of the current condition so should be more comprehensive
• Monitoring involves repeated measurement of a selected set of indicators from the baseline dataset that can assess changes or measure progress of mitigation actions
All of us here come from different perspectives

- Government (national, local)
- Hydropower Industry
- NGOs
- Development Organizations
- Lenders
- Academics

Quality baseline information is essential for making the best decisions and planning for Hydropower projects
Good Baseline Studies need to include:

- International standards and good practice
- Broad geographic scope
- Solid Background Research
- Adequate time and frequency before project starts
- Selection of parameters/measurements
- Internationally accepted methodologies
- Expertise
- Analysis of values

With the objective of documenting the current environmental and/or social conditions
I look forward to discussing baseline studies with you during the workshop.

Thank you!