ECOSYSTEM SERVICES
ADAPTIVE MANAGEMENT
AND
LAND USE REGIMES

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OUTLINE

- Context
- Law’s role in AM of ES
- Starting points and assumptions
- The law and landscapes of land use regimes
- Categories of land use regimes
- Assessment of each category for AM of ES
- Conclusions
Context

- Ecosystem services framework gaining traction in policy (e.g., OMB directive)
  - Still far to go on measurement and valuation
- Adaptive management firmly embedded in policy
  - Still far to go in actual practice
- Adaptive management of ecosystem services sounds like a good idea
  - But how do we make it so?
EASY!

MAKE IT SO
OK, maybe not so easy...

- Managing for ecosystem services presents significant trade-off and scale issues
- Adaptive management requires controllability
- Law can stand in the way of both
  - *Legal systems mediate trade-offs*
  - *Legal systems limit or facilitate controllability*
- In particular, *land use regimes play* an important role when decisions must be made about how to manage human use of landscapes and ecosystems
The Law of Land Use Regimes

- Governing Substantive Authorities
  - *Public Lands*
    - Organic statutes (e.g., Forest Service)
    - Goal statutes (e.g., MUSY)
    - Planning statutes (e.g., National Forest Management Act; FLPMA)
  - *Private Lands*
    - Zoning
    - Private covenants
    - Nuisance law

- Procedural Requirements
  - *Plan Development* (e.g., National Forest LMPs; local comprehensive plans)
  - *Pre-decision Assessment* (e.g., NEPA, ESA)
  - *Public Participation* (e.g., notice and comment rulemaking: hearings)
The Landscape of Land Use Regimes

- Can be highly fractured, or contiguous, over large scales
- Distinct land use regimes often abut
- Patchwork of governing authorities at multiple scales
- Difficult to coordinate over large landscape scales

But, we have to play with the cards we’re dealt
Starting points, assumptions, and the question:

- We already do an excellent job of adaptively managing for provisioning services
  - Easy to measure and value
  - Markets and fees help allocate

- Many public and private land use disputes are about shifting the balance to enhance regulating services

- These disputes play out within a highly structured legal context

- ASSUMPTION: Goal is to rebalance towards regulating

- QUESTION: How will land use regimes facilitate or constrain that goal?
Categories and Assessment of Land Use Regimes

■ Regime Types
  - *Preservation*
  - *Dominant use*
  - *Multiple use*
  - *Developed*
  - *Engineered*

■ Assessment Factors
  - *Ecosystem Services*
    ■ How flexible in terms of managing for specific regulating services?
    ■ How must trade-offs be mediated?
  - *Adaptive Management*
    ■ How is decision making constrained?
  - *Strategy*
    ■ How to optimize for regulating services?
<table>
<thead>
<tr>
<th>PRESERVATION</th>
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</table>
| **EXAMPLES** | • Wilderness areas  
• Endangered species mitigation preserve  
• Land trust preserves |
| **FEATURES** | • Restore and maintain sustainable ecosystem  
• Historical reference point  
• Highly regulated in terms of limiting intervention and manipulation |
| **ECOSYSTEM SERVICES** | • Provisioning services usually not prioritized  
• All ecosystem services flow incidental to management for reference point |
| **ADAPTIVE MANAGEMENT** | • Useful for maintenance of reference point (e.g., control invasive species)  
• Cannot interfere with reference point |
| **STRATEGY** | • Use AM where appropriate to achieve reference point  
• Identify and publicize incidental regulating services benefitting offsite communities |
<table>
<thead>
<tr>
<th><strong>DOMINANT USE</strong></th>
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<tbody>
<tr>
<td><strong>EXAMPLES</strong></td>
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<tr>
<td>• Wildlife refuges</td>
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<td>• Land trust working landscapes</td>
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<td>• Croplands</td>
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<tr>
<td><strong>FEATURES</strong></td>
</tr>
<tr>
<td>• Maintain primary purpose</td>
</tr>
<tr>
<td>• Allow compatible secondary uses</td>
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<tr>
<td>• Highly regulated in terms of limiting interference with primary purpose</td>
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<tr>
<td>• Dominant use often has a strong and vocal constituency</td>
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<tr>
<td><strong>ECOSYSTEM SERVICES</strong></td>
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<tr>
<td>• Provisioning services often are prioritized</td>
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<tr>
<td>• All ecosystem services flow incidental to management for the primary purpose</td>
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<tr>
<td>• Management for regulating services as secondary use may be permitted</td>
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<tr>
<td><strong>ADAPTIVE MANAGEMENT</strong></td>
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<tr>
<td>• Useful for maintenance of primary purpose (e.g., game management; crop production)</td>
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<tr>
<td>• May be appropriate for secondary purposes</td>
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<td><strong>STRATEGY</strong></td>
</tr>
<tr>
<td>• Use AM where appropriate to achieve primary and secondary purposes</td>
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<tr>
<td>• Include and manage ecosystem services as secondary purpose if compatible</td>
</tr>
<tr>
<td>• Identify and publicize incidental regulating services benefitting offsite communities</td>
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# Multiple Use

## Examples
- National forests
- BLM lands
- Suburban parks

## Features
- Balance and distribute different specified uses
- Some uses may be incompatible
- Each use often has a strong and vocal constituency
- Extensive planning and process often required

## Ecosystem Services
- Provisioning and regulating services often within scope of different uses
- Managing for ecosystem services often within scope of governing authorities
- Trade-off and scale issues likely to be faced

## Adaptive Management
- Useful for maintenance of continual balancing of uses
- Most likely AM is within scope of governing authorities

## Strategy
- Use AM where appropriate to balance uses
- Use AM where appropriate to manage for ecosystem service goals
- Identify and publicize regulating services benefitting offsite communities
## DEVELOPED

### EXAMPLES
- Dense urban areas
- Industrial zones

### FEATURES
- Most surface area devoted to urban and industrial uses
- Small pockets of stressed “natural” areas may exist (urban parks, stormwater ponds)
- Land use decisions often highly contested

### ECOSYSTEM SERVICES
- Most ecosystem services severely depleted
- Almost no production of provisioning services
- Pocket areas may provide limited regulating services

### ADAPTIVE MANAGEMENT
- May be appropriate for managing complex land use system decisions
- Unlikely to have sufficient control over pocket areas
- Green infrastructure may present opportunities (see ENGINEERED)

### STRATEGY
- Pursue green infrastructure
- Identify and publicize regulating services benefitting the onsite communities
<table>
<thead>
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<tr>
<td><strong>EXAMPLES</strong></td>
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<tr>
<td>• Constructed beach dunes</td>
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<td>• Wetland mitigation bank</td>
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<tr>
<td>• Urban green infrastructure</td>
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<tr>
<td><strong>FEATURES</strong></td>
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<tr>
<td>• Extensive intervention to establish specific “ecosystem” state</td>
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<tr>
<td>• Highly regulated in terms of requiring intervention and manipulation</td>
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<tr>
<td>• Rising interest given climate change adaptation</td>
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<tr>
<td><strong>ECOSYSTEM SERVICES</strong></td>
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<tr>
<td>• Enhancing a specific regulating service often is the specific goal</td>
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<tr>
<td>• Other ecosystem services flow incidental to management for specific goal</td>
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<tr>
<td><strong>ADAPTIVE MANAGEMENT</strong></td>
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<tr>
<td>• Useful for establishing and maintaining the “ecosystem” state</td>
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<td>• Most likely within the scope of governing authorities</td>
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<tr>
<td><strong>STRATEGY</strong></td>
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<tr>
<td>• Use AM where appropriate to achieve specific engineered outcome</td>
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<tr>
<td>• Identify and publicize intended and incidental regulating services benefitting onsite and offsite communities</td>
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CONCLUSIONS

BOTTOM LINE: If you are interested in AM of ES to enhance regulating services and want to “make it so,” understand your land use regime

- How much intervention authority exists?
- What ecosystem services are expressly required to be managed?
- Which regulating services can be “slipped in” under governing authorities?
- What process must be satisfied, particularly for trade-off decisions
- Fill out the chart, then move on to politics, money, and all the other fun stuff