Sustainable Forestry in the West: Past, Present, and Future

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Topics for Today

- Talk about **sustainable forestry** in **historical** context of forestry in western North America
- **Discuss** dramatic **transformation** and **paradigm** shift in forest management (reasons and consequences)
- Role of **C&I** and **forest certification**
- Describe a **case study** which has some characteristics of **sustainable forestry**
Shift in Management Philosophy

- **Agricultural Model**
  - **Utilitarian**
  - **Output** oriented
  - **Stand** organization
  - **Timber primacy** (sustained yield)
  - **Multiple use**

- **Ecosystem Model**
  - **Naturalistic**
  - **State** oriented
  - **Landscape** view
  - **Multi-resource** (sustainability)
  - **Integrated use**
Land Use Controls in West

- Historically a **zonal** approach
- **Production** vs. **protection** forests
- **Plantations** vs. **natural** forests
- **Commodity** vs. **preservation**
- **Exchange** value vs. **use** value
- **Active** (intentional) vs. **passive** management
Why a Paradigm Shift?

- Changing **societal values** of an **urbanizing population**
- Growing **influence** of the **science of ecology**
- **Global warming, biodiversity, tropical deforestation, restoration, habitat, endangered species, wildfire, clean water, and forest health**
Why a Paradigm Shift?

**Additional factors** –
- ecosystem **fragmentation**
- loss of habitat **connectivity**
- forest land **conversion**
- absence of adequate **woody debris** and **forest structures** in the managed forest
What Is Sustainability?

- To **manage** (both **passive** and **active**), and **use** the products and amenities of **managed** forests, **natural** wild lands, and **urban** and **suburban** environments so that they are maintained in a **productive** state over the **long term**
What Is Sustainability?

- A set of activities or processes that produce desired products and services over long periods of time.
- Rational approach that seeks a dynamic equilibrium.
- Uses interdisciplinary set of social, ecological and economic sciences in an integrated fashion.
- Future generations have the opportunity to enjoy the same products and amenities.
Sustainable Forestry

- **Sustainable forests** are the desired goal
- **Sustainable forestry** or **sustainable forest management** is the means to the desired end
Sustainable Forestry

- **Sustainable forestry** is the suite of forest policies, plans, and practices that seek to sustain a specified array of forest benefits in a particular place.

- **Sustainability** is a process and a goal, not a single end-point condition.

Sustainable Forestry

- A type of management that views the forest not as the source of any one economic product or service, but as an integrated whole.
- Respects the full range of environmental, social, and economic values of the forest and attempts to integrate these diverse values.

Source: Roundtable on Sustainable Forests
Sustainable Forestry

- Managing a forest to meet all existing regulations such that environmental, social and economic factors are balanced to meet the needs of the present without compromising the ability of future generations to meet their needs.
Sustainable Forestry Initiative

- A **land stewardship ethic** that **integrates** reforestation, growing, and harvesting trees for useful products while **conserving** soil, air, and water quality, wildlife and fish habitat and aesthetics, and **protecting**: a) the resource from fire, pests, and diseases and b) lands of **special** significance

Source: American Forest and Paper Association
Sustainable Forestry Initiative

- **Consider key values:**
  - biodiversity
  - habitat protection and enhancement
  - riparian/wetland protection
  - protection of productive capacity
  - protection of endangered plants and animals
  - protection of cultural, spiritual, and historical sites

Source: American Forest and Paper Association
Sustainable Forestry Initiative Standard Objectives

- Ensure long-term harvest levels based on the use of the best scientific information
- Ensure long-term forest productivity and conservation of forest resources through prompt reforestation, soil conservation, afforestation, and other measures
Sustainable Forestry Initiative
Standard Objectives

- Protect \textit{water quality} in streams, lakes, and other water bodies

- Manage the quality and distribution of \textit{wildlife habitats} and contribute to the \textit{conservation} of \textit{biological diversity} by developing and implementing stand- and landscape-level measures that promote \textit{habitat diversity} and the \textit{conservation} of forest plants and animals, including aquatic fauna
Sustainable Forestry Initiative
Standard Objectives

- Manage the **visual impact** of harvesting and other forest operations
- Manage lands that are **ecologically**, **geologically**, **historically**, or **culturally** important in a manner that recognizes their special qualities
- Promote the **efficient use** of forest resources
- Improve **forestry research**, **science**, and **technology**, upon which **sound** forest management **decisions** are based
Definitions convey that sustainability applies to many resources in addition to timber; considers the needs of future generations as well as those of the present; is concerned with ecological functions and condition; and is as much a social and economic as a bio-physical process.
Criteria and Indicators

- Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests (Montreal Process)
- USA signed in Feb. 1995 as the Santiago Declaration
Criteria and Indicators

- Santiago Declaration
  - Provides a common framework for describing, assessing and evaluating a country's progress toward sustainability at the national level
  - Manages forests at the ecosystem level
  - Provides information to decision-makers and the general public
Criteria and Indicators

- Conservation of biological diversity 9
- Maintenance of productive capacity of forest ecosystems 5
- Maintenance of forest ecosystem health and vitality 3
- Conservation and maintenance of soil & water resources 8
- Maintenance of forest contribution to global carbon cycles 3
- Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies 19
- Legal, institutional and economic framework for forest conservation and sustainable management 20
Green Forest Certification

- **Major** systems in **North America** –
  - Sustainable Forestry Initiative (SFI)
  - Forest Stewardship Council (FSC)
  - Canadian Standards Association (CSA)

- The **Program for the Endorsement of Forest Certification** (PEFC) is a global umbrella that recognizes **national** certification schemes
Green Forest Certification

- Promotes **responsible** forest management
- Increases **awareness** among public
- Incorporates elements of the international **C&I**
- Has a **world-wide** impact in both **tropical** and **temperate** regions
Sustainability Occurs at the Intersection

- Economics
- Social
- Ecological
Observations

- A balance of **ecological** and **economic** values in a **socially acceptable** fashion
- The use of proper science is absolutely **necessary** to find the proper **balance** but is by no means **sufficient**
Observations

- **Value preferences** expressed through the **economic**, **political**, and **legal** systems will largely determine the ultimate **balance**.

- Requires that we adopt an **integrated**, **holistic**, **adaptive** approach that simultaneously considers **utilitarian values** as well as **ecological** and **social values**.
Sustainable Forestry

- May **accomplish** this in several ways
Models of Sustainability

- Find best **economic** solution subject to **ecological** sustainability constraints
- Find best **ecological** solution subject to **economic** sustainability constraints
- **Jointly** optimize ecological and economic values (**tradeoffs**)
Observations

- The **challenge** to actually define and implement **sustainable forestry** is tremendous.

- It may be the greatest **challenge** for educators, natural resource managers, scientists, and policy makers at the start of this Century.
Case Study
Case Study Observations

- There are several examples of where we have **successfully** achieved adoption of a **sustainable forestry** program in **Washington**.
- Some may argue that the **HCP** for our WDNR lands coupled with **regulatory** forest practices is an example of such a program.
Case Study Observations

- Others might argue that forest lands certified under the FSC or SFI principles qualify as examples.
- Others would cite the lack of compliance with the seven indicators and 67 criteria of the Montreal Process to disqualify some of these examples.
Case Study Observations

- Case study involves the Washington State trust lands that are managed by the Washington State Department of Natural Resources.
- We consider the 1.4 million acres lying west of the crest of the Cascade Mountains in the DF region.
Key Statutes: Multiple Use

- Management and administration of state-owned lands under the jurisdiction of the WDNR to provide for **several uses simultaneously** (on a single tract and/or planned rotation) of **one or more uses on and between** specific portions of the total ownership
Key Statutes: Sustained Yield

- Management of the forest to provide harvesting on a **continuing basis** without major **prolonged curtailment or cessation** of harvest
Timber Harvest Policy

- The Department will manage state forest lands to produce a sustainable even flow harvest of timber subject to economic, environmental and regulatory considerations (Forest Resource Plan, 1992)
Sustained Yield (Timber Mgt.)

- **Two** historic interpretations:
  - Protection of *productive capacity*
  - *Continuous* and *relatively smooth* harvest of timber over time
Sustained Yield

- Classical model of sustained yield
  - Regulated forest is the goal
  - Harvest at age where average annual growth is maximized
  - Harvest oldest age classes first
  - Volumetric goal

Uneven-aged variant is to seek a balanced size class distribution using DeLiocourt’s ‘q’
Forest Planning Is Complex

- **Multiple** objectives and players (tradeoffs)
- Long **time** horizons, **variability**, and **uncertainty**
- **Hierarchical** in nature
  - **Strategic** (long term sustainability plans)
  - **Tactical** (landscape plans)
  - **Operational** (project plans)
- Challenging to **coordinate** levels of planning (time and space)
1996 UW study of alternatives for the HCP
Planning Scenarios

- **WDNR**: Uses 60+ year rotations; on/off base acre allocations as shown; no wildlife thins; no partial cuts in the 60-70 year old age classes; **even flow** harvest constraints; **no harvests** in riparian or wetland areas; **nondeclining** late seral conditions
Planning Scenarios

- **ALTS**: Uses 50+ year rotations; on/off base acre allocations as shown; wildlife thins; partial cuts in the 60-70 year old age classes; + 25% change in harvest from one decade to the next; **partial harvests** in **riparian** or **wetland** areas if on-base; **nondeclining** late seral conditions
# W. Washington Acreage Summary

<table>
<thead>
<tr>
<th></th>
<th>ALTS</th>
<th>DNR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>On Base</strong></td>
<td>1,178,154</td>
<td>1,035,586</td>
</tr>
<tr>
<td><strong>Off Base</strong></td>
<td>247,937</td>
<td>390,508</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,426,091</td>
<td>1,426,094</td>
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## Scenario Results

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Asset Values ($ Billion)</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DNR</td>
<td>ALTS</td>
</tr>
<tr>
<td>W Washington</td>
<td>7.505</td>
<td>9.799</td>
</tr>
<tr>
<td>North Puget</td>
<td>1.945</td>
<td>2.487</td>
</tr>
<tr>
<td>South Puget</td>
<td>0.85</td>
<td>1.091</td>
</tr>
<tr>
<td>Columbia</td>
<td>1.581</td>
<td>1.976</td>
</tr>
<tr>
<td>Straits</td>
<td>0.715</td>
<td>1.034</td>
</tr>
<tr>
<td>OESF</td>
<td>0.781</td>
<td>1.379</td>
</tr>
<tr>
<td>South Coast</td>
<td>1.416</td>
<td>1.746</td>
</tr>
<tr>
<td><strong>Six Unit Total</strong></td>
<td><strong>7.288</strong></td>
<td><strong>9.713</strong></td>
</tr>
</tbody>
</table>

% Difference: 3% to 1%
W Washington Timber Harvest
(DNR$7.5; ALTS$9.8)

Annual Harvest (MMBF)

Decade

0 500 1000 1500 2000
1 2 3 4 5 6 7 8 9 10

DNR
ALTS

DNR
ALTS
W Washington Old Forest Habitat

Decade
Acres ('000)

DNR
ALTS
Version Two

2004 WDNR study of alternatives for the Sustainable Harvest Calculation
Recap of the Six Alternatives

- **Alternative 1**
  - No Action Alternative: Current Operations

- **Alternative 2**
  - HCP intent

- **Alternative 3**
  - Combined Ownerships
Recap of the Six Alternatives

- **Alternative 4**
  - Passive Management Approach
- **Alternative 5**
  - Intensive Management Approach
- **Preferred Alternative**
  - Innovative Silvicultural Management
Key Outcomes

- **Gross & Net income** (timber harvest)
- **Variability of income**
- **Forest Structure and Older Forest-dependent species**
- **Implementation** considerations
Key Policy Choices for the BNR

- **Active vs. Passive**
- **Area to Manage**
- **Ownership Groups**
- **Harvest Flow Approach**
- **Old Growth Protection**
- **Volume vs. Value** Regulation
Key Policy Choices for the BNR

- Riparian Management
- Northern Spotted Owl Management
- Legacy and Reserve Tree
Stand Structure Distribution

2004

![Graph showing Stand Development Stages]

- Ecosystem Initiation
- Competitive Exclusion & Understory Development
- Structurally Complex Forest

Stand Development Stages

Percentage of Forest Base

0% 20% 40% 60% 80%
Stand Structure Distribution

2013

Ecosystem Initiation
Competitive Exclusion & Understory Development
Structurally Complex Forest

Alt.1
Alt.2
Alt.3
Alt.4
Alt.5
PA
2004

Stand Structure Distribution
Stand Structure Distribution

2067

- Ecosystem Initiation
- Competitive Exclusion & Understory Development
- Structurally Complex Forest

Alt.1, Alt.2, Alt.3, Alt.4, Alt.5, PA, 2004
Timber Harvest Potential (MMBF/year)
Harvest Area (acres/year)

Average Harvest Area (acres per year)

Decades

Alt.1  Alt.2  Alt.3  Alt.4  Alt.5  PA
Proposed Timber Harvest Level

Proposed Timber Harvest Level (PF)

Decade One

Annual Timber Harvest (MMBF)

Decade One

FY05 FY06 FY07 FY08 FY09 FY10 FY11 FY12 FY13 FY14
Harvest Type (area/year)
Percent of Harvest Volume by Wood Type

- Hardwood dominated forest type
- Softwood dominated forest type
Summary Points

Revenue Generation

• Less constrained flow control provides significant opportunities for active management

• Ownership group policy needs further discussion and a focus on individual trust objectives

• Harvest regulated by value, and economically determined rotations in non-habitat areas provide greater returns

Conservation Benefits

• Longer rotations benefit more complex structures

• Active management has to be the “right type” of silviculture to accelerate the development of complex stand structures

• Passive management appears to be an option for developing complex forest structures, albeit a risky and expensive one ($106 vs. $208 million in gross revenues between Alts. 1 and 6)
The End