Phases in Scenario Planning

I. Preparing for the process

II. Building and refining scenarios

III. Using scenarios to evaluate, prioritize, and implement management actions
### Building Scenarios: Steps

1. Refine scope and focus question
2. Identify key external drivers
3. Assess and prioritize critical drivers
4. Explore and select scenario logics
5. Develop outlines of time evolution
6. Develop scenario narratives
7. Evaluate scenarios

**Building Scenarios: Steps**

- **5. Develop outlines of time evolution**
  - Beginning, middle, end
  - Legacy components (‘pre-determined’)
  - Surprise
Comparison of 3 Scenarios for JOTR

<table>
<thead>
<tr>
<th></th>
<th>Summer Soaker</th>
<th>When It Rains It Pours</th>
<th>Dune</th>
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<tbody>
<tr>
<td><strong>IPCC Emission Scenario</strong></td>
<td></td>
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<tr>
<td>Rate of CO₂ emissions</td>
<td>Slowest rate of increase</td>
<td>Increases moderately</td>
<td>Steepest rate of increase</td>
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<tr>
<td><strong>Temperature</strong></td>
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<tr>
<td>Increases</td>
<td></td>
<td>Increase</td>
<td>Increases</td>
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<tr>
<td><strong>Precipitation</strong></td>
<td>Decreases in winter and spring, increases in summer; little or no change overall</td>
<td>Increases in extremes (drought in summer, storms in winter); overall decrease</td>
<td>Decreases overall and seasonally</td>
</tr>
<tr>
<td><strong>Vegetation: non-native annual grasses</strong></td>
<td>Decrease in current community; potential new suite of invaders emerge</td>
<td>Increase</td>
<td></td>
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<tr>
<td><strong>Vegetation: native grasses</strong></td>
<td>Increase</td>
<td>Decrease</td>
<td>Decrease</td>
</tr>
<tr>
<td><strong>Vegetation: Joshua trees and other woody veg</strong></td>
<td>Decrease and move to higher elevations</td>
<td>Decrease</td>
<td>Decrease</td>
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<tr>
<td><strong>Fire regime</strong></td>
<td>Slightly more intense, modulated pattern</td>
<td>More intense, mainly after wet years</td>
<td>More intense initially, decrease over time as vegetation decreases</td>
</tr>
<tr>
<td><strong>Native animal species</strong></td>
<td>Decrease in Mojave species, increase in Sonoran species</td>
<td>Decrease</td>
<td>Decrease</td>
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**Current laws continue**

- No need to meet ESA, NEPA, Clean Water Act requirements
- No need to meet ESA, NEPA, Clean Water Act, monitoring requirements
- Development haphazard
- Broad connectivity threatened
- Ecosystems fragmented, vulnerable to invasives

**Environmental Laws**

- Consistent, but low
- Boom & bust

**Unfunded Mandates**

- Funding consistently limited

**Government Funding**

- Follow the Money

**Opportunity Knocks**

- Continued need to meet environmental mandates
- “Stimulus funding” rinse & repeat

**Rebels with Many Causes**

- No need to meet ESA, NEPA, Clean Water Act requirements
- Race to implement individual priorities

**Cienegas Upland System**

- Consistent, but low
- Boom & bust
- Environmental Laws
- Unfunded Mandates
- Government Funding
- Opportunity Knocks
- Rebels with Many Causes
Unfunded Mandates [CONSISTENT, LOW FUNDING – CURRENT LAWS] / Habooby Trap [HI SUMMER WINDS – DRY WINTER]

- **Climate factors:** Long-term drying and wind erosion.
- **2020:** Increased fire risk, grass mortality. Heterogeneous decrease in grass cover.
- **2050:** Conversion to shrub/scrub. Less connectivity, fuel load and fire risk. But, limited ability to recover or maintain ground cover.
- **2100:** Loss of soil productivity, large bare patches, scoured landscape
- **Challenge:** How to transition type conversion with minimal soil exposure, no matter the species, while meeting ESA obligations?

Follow the Money [CONSISTENT LOW FUNDING – LAWS ABOLISHED]/Tucson Good Ol' Days [EARLY MONSOON – DECREASE TROPICAL CYCLONES]

- **Climate factors:** precipitation favorable. Still, warming, seasonal shifts.
- **2020:** Regulation removal favors “land grabs”, speculation, economic priorities. Agriculture & exurban development increase haphazardly, facilitating bufflegrass spread.
- **2050:** groundwater stress due to development, mining projects. Recreational demands up. Bufflegrass dominant upland species.
- **2100:** Many threatened/endangered species gone.
- **Challenge:** How to ensure expanse of native vegetation under development pressures, absent regulations, even under a productive climate?
• **Climate factors**: severe pre-monsoon stress, extreme precipitation events
• **2020**: warmer drought produces grassland mortality, stress on ranching, funding infusions (similar to 1930s programs)
• **2050**: conversion to annual grasslands, lower diversity, pressure on landowners/ranchers, but without federal support. No funds to replace destroyed flood control structures.
• **2100**: continuous disturbance, erosion. Emphasis on protecting human structures and communities.
• **Challenge**: How can we use surge funding effectively to deal with continuous disruption and disturbance, including extreme events?

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6. **Develop scenario narratives**
   - All scenarios have “good” and “bad” parts
   - Characters
   - Plot lines: Winners/losers, Crisis/response, Generations (new cultures), Perpetual transition, others…
Images can be effective for story telling

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Criteria for Vetting Scenarios

What is a good scenario?

• Decision making power: relevant and challenging
• Plausible, with internal logical consistency
• Divergent
• Memorable

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<tr>
<td>Relevant</td>
<td>3.5</td>
<td>3.6</td>
<td>3.1</td>
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<tr>
<td>Creative</td>
<td>3.3</td>
<td>3.3</td>
<td>3.2</td>
</tr>
<tr>
<td>Legitimate</td>
<td>3.1</td>
<td>3.1</td>
<td>2.6</td>
</tr>
<tr>
<td>Credible</td>
<td>3.3</td>
<td>3.2</td>
<td>2.3</td>
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Develop scenario narratives

**Objective:** Create a compelling story for each scenario

• Important elements of a compelling story: actors, plots, time evolution, connect to values and focus
• Describe the management challenge, but not the response

Activity 7

• Newspapers and Novels