Foundations of Forest Sustainability

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Issues to contemplate (after Floyd):

- Concept of sustainability has evolved over thousands of generations
- Historically, forest protection, food production, population growth and development are inextricably linked
- More recently, global climate change, search for new sources of energy (fossil and renewable bio sources), and population growth have arisen
Natural Resources & Forest Sustainability

- **Issues** to consider (after Floyd):
  - The things we **want** from our forests change over time: place of **worship** - **solitude** – source of **food**, **fiber**, and **fuel** – **recreation** - **biodiversity** – global **climate** mitigation – spans over 5,000 years of human history
  - Many things we want from forests are **mutually exclusive** at the **local** level
  - In **developing** countries, forests are **converted** to **agriculture** and **grazing** to support larger human populations
Issues to consider (after Floyd):

- In developed countries forest issues involve enhancing biodiversity, protecting natural forests, and making our forests as resilient as possible in the face of climate change
- In developed countries, population growth is slowing, food is produced on fewer acres and forest area is expanding
In developed countries a big issue is how to balance intensive forest management (plantations) on some lands and protect sensitive natural forests elsewhere.

Trade offs exist between:

- Forest plantations
- Working forests
- Protected forests
### Shifting Management Philosophy

<table>
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<tr>
<th>19-20&lt;sup&gt;th&lt;/sup&gt; Centuries</th>
<th>21&lt;sup&gt;st&lt;/sup&gt; Century</th>
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<tr>
<td><strong>Agricultural Model</strong></td>
<td><strong>Ecosystem Model</strong></td>
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<td><strong>Utilitarian</strong></td>
<td><strong>Eco-centric</strong></td>
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<td><strong>Output oriented</strong></td>
<td><strong>State oriented</strong></td>
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<td><strong>Forest productivity</strong></td>
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<td><strong>Stand level</strong></td>
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<td><strong>Timber primacy</strong></td>
<td><strong>Multi-resource</strong></td>
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<td>(sustained yield)</td>
<td>(sustainability)</td>
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<td><strong>Multiple use &amp; carrying capacity</strong></td>
<td><strong>Integrated use</strong></td>
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Why a Paradigm Shift?

- Changing **societal values** of a **growing, affluent, and urbanized population**
- Growing **awareness** of the **ecological and environmental** implications of **climate change** and **globalization of trade and business**
- Living beyond the **ecological limitations** of our **natural systems**
Why a Paradigm Shift?

- Growing concern over loss of biodiversity in managed forests, fragmentation, invasive and endangered species, wildfire, clean water/air, recreation and forest health.
Combined, these influences have had a **significant impact** on the way we **view** our forest resources and how society expects them to be **treated** in the **future**

- Creates **opportunities** for new thinking and approaches
In USA, the evolution of conservation and sustainability began over 150 years ago with the Conservation Movement (Marsh, Hough, Fernow, Pinchot, T. Roosevelt). Preceded by Penn and Jefferson who tried to balance material use of forests with a more romantic concept where unspoiled forest virtues were stressed.

Environmentalism was also prevalent with Emerson, Thoreau, Muir, Leopold and then later with Carson, Nelson (Earth Day) and UNCED (Rio 1992)
The UN established **IPF** (1995-97); **IFF** (1997-2000); **UNFF** (2000) to build political commitment for **SFM**

2011 was the UN’s **International Year of Forests**

The **evolution** of the **conservation** and **environmental pathways** have created the **sustainability** movement or revolution
Context of Sustainability

- **Characteristics** include (after Edwards, The Sustainability Revolution p.7)
  - Concern for **environment**, **economy** and social **equity**
  - Knowledge of **limits** of Earth’s ecosystems and detrimental impact of **unchecked** human activities
  - Long-term, **intergenerational** perspective in actions and goals
  - Understanding our **dependence** on **health** of natural systems
Defining Sustainability

- Economics
- Social Equity
- Ecological
To Be Sustainable

- In the long run: resource consumption cannot exceed resource production.
- Sustainability is related to concept of carrying capacity for wildlife populations – what population level to sustain without damaging the productive capacity of the resource into the future.
- We need to consider our choices so that future generations will have options to use natural resources to best meet their needs.
What Is Sustainability?

- A set of activities or processes that produce desired products and services over long periods of time (i.e., to sustain is to endure)
- Rational approach that seeks a dynamic equilibrium. Seeks to balance economic goals and ecological health in a socially acceptable manner
- 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
Sustainability -- an alternative to the Industrial Revolution -- that supports economic viability and healthy ecosystems by modifying consumption patterns and implementing a more equitable social framework.

Source: Edwards, The Sustainability Revolution, p.3
Sustainability

- Sustainability applies to all resources; considers the needs of future generations as well as those of the present; is concerned with ecological functions and conditions; and is as much a social and economic as an ecological process.
Sustainability

- A **goal** and not a specific endpoint
- A **direction** (i.e., a **pathway**) in conservation and forestry reflecting an **evolution** in **societal** perspectives and **scientific** knowledge

Source: Lindenmayer and Franklin, Towards Forest Sustainability, 2003
**Conservation**

- **Conservation**
  - Definition: to **protect** from **loss** or **waste**
  - The careful **management** (or **stewardship**) of the **environment** and of **natural resources**
  - **Sustainability**, **conservation**, and **stewardship** all imply the **wise use** of **natural resources**
  - A **means** to achieving **sustainability**; to **endure** or **maintain**
Living Sustainably

- Requires that we meet the needs of the present without compromising the ability of future generations to meet their own needs

Source: Our Common Future, World Commission on Development and Environment, 1987
Sustainable Forestry

- 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
Achieving Sustainability

- Complex undertaking
- Many stakeholders
- Multiple and conflicting goals (trade offs)
- Uncertainty
  - future societal needs
    - future state of ecosystem and unknown environmental factors
    - lack of complete understanding of ecosystem behavior and reaction to natural or man caused perturbations
Achieving Sustainability

- 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 all values and stakeholders.
Context of Sustainability

- Natural resource managers have a long tradition based on the concepts of sustainable resource use, stewardship, conservation, protection, and carrying capacity.
- Sustainable resource use has largely been synonymous with maximum biological sustained yield (agricultural model).
Few concepts have received more attention in natural resource management than that of sustained yield and carrying capacity.

The basic idea is that existing stocks of renewable natural resources should be managed to guarantee that rates of replenishment (reproduction and growth) are in balance with rates of removal (harvest).
Multiple Use

- Historically used as a policy instrument for rationalizing uses across a landscape
- Is largely normative and not prescriptive
- Too closely identified with forest outputs instead of desired future states. Multiple use must be modified to meet the changing demands of society.
- A new paradigm that extends our traditional reliance on multiple outputs is needed. Sustainability offers this promise.
The End