

Ecosystem Services in Forests: Concepts and Applications

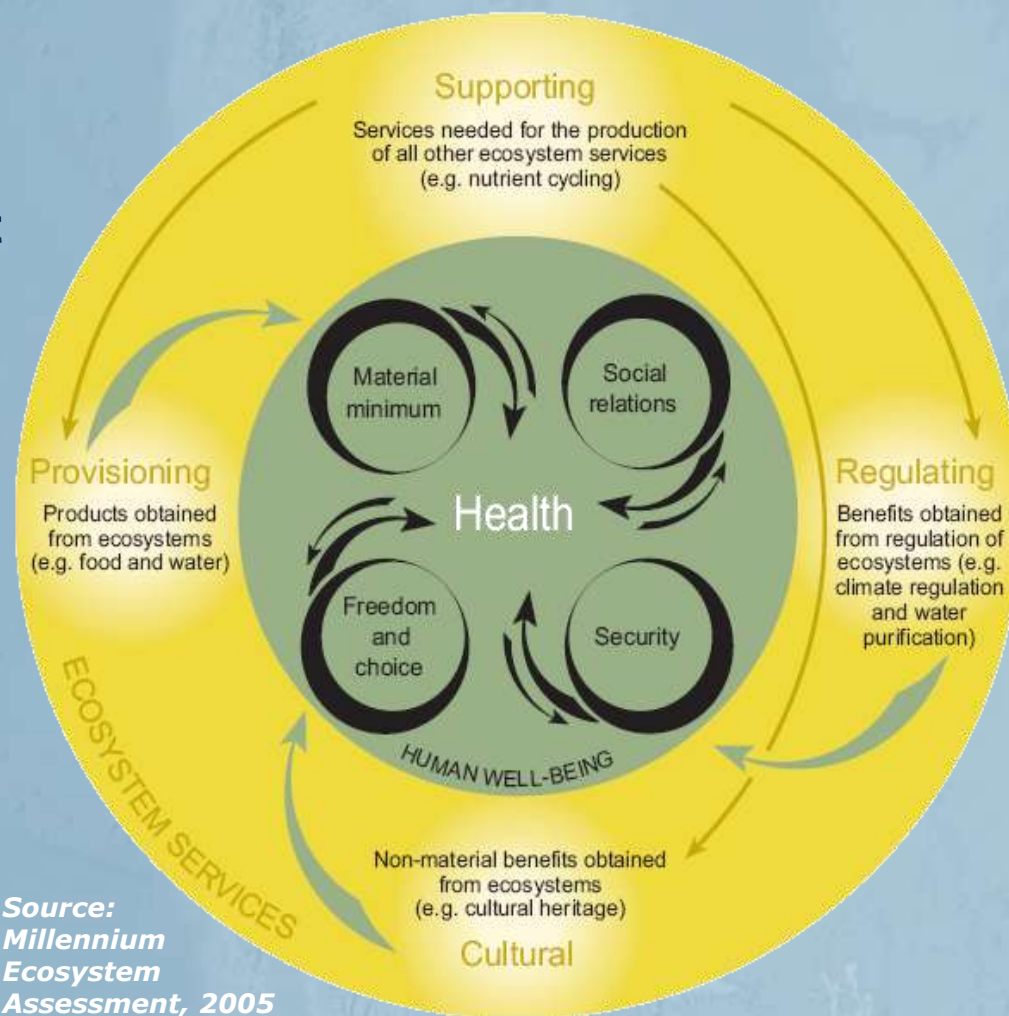
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Matt Weber
Ecotrust
Portland, Oregon
mweber@ecotrust.org



Ecosystem Services

- Many ecosystem services are “Public Goods”
- Public goods are underprovided by the market
- E.S. Typology emerging
- Focus: Human Health and Well-Being



Source:
Millennium
Ecosystem
Assessment, 2005

Ecosystem Services in Forests

- **Timber**
- **Scenic value**
- **Recreation**
- **Biodiversity – salmon**
- **Non-use values**
- **Water quantity, water quality**
- **Climate regulation**
- **Food**
- **Artisan materials**



Ecotrust Examples

- **Ecotrust Forestry Program**
 - Conservation vs. Industrial Forestry
 - Whole Watershed Restoration Initiative
- **Ecotrust Consulting**
 - Forest Growth & Yield Modeling
 - Balancing timber & other ecosystem service values
- **Ecotrust Forests LLC**
- **Western Climate Initiative**



Source: Binkley et al. 2006

Environmental Property Rights

- **Who owns the environment?**
 - Property rights structure affects environmental outcome and who pays
- **Willingness-To-Pay framework implies the public does not have a right to a positive environmental change**
- **Willingness-To-Pay vs. Willingness-To-Accept**
 - Income effect, non-substitutable resources drive \$ difference
 - Systematic disadvantage for low-income groups
- **Potential Pareto Improvements vs. Distributional Equity**
- **Economics for Equity and the Environment**
 - www.e3network.org

Carbon Market

- **Regulatory Market**

- European Union Emission Trading System
- Kyoto Protocol: Clean Development Mechanism; Joint Implementation
- California Climate Action Registry
- Western Climate Initiative

- **Voluntary Market**

- Chicago Climate Exchange
- Voluntary Carbon Standard
- Gold Standard
- Community Climate and Biodiversity Alliance

- **Issues**

- Additionality, Permanence, Leakage
- Rigor vs. Barriers to Entry
- Transparency, information sharing



Source: CCX, 2008

LCA Research Potential

- **LCA of biomass energy**
 - Alternative to fossil fuel energy
 - Emissions associated with production, harvest, transport, combustion
- **LCA of wood products**
 - Carbon storage in long-lived wood products
 - Emissions associated with harvest, transport, manufacturing, disposal
- **Incorporating LCA into LEED Green Building guidelines**
 - Ecosystem service impacts, embodied energy & embodied emissions of substitute materials
- **LCA of forest carbon storage**
 - Carbon emissions Additionality, Permanence, Leakage
 - Impact on other ecosystem services
- **Ecotrust question: What are the net impacts of longer rotation forestry?**
 - Regional differences in tree growth
 - Growth rates for different forest cohorts