Unit 9
Environmental Consequences
Objectives

- Understand direct, indirect, and cumulative effects
- Determine site-specific effects and comparison between alternatives
- Use meaningful measures of change
- Provide evidence to support findings
- Where to find effects analysis requirements
- The role of the interdisciplinary team
Examples of Relevant Resources

Resources that may be affected by actions

- Vegetation
- Wildlife
- Soils
- Hydrology
- Air Quality
- Recreation
- Transportation
- Structures
- Scenery
- Social environment (cultural heritage sites)
- Local Economy
- Climate Change
Direct and Indirect Effects

What is an effect?
- Result caused by an action

Project effects caused by actions include:
- **Direct effects** - same time and place
- **Indirect effects** - later in time or farther removed in distance
Direct Effects

- Are those that occur at the same time and place as the action.
Indirect Effects

- Are caused by an action, but occur in a different place or time.
Describing Effects: Be Site-specific

- **Site-specific**
  - Where actions occur
  - What happens (the result) at that location based on the resources of that area (e.g. soil erosion based on slope, soil type, rainfall amount)

- **Not site-specific**
  - A description that could apply anywhere in the Analysis Area, watershed, landscape
Meaningful Interpretation - Ask:

- Are cause and effect relationships explained?
- Is a reference point of normal variability and relative conditions used?
- Are conclusions drawn where appropriate?
- Is technical jargon avoided?
- Are graphic displays helpful?
- Are effects discussed objectively and clearly?
- Are effects site specific?
- Is appropriate science referenced?
Hard Look!

- Assumptions spelled out
- Inconsistencies explained
- Methodologies disclosed
- Contradictory evidence addressed
- Records referenced solidly grounded in science
- Guesswork eliminated
- Conclusions supported in a manner capable of judicial understanding
Professional Judgment vs Personal Values

Use Professional Judgment:
- Conclusions based on scientific training and data
- Experience to predict results & interpret facts
- References literature cited
- Seek professional expertise, depending on resource issues

Not Personal Values:
- Opinions based on relative worth
- Individual preference
- Never right or wrong
What’s in a Word?

Often

Usually

Frequently

Most of the time

Sometimes
Determine Measures of Change for Effects

- Measures/indicators must be:
  - Understandable
  - Quantifiable
  - Sensitive to change
  - Applied consistently for all alternatives

- Qualitative discussions may be necessary, if can’t quantify change
- Measures/indicators may exist in addition to those related to issues. E.g., regulatory or legal compliance
- Not acceptable to just say that “the action will have an impact”…must explain what the impact could be and the intensity of the impact.
Ways to Measure Change

(i.e. in USAID terms…specific indicators to show change)

- Magnitude
- Speed
- Likelihood
- Duration
- Extent

Linked to Cause & Effect Relationships
Examples of Measuring Effects

Example 1:
- Planting willows and grass along the Cat Creek stream bank on 20 acres would reduce sediment from current levels (existing conditions) by 2 percent after one year.

Example 2:
- Clearcutting 500 acres of pine stands in the Flat Creek watershed would reduce hiding cover for deer from 10,000 acres to 9,500 acres, a 5 percent reduction. Hiding cover would recover in 15-20 years.
Extent and Duration of Effects

- **Extent - Geographic** (Space)
  - Where the direct and indirect effects would occur

- **Duration - Temporal** (Time)
  - How long the direct and indirect would occur

- Varies by resource

- Determines the boundaries for analysis
Are There Any Effects of No Action?

- Nothing stays the same
- No Action does not necessarily mean “no impact”
- Describe the results if no action is taken. E.g.— soil erosion is currently occurring on a hillside. Without soil conservation it will continue to occur and possibly increase.
- Compare the impacts of the Proposed Action (and any other alternatives) with the No Action Alternative.
Schoolhouse Exercise

- Demonstration: Effects to sensitive plant habitat from
  - The Proposed Action
  - Alternative X
The agency shall include in the environmental impact statement:

1) A statement that such information is incomplete or unavailable.
2) A statement of the relevance of the information to evaluating impacts.
3) A summary of existing credible scientific evidence relevant to evaluating significant adverse effects.
4) The agency’s evaluation of such impacts based on theoretical approaches or research methods generally accepted in the scientific community.
Cumulative Effects

- Incremental impact of the proposed action/Alternative action, when added to impacts from other:
  - Past
  - Present
  - Reasonably foreseeable future project actions

Regardless of what agency or person undertakes such other actions.

- If a project action does not have a direct or indirect impact then it will not have a cumulative impact.
- Must identify the Analysis Area for Cumulative effects to properly focus the analysis.
- Cumulative effects must be evaluated for all action Alternatives.
- Cumulative effects are not a list of past, present, or foreseeable projects in the analysis area without an assessment of their impacts.

Proposed or Alternative action
+Past
+Present
+Future
Cumulative
Cumulative Effects
Overlap ...

In order to have cumulative effects, the effects must overlap in space and time.

**Project A**
Effect-1 Occurs
Years 1-3

**Project B**
Effect-1 Occurs
Years 2-5

Cumulative effects contribution because of space and time overlap.
Evaluation of Past Projects

Is the past action/event still contributing relevant effects?

No

Are the effects still changing? (beneficially or adversely)

No

Can effects be incrementally estimated?

No

Consider cataloging past actions and their effects

Yes

No need to consider this past action

Yes

Are the unchanging effects reversible?

No

Integrate past actions/events into baseline estimates

Yes

Group actions into a single estimate of effects with a recovery timeline

Yes

Can effects be incrementally estimated?

Consider cataloging past actions and their effects
Reasonably Foreseeable Scale

Must Consider  ?  Need not Consider

Planned  Likely Anticipated  Speculative Remote Hypothetical Unknown
What is NOT Reasonably Foreseeable?

- **Speculative** – Theoretical rather than demonstrable.
- **Remote** – Not arising from a primary or proximate action. Removed in time or space.
- **Hypothetical** – Depending on supposition (supposing)
- **Contingent on unknown factors or independent decisions** – decisions of others with limited history or predictability.
What is the Most Frequent Mistake in the Analysis of Cumulative Effects?

- “Cumulative impacts” are not the things that happen later or some distance from this proposal, such as downstream sedimentation five years from now.

- Those are called "indirect impacts," which NEPA also requires the agency to consider.
Next Step
Bounding the Effects in Time and Space

- As a general rule, the area of analysis for a specific effect should be expanded until the contribution of the proposed action or alternatives is no longer quantitatively or qualitatively meaningful.
Cumulative Effects Analysis Boundary

- **Location and Timing Overlap**

- **Water Quality Impacts**

![Diagram showing Watershed Boundary, Old Mine, Project X, I-15, and Future project Y]
Cumulative Effects Analysis Boundary

- Location and Timing Overlap
- Impacts to View-shed
Schoolhouse Exercise

- Demonstration: Cumulative effects
  - Review past, present, and reasonably foreseeable actions
  - The Proposed Action
  - Alternative X
Cumulative Effect
Fatal Flaws

- Ignoring cumulative effects
- Labeling indirect effects as cumulative effects
- Labeling long term effects as cumulative effects
- List past, present, reasonably foreseeable actions, without discussing their effects
- Failing to bound and explaining the bounds of analysis
## Table 2-16 Comparison of Alternative by Resource Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>Alternative 3</th>
<th>Alternative 4</th>
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<tbody>
<tr>
<td>Forest Vegetation</td>
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<td></td>
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</tr>
<tr>
<td>Composition and Structure</td>
<td>Acres reforested with PP, WL, and WP</td>
<td>Acres reforested with PP, WL, &amp; WP</td>
<td>Acres reforested with PP, WL, &amp; WP</td>
<td>Acres reforested with PP, WL, &amp; WP</td>
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<tr>
<td></td>
<td>Acres of dry forest structure restored to open conditions featuring large diameter ponderosa pine. (Acres in IC and GS/CT)</td>
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</tr>
<tr>
<td>Risk of stand-replacing fire</td>
<td>Reduction in risk</td>
<td>0</td>
<td>52%</td>
<td>40%</td>
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<tr>
<td></td>
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<td>Air Quality emissions (total tons)</td>
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<td>2460</td>
<td>2033</td>
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<tr>
<td>Risk of Root Disease on dry forests</td>
<td>Reduction in Risk</td>
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<td>35%</td>
<td>5%</td>
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<tr>
<td></td>
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<td>0</td>
<td>Reduction in Risk</td>
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Key Points

- Analyze affected resources
- Identify effects boundary (geographic) for impacts
- Analyze direct, indirect, and cumulative effects
- Provide evidence for conclusions
  - Context and intensity
  - Best science
- Analyze cumulative effects considering past, present and reasonably foreseeable actions
- Document consistency with CDCS & plans, laws and regulations