Module 12

Tradeoffs and goals for ecosystem management

This Module uses a simulated decision framework (an Intimate Debate) to engage people in choosing tradeoffs in catchment management

Be sure to customize this to your style

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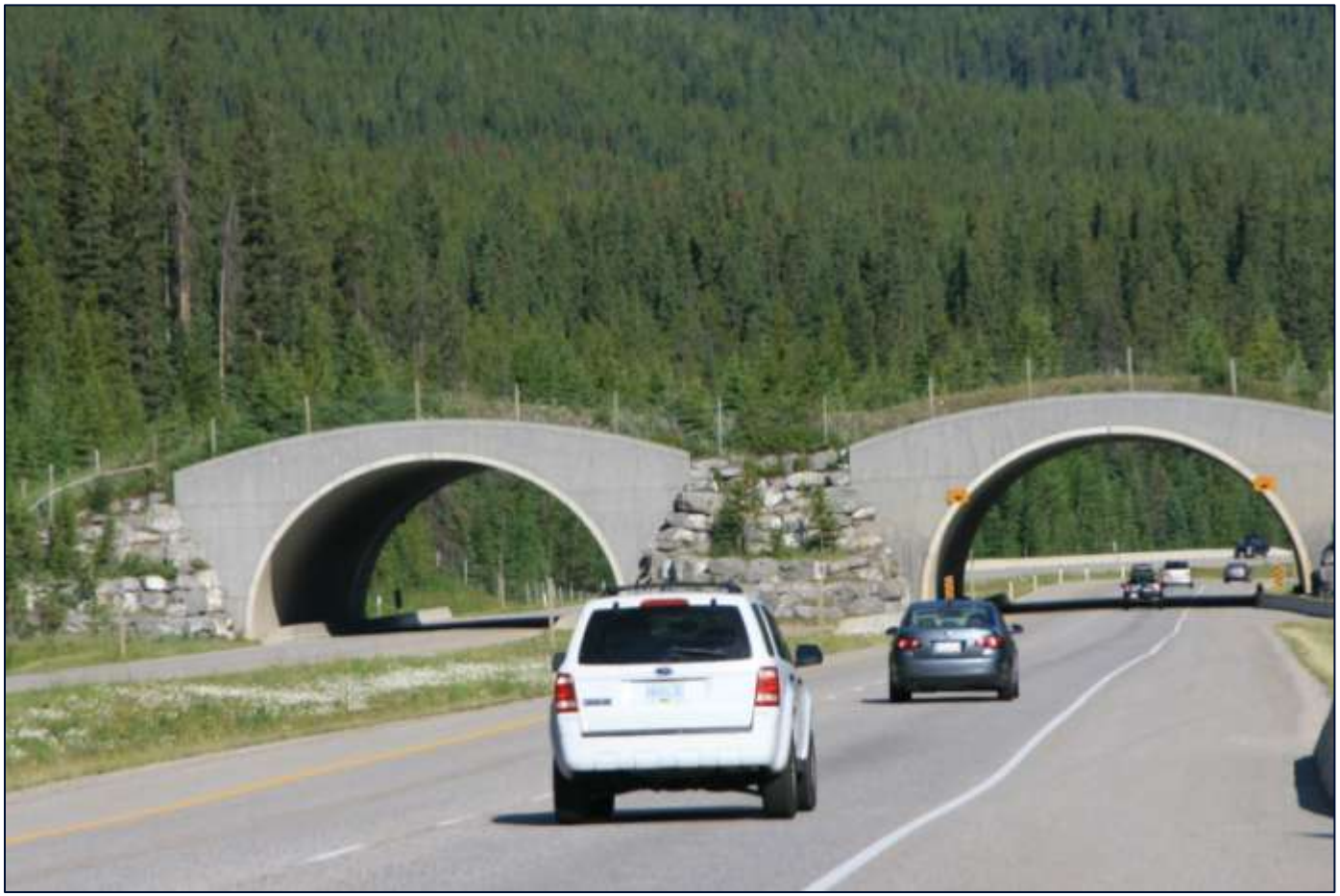


Introduction

- People are part of ecosystems, typically major drivers of impacts
- Range and level of ecosystem service benefits change as ecosystems move from intact to increasingly modified
- Level of service depends on use and management
- Urban footprint expresses impact of peri-urban zone; demand for ecosystem services goes beyond areas that benefit directly from those services

Terrestrial Ecosystem Modification

- At low impact, demand for food, water, shelter and resources may not cause detectable change
  - In those cases, human needs are met within ecosystem's resilience capacity

- Increasing human demand may lead to:
  - Levels of hunting that reduce or extinguish species
  - Land cleared or modified for agriculture, reducing biodiversity and ecosystem processes
  - Water harvest that compromises ecological functions



Ecosystem Modification

- Ecological services are taken for granted until impact and evidence cannot be ignored (e.g., resource decline or scarcity)
- Perceptions may develop slowly because declines are explained as variance (e.g., poor season); further masked by shifting baselines
- Water pricing is opportunity to change in water use

Degrees of Impact

Intact No detectable human impacts

Minor alienation Small areas cleared for crops, slash and burn, plots cycle; erosion and fires may result

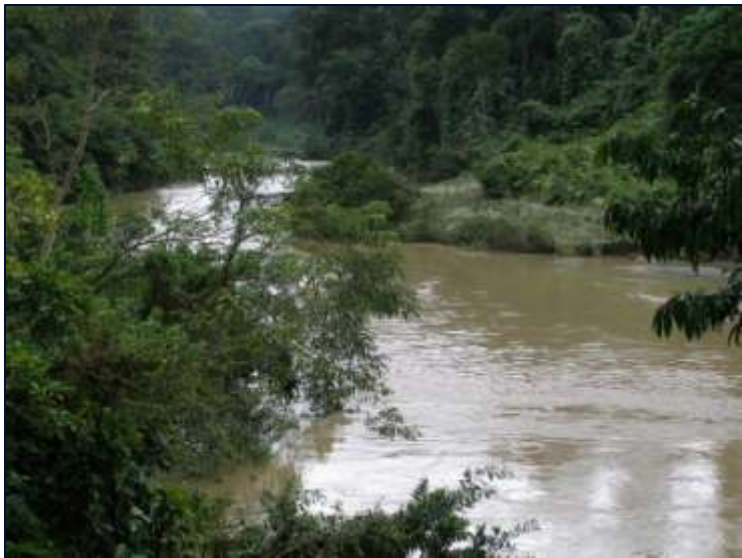
Moderate alienation Small-scale agriculture, hunting and gathering and limited residential population, significant proportion of habitat intact

Substantial alienation Industrial-scale agriculture with residential, commercial development and infrastructure corridors, patches of relict habitat; ecosystem service impacts may be partially offset by reserves, wildlife corridors and management

Gross alienation Large-scale land cleared, deliberate replacement of pre-existing ecological communities with development

Linkages

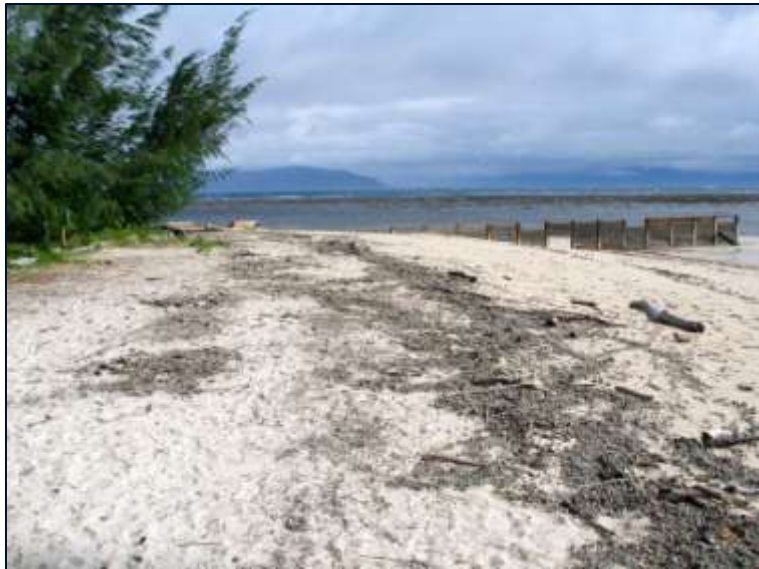
- Sequence of development of impacts is a gradient from intact to highly modified ecosystems
- In terrestrial ecosystems, linkages are unidirectional through flow of freshwater down catchments toward the sea
- Downstream ecosystems not directly impacted by human use may be impacted by upstream activities
- Upstream benefits may result in downstream costs



Marine Ecosystems

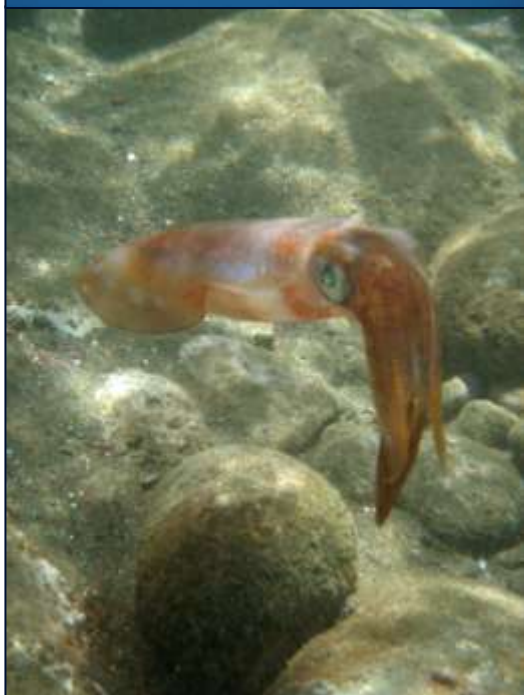
- Coastal ecosystems receive flows from catchments
- Complicated; flows in the seas are multi-directional and mixed by currents, tides and waves
- Coastal areas are important for food species
- Water frequency, duration, rate and quality critical to breeding success and larval survival
- Flows may be altered by land-use changes

- Water harvest may reduce flows to times when storage dams overflow, reducing breeding opportunities for coastal species



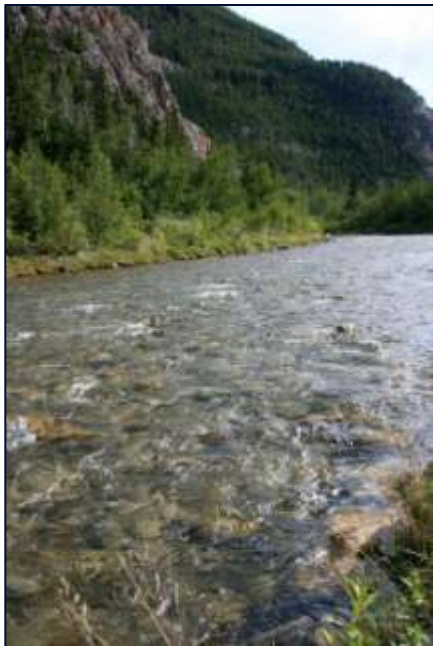
Marine Ecosystems

- In intact catchments, occasional recharge and gradual discharge of water from wetlands can maintain conditions
- Land cover may reduce overland flow:
  - Wetlands are productive areas often converted to agriculture
  - Land cover may increase rate but reduce duration in downstream, coastal plain wetlands, areas often converted to residential or industrial development
  - Habitat loss is compounded when slow flows that naturally occurred over weeks are compressed into hours or days of high flow; flows may carry nutrients beyond coastal nurseries



Marine Ecosystems

- In intact systems, freshwater flows carry sediment, gravel, minerals and nutrients, organic matter
- These materials drive productivity of estuarine and coastal marine ecosystems
- In altered systems, increased sediment, minerals, nutrients, organic matter, and chemicals can cause negative impacts
- Overloads may cause short-term to permanent changes

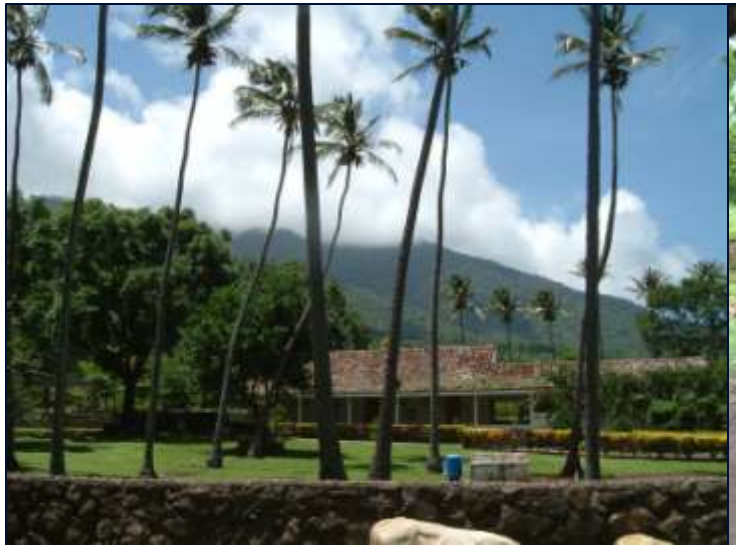


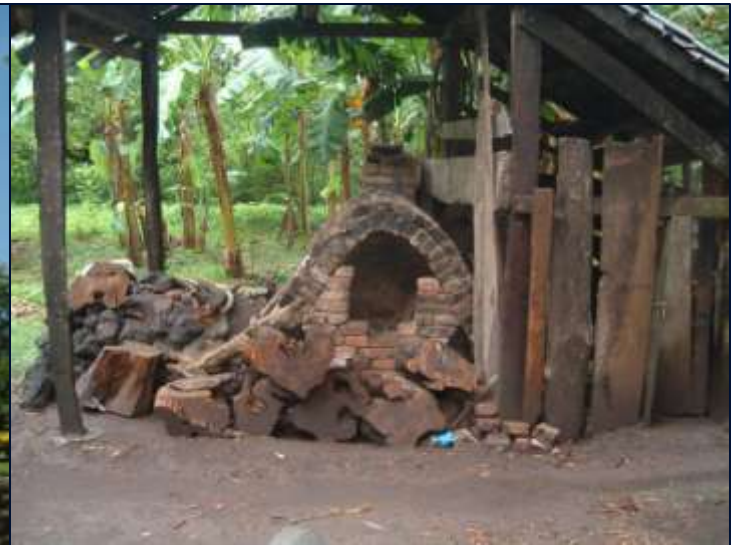
Exercise

- Coastal and shallow seas play major roles in providing ecosystem services and are impacted by upstream management
- Downstream waters always are impacted in some ways by upstream actions
- Two sets of groups: list ecosystem services empowered or constrained in downstream a) freshwater or b) marine systems (10 min)
- Return to plenary; compile and discuss. How much does that downstream influence affect upstream decisions? Is that generic among freshwater systems? Does it differ between freshwater and marine systems? (10 min)

Jurisdictions

- Upstream-downstream linkages may mean management involves addressing activities at more than one level (e.g., local, national, regional)
- Benefits to one community may result in costs to others





Planning for holistic management addresses

- Multiple, current and potential human uses and impacts
- Effective engagement of stakeholders
- Systematic process based on well publicized operational principles or decision rules
- Understanding best available science
- Establishing a multi-sectoral framework
- Identifying sectoral objectives, impacts, outlooks, and multi-sectoral interactions
- Establishing adaptive management regime
- Commitment to an adaptive cycle

Exercise

Each group is assigned 2 ecosystem services. Consider a holistic management context for your two services in your catchment. Tabulate goals, constraints, trade offs (20 min)

Service	Conflicts	Constraints	Opportunities	Goal Justification

Elect a spokesperson to present in plenary (15 min)

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What would make this Module most and least successful for you?

How would you customize it for your use?