

# A perspective on forest stream ecosystem services

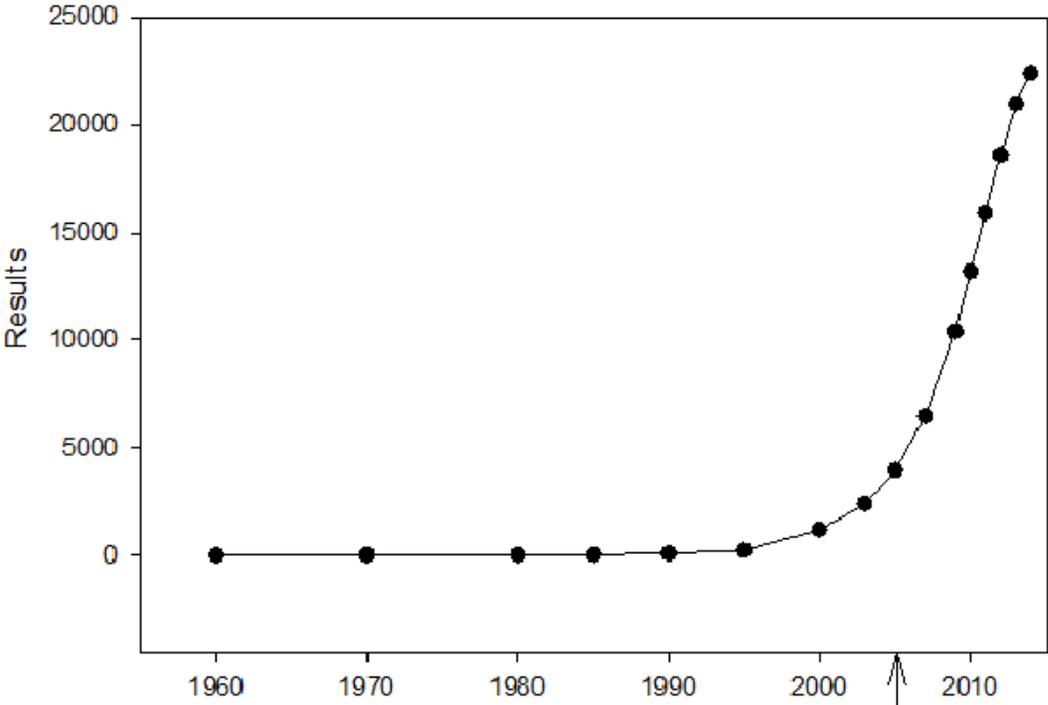
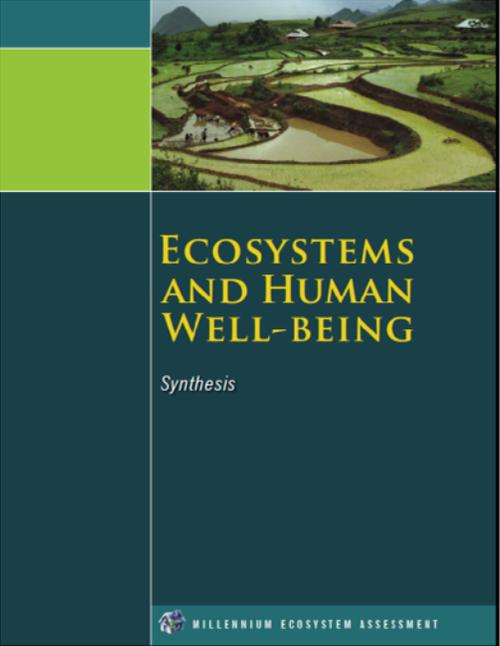
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*Disclaimer: These are my views, not EPA's*

There are subtle variations in the definition of ES

- The benefits people obtain from ecosystems (MEA, USFS 2012 planning rule).
- The benefits provided by ecosystems that contribute to making human life both possible and worth living (UKNEA).
- The outputs of natural ecosystems that are directly enjoyed, consumed, or used to yield human wellbeing (EPA).
- Theme: value defined in the context of human welfare

# Google Scholar results for "ecosystem services"



Millenium Ecosystem Assessment published

Conclusion of multiple review papers:

Practical application of ES approach into local/regional decision-making lags way behind academic and theoretical ES research

## The White House Memo may raise the stakes



October 7, 2015

M-16-01

### MEMORANDUM FOR EXECUTIVE DEPARTMENTS AND AGENCIES

**FROM:** Shaun Donovan, Director  
Office of Management and Budget  
Christina Goldfuss, Managing Director  
Council on Environmental Quality  
John Holdren, Director  
Office of Science and Technology Policy

**SUBJECT:** Incorporating Ecosystem Services into Federal Decision Making

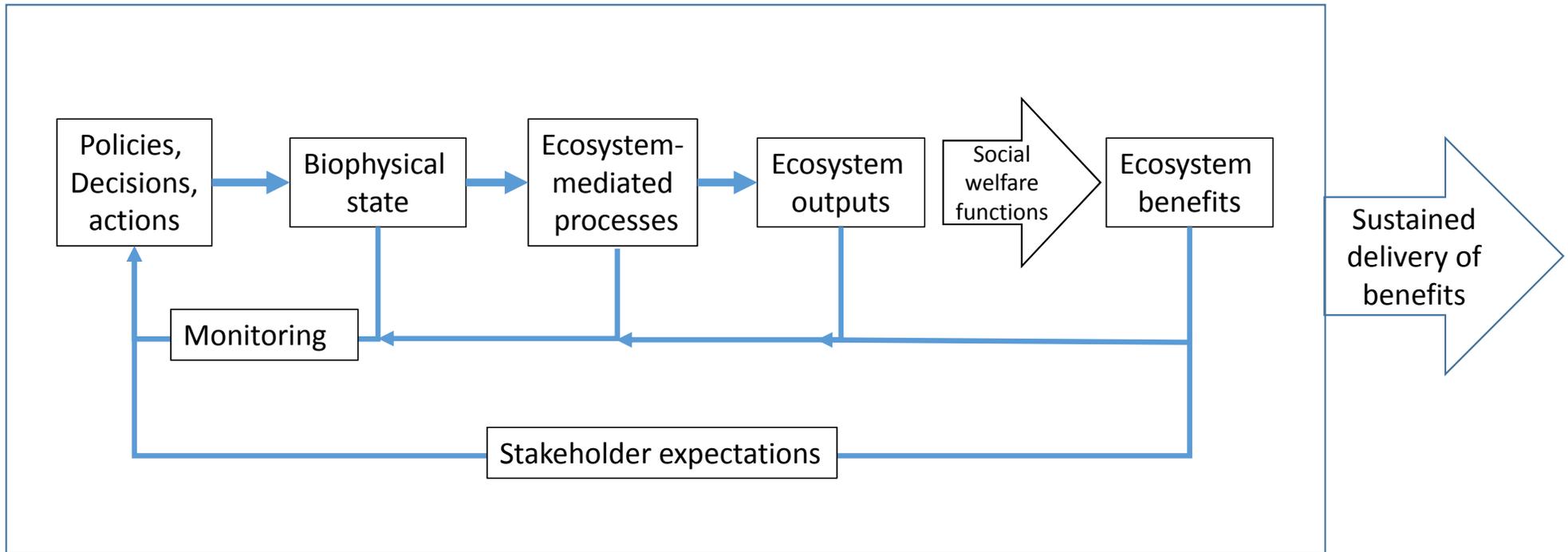
**Overview.** Nature provides vital contributions to economic and social well-being that are often not traded in markets or fully considered in decisions. This memorandum provides direction to agencies on incorporating ecosystem services into Federal planning and decision making. (Broadly defined, ecosystem services are the benefits that flow from nature to people, e.g., nature's contributions to the production of food and timber; life-support processes, such as water purification and coastal protection; and life-fulfilling benefits, such as places to recreate.)

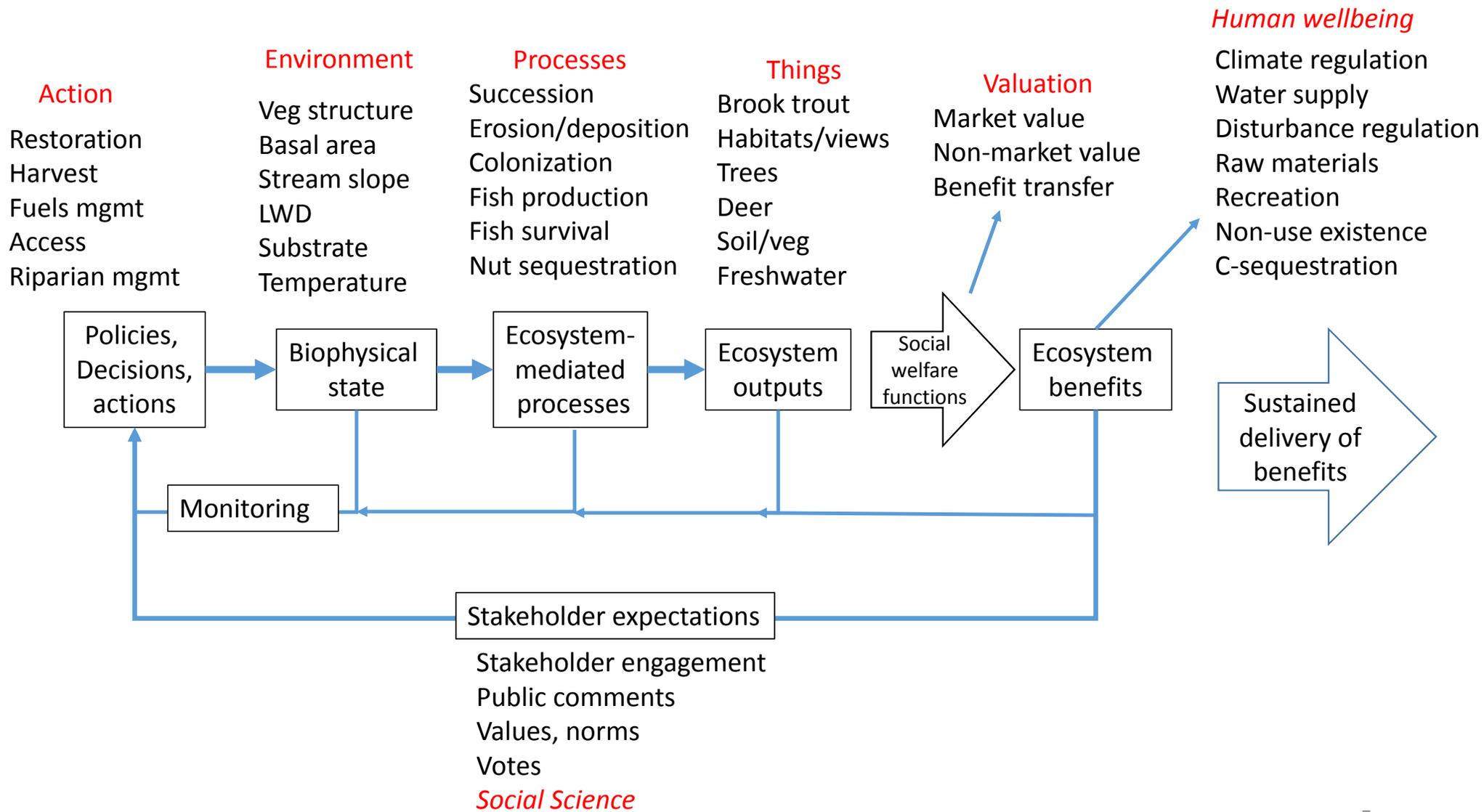
Specifically, this memorandum:

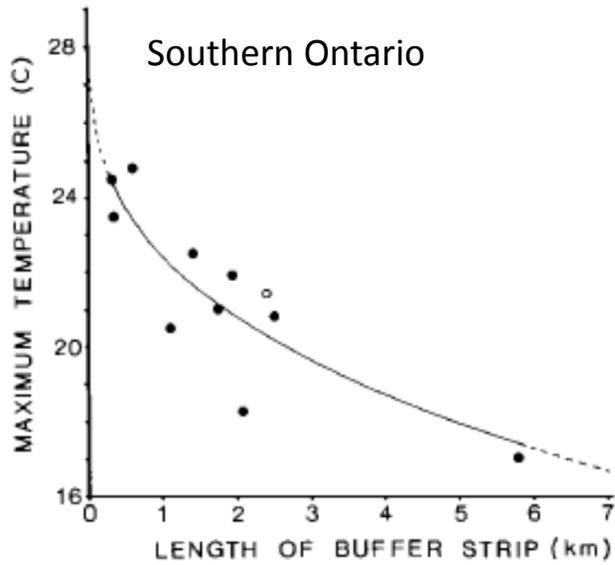
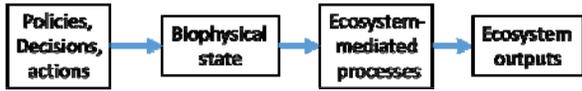
- (1) Directs agencies to develop and institutionalize policies to promote consideration of ecosystem services, where appropriate and practicable, in planning, investments, and regulatory contexts. (Consideration of ecosystem services may be accomplished through a

*Directive: Agencies shall develop policies to promote consideration of ecosystem-services assessments within existing planning and decision frameworks...*

Simple conceptual framework for local decision-making in ES context



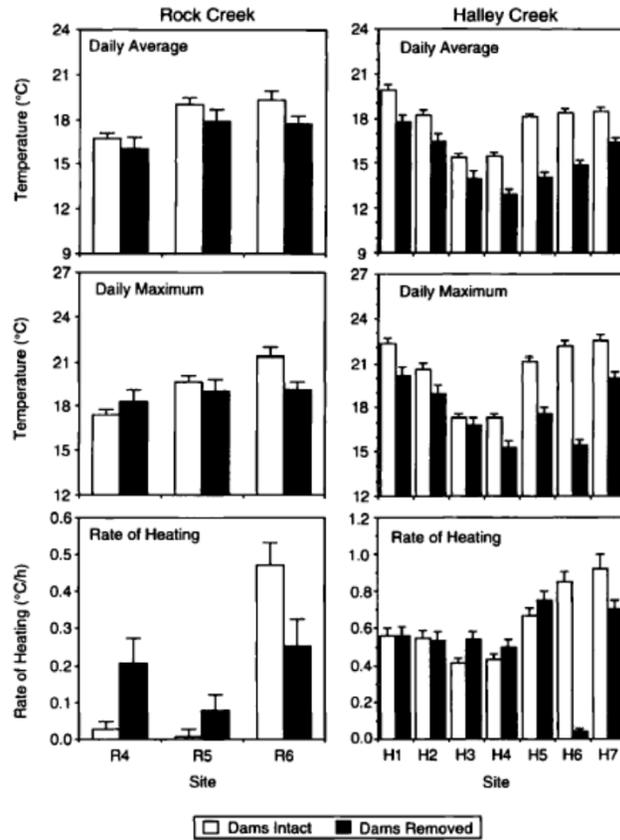




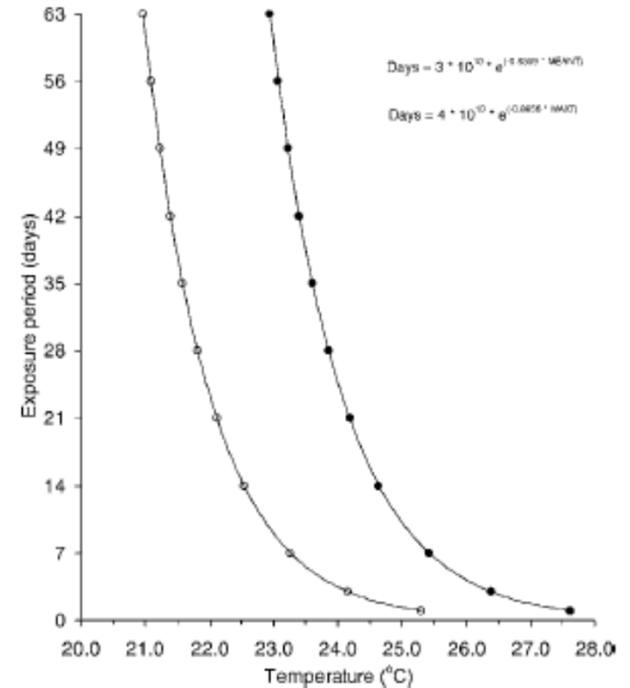
**Figure 7. Relationship between length of buffer strip and weekly maximum temperature for streams located within buffer strips.**

Barton et al. 1985

### Northern Wisconsin



### Wisconsin and Michigan



**Thermal tolerance of trout**  
Wehrly et al. 2007

### Effect of beaver dam removal on stream temperature

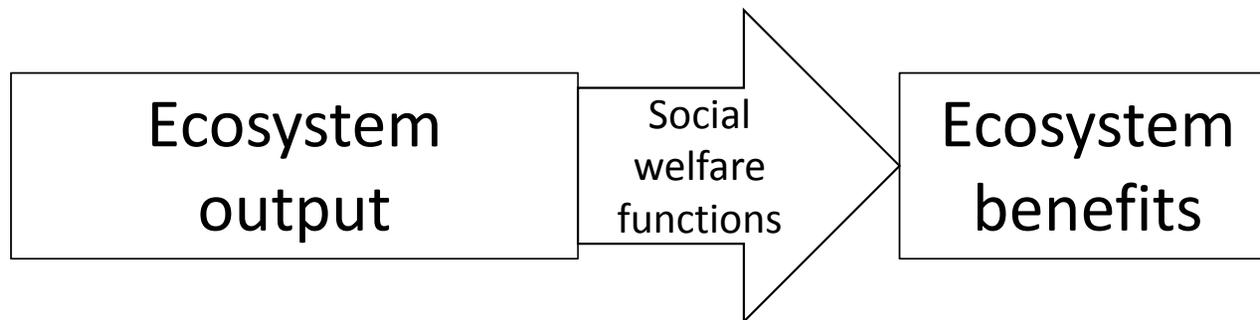
McRae and Edwards 1994

The social welfare function: The relationships for translating the perceived, quality, scarcity and or substitutability of an ecosystem output into benefit metrics rendering (at least some) of them comparable.

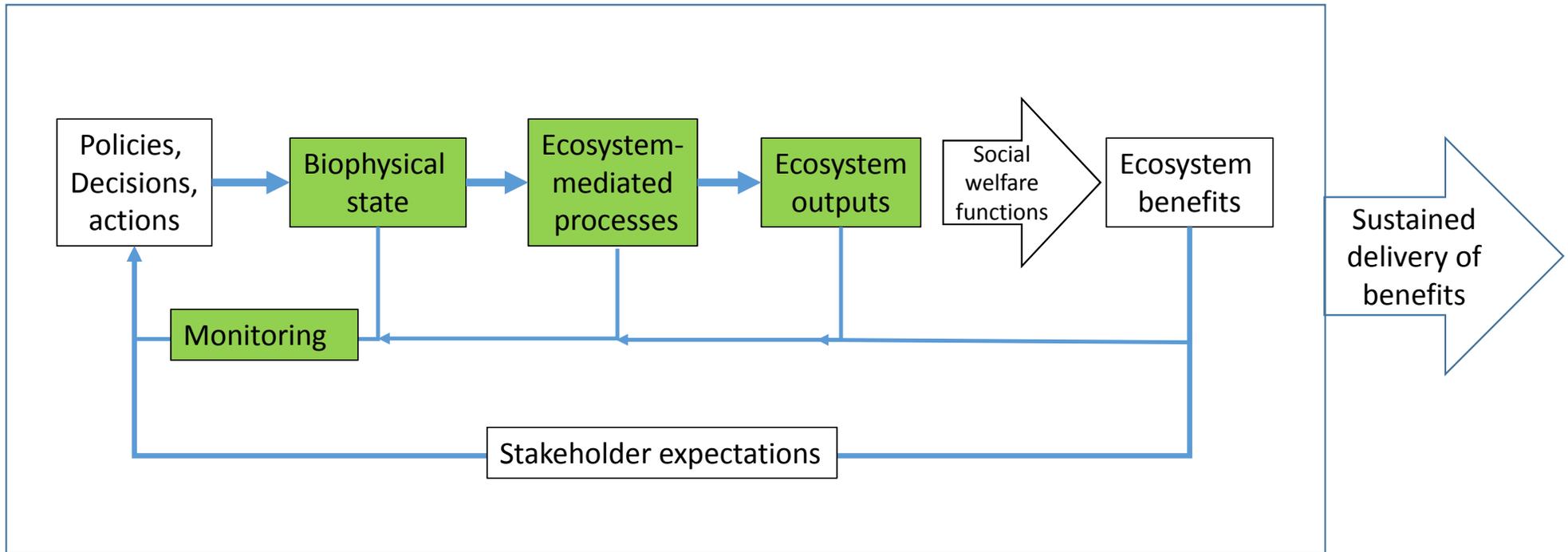
Brook trout biomass  
Sawlogs  
Wilderness  
Clean water  
Baby owls

Contingent valuation  
Commodity price  
Economic impact  
Treatment cost  
?

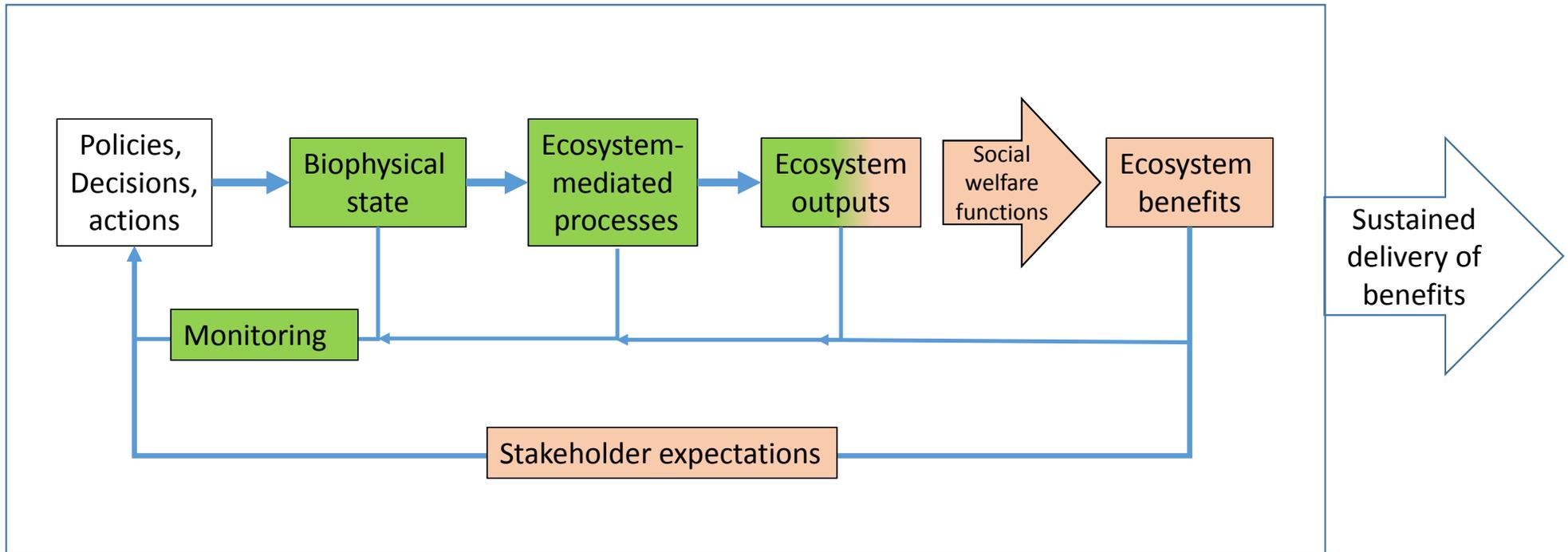
Recreational fishing days  
Raw materials \$/acre  
Local economic benefit \$/acre  
Avoided cost  
Priceless (cultural non-use)



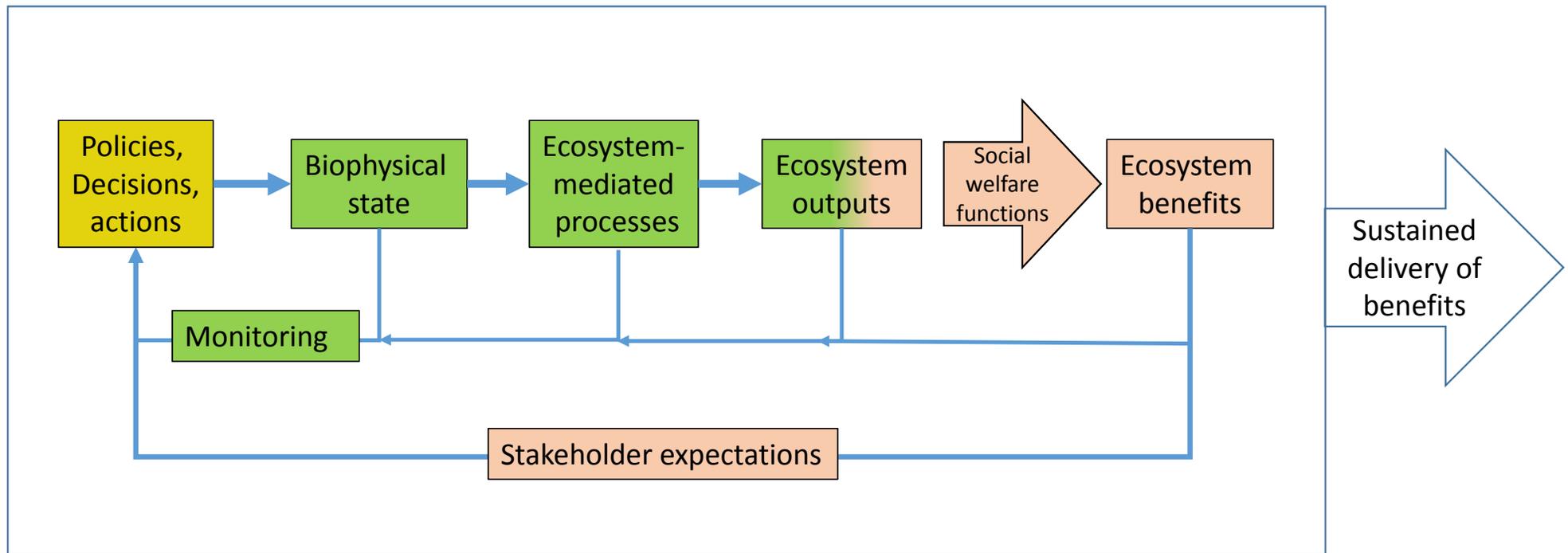
Highly interdisciplinary: ecologists (hydrologists, geologists, biologists...)



## Highly interdisciplinary: ecologists + social scientists



Highly interdisciplinary: ecologists + social scientists + managers



# Don't overthink it

- Managing for sustainability and functional integrity/resilience preserves future options.
- Use available data and functions to make simple (“Tier 1”) models to add insight to decisions.
- Grow your agency’s interdisciplinary capacity and sophistication over time.



- Value is not the same as price – some important things, especially outputs with cultural value, have no monetary value and no market.
- Benefits imply a beneficiary. More pristine does not necessarily equal more benefits. Not “green sector.”
- Access to (and awareness of) outputs always mediates the value and distribution of benefits.

