Coastal Area Planning and Management Using Forests and Trees as Protection

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Approach

Coastal Hazard Management Phases:
- Phase I: Assessment
- Phase II: Mitigation
- Phase III: Implementation

Phase I

Clarifying the Issues:
- Hazard Assessment
- Vulnerability Assessment
- Risk Characterization

Hazard Identification Approach

- Inventory of Existing Data on Coastal Hazards
- Discussions with local and national agencies and stakeholders (e.g. glass bottom boat owners, hotel operators)
- Site Visits/Observation
- Interdisciplinary Consultations
**Vulnerability Assessment**

- Identify and characterize impacts from prior events
- Correlate effects with coastal geometry
- Correlate with eco-system features

**Vulnerability Assessment (cont.)**

- Correlate hazard with man-made societal features

During this task institutional factors such as enforcement of land use planning regulations are assessed

**Risk Assessment**

Correlate the hazard with the vulnerability

**Probability and Consequences**

Hikkaduwa, Sri Lanka Case Study

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Frequency</th>
<th>Consequence</th>
<th>Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclone</td>
<td>Moderate</td>
<td>High</td>
<td>1-15 years</td>
</tr>
<tr>
<td>Tsunami</td>
<td>Rare</td>
<td>High</td>
<td>&gt;15 years</td>
</tr>
<tr>
<td>Landslide</td>
<td>Rare</td>
<td>Moderate</td>
<td>&gt;15 years</td>
</tr>
<tr>
<td>Coastal Flooding</td>
<td>Frequent</td>
<td>Moderate</td>
<td>Annual</td>
</tr>
<tr>
<td>RiverineFlooding</td>
<td>Frequent</td>
<td>Moderate</td>
<td>Annual</td>
</tr>
<tr>
<td>Coastal Storms</td>
<td>Frequent</td>
<td>Moderate</td>
<td>Annual</td>
</tr>
<tr>
<td>Coastal Erosion</td>
<td>Frequent</td>
<td>Low</td>
<td>Annual</td>
</tr>
</tbody>
</table>
Outcome of Probability/Consequence Analysis:
Weighting of priorities to be used in establishing mitigation strategies

Phase II:
Mitigation Strategy Planning:
- Identifying tools to reduce the problems
- Evaluating and selecting the mitigation tools

Mitigation Tools

“Hard” Options

“Soft” Options

Hybrid Options: Plantations and land use controls
Selecting and Evaluating Options

Strategies Consider:
- Social factors
- Economic Implications
- Eco-systems
- Institutional factors

Phase III: Implementation

Implementation Framework:
Integrated decision making based on cost benefit analysis

Cost-Benefit Evaluation

7 Key Criteria:
- Effectiveness
- Time to Implement
- Permanence
- Cost
- Technical Feasibility
- Social/Political Feasibility
- Environmental Impacts

Bank Stabilization Case Study

Hard Options

Soft Options
**Hilo Tsunami Recovery**

**Plan Elements**
- Breakwater
- Tsunami Forest
- Park
- Land Use restrictions

No participatory involvement

**Hilo Keaukaha Regional Plan**

**Plan Elements**
- Regional approach
- Shoreline management zone
- Multiple land uses
- Coastal road realigned
- Character/lands use areas
- Multi-sector participation

**Keaukaha Sub-regional Plan**

**Plan Elements**
- Regional approach
- Shoreline management zone
- Multiple land uses
- Coastal road realigned
- Character/lands use areas
- Multi-sector participation

**Keaukaha Project Scale**

**Plan Elements**
- Coastal roadway realigned
- Tree buffer
- Wetland preservation
- Land Use Regulations
- Building Code Regulations
- Public Private Commitment
**Implementation=Institutional Leadership**

Management Program to oversee
- Integrated coordination
- Prioritization
- Enforcement

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**Conclusions**

Integrative planning can establish a framework within which to prioritize locations for forests, and vegetation buffers.