

Session 3: Environmental Co-effects of GHG Mitigation: The Ecosystem Services View

Ralph Alig
Brian Murray,
session
coordinators



USDA Forest Service
Pacific Northwest Research Station
and
Duke University

GHG Context

1. Policy makers need info on effects of both GHG and non-GHG benefits, e.g., soil erosion, water quality, biodiversity
2. Benefits and costs framework for evaluating effects of GHG policies and management;
3. Incentives for society to invest in environmental protection and enhancement, e.g., 2007 Farm Bill in U.S.; and
4. Monitor changes in ecosystem services, such as those associated with expansion of biofuels production area) (thanks to Jeff Kline, USDA Forest Service, PNW, for some of the slides)

Challenges in applying ecosystem services concept

1. Defining a typology of ecosystem services;
2. Describing and measuring ecosystem services outputs;
3. Describing and measuring ecosystem services values.

Perspectives on “value”

Economic

Values *to people* arise from presence of ecosystem service in utility function either directly, or indirectly as inputs in the production of final goods and services.

Socio-cultural

Values *to people* arise from less tangible factors; e.g., equity, and intra- and inter-generational distribution.

Ecological

Values arise from degree to which service contributes to ecological objective or ecosystem condition.

Perspectives on “value” *continued*

Biological

Values arise from degree to which service contributes to the survival of individual species.

Biophysical

Values arise from direct and indirect inputs and outputs of mass and energy among ecosystem components.

Daily's typology

Purification of air and water
Mitigation of floods and droughts
Detoxification and decomposition of wastes
Generation and renewal of soil fertility
Pollination of crops and natural vegetation
Dispersal of seeds and translocation of nutrients
Maintenance of biodiversity
Protection from ultraviolet rays
Partial stabilization of climate
Moderation of temperature, winds, and waves
Support for diverse human cultures
Providing aesthetic beauty and intellectual stimulation

From: Daily, G.D. 1997. Nature's services. Washington, DC: Island Press.

Millennium Ecosystem Assessment examples

Provisioning: Food, fiber, fuel, genetic resources, fresh water, biochemicals, ornamental resources.

Regulating: Air quality regulation, climate regulation, erosion regulation, water purification, natural hazard mitigation, pollination.


Cultural: Cultural diversity, spiritual/religious values, knowledge systems, educational values, inspiration, aesthetic values, recreation.

Supporting: Soil formation, photosynthesis, primary production, nutrient cycling, water cycling.

From: Millennium Ecosystem Assessment. 2005. Ecosystems and human well-being: synthesis. Washington, DC: Island Press.

Boyd and Banzhaf's typology example

Human Benefit	End Service	Intermediate Service
Angling	Water body Fish population Riparian forest	Water body quality
Drinking water	Water body quality	Wetlands Riparian forest



From: Boyd, J. and S. Banzhaf. 2006. What are ecosystem services?
RFF-DP-06-02. Washington, DC: Resources for the Future.

Examples of Past Discussions at Earlier Fora

- Bruce McCarl—co-effects from land use allocation and management
- Andrew Plantinga—coeffects of tree planting for carbon sequestration goals
- Cathy Kling—Upper Mississippi River study, e.g., water quality
- Bottomland Hardwoods session at last forum; water quality improvement from expanded tree planting

4th Modeling Forum

- Panel Discussion: Rich Woodward and Pascal Badiou
- Group Discussion

Questions for panel to address

- (1) How are environmental services being incorporated into models? Into policy decisions?
- (2) Can GHG emissions be usefully addressed by framing emissions reductions and sequestration as ancillary environmental services incentivized by market or governmental policies or actions?
- (3) Anticipated policy actions in US (e.g., Farm Bill 2007) and Canadian policy processes.

Richard Woodward, Texas A&M Univ.

- “Potential for Bundling and Trading Ecosystem Services, Including Climate Benefits and Comparison to Water Quality Service Trading”

Pascal Badiou,
Ducks Unlimited, Canada

- “Wetlands, Carbon and Ag Landscapes”
- Canada's agriculture and agri-food sector's new Agricultural Policy Framework