

# Ecosystem Services: a new framework for old ideas?

Kate Thompson<sup>1</sup>, Peter Duinker<sup>2</sup>, and Kate Sherren<sup>2</sup>

<sup>1</sup>IDPhD Program, Dalhousie University, Halifax, NS, Canada.

<sup>2</sup>School for Resource and Environmental Studies, Faculty of Management, Dalhousie University, Halifax, NS, Canada.



## Introduction

- Ecosystem services (ES) frameworks are promoted as a new and important way to recognize and account for nature's benefits to humans
- A comparative analysis of the Millennium Ecosystem Assessment (MA) framework against land-use planning and forest management approaches shows how ES concepts emerged earlier
- Elements and themes are shared, but concepts are organized differently
- Divergences provide insights about the utility of ES concepts and frameworks

## Background & Purpose

- ES concept introduced to awaken people to the global loss of biodiversity (Norgaard, 2010)
- Landscape architecture and environmental planning from the 1960s recognize interdependence between people and nature
- Sustainable forest management (SFM) criteria and indicators (1990s) echo themes of the MA
- Research Purpose: to demonstrate how the ES concept emerged in other fields, and to compare application and conceptualization of ES and analogous ideas

### Research questions:

- What concepts and elements are shared between the MA ecosystem services framework and approaches to sustainable forest management, land-use planning, and landscape architecture?
- How are concepts in the MA framework and in related fields organized and operationalized?
- What lessons can be learned from the use of analogous ideas and approaches in other fields?

## Method

High-level, descriptive comparison of five approaches.

### We inquired into:

- purpose, application, and underlying rationale;
- organization, including types of data, spatial and temporal units of analysis, and perspectives on drivers of change and future uncertainty; and
- implementation, including trade-offs and conflicts, public participation; governance.

## Approaches

### MA Framework (MA, 2003)

- four categories of ecosystem services, in relation to human well-being, and their interactions with drivers of change

### Criteria and Indicators of Sustainable Forest Management (C&I-SFM)

- created a common understanding of SFM
- supports reporting on the state of forests, forest management, and progress toward sustainability goals (CCFM, 2005)
- applied in national level reporting on the status of Canada's forests
- central element of the Canadian Standards Association (CSA) forest certification standard (CSA, 2010)

### Ecological Land Classification (ELC) (Hills, 1961)

- incorporated natural processes into land-use planning
- land units were classified, evaluated and ranked for limits to human use; i.e., capability (Hills, 1961)

### Environmental Planning – McHarg

- aligned land uses with natural structures and functions - "design with nature" (McHarg, 1969)
- ideas are pervasive and influential

### Urban Design (Hough, 1984)

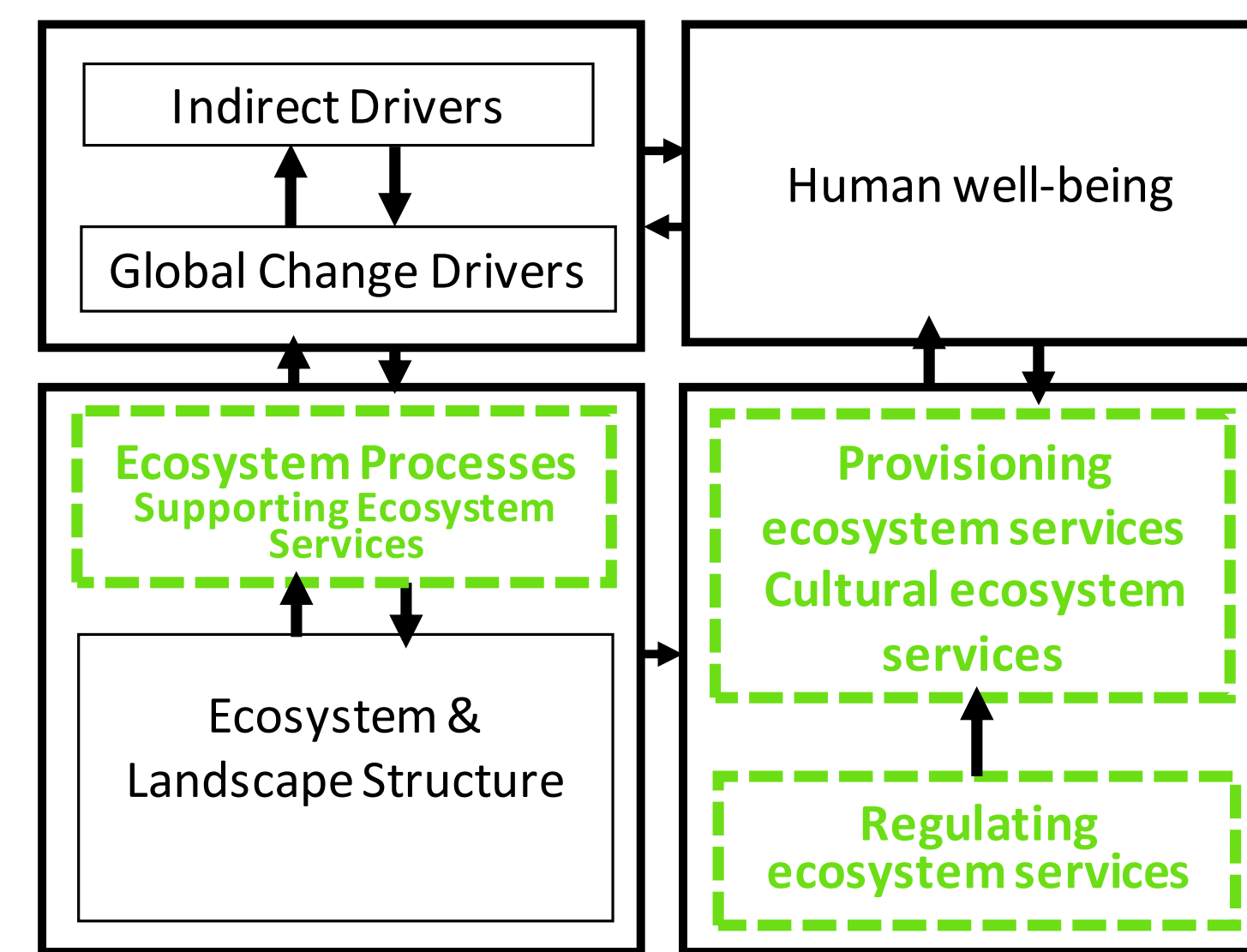
- included natural structures and processes in urban design predated concepts like green infrastructure, low impact development, and urban ecological design

## The language of ecosystem services

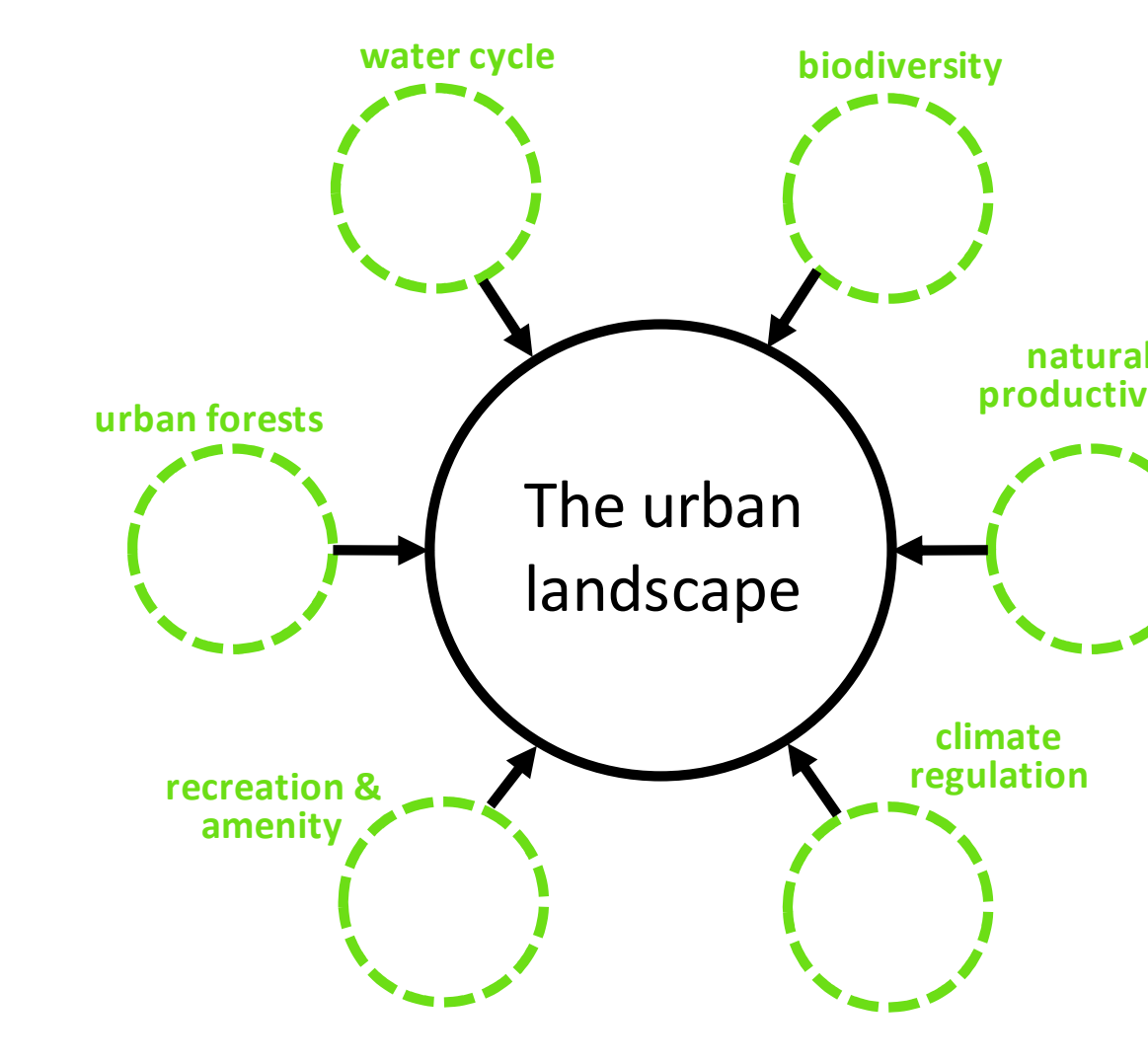
Approach	Ecosystem services or analogous concepts
<b>MA</b>	<b>Ecosystem services</b> - provisioning, regulating, cultural and supporting services
<b>C&amp;I-SFM</b>	<b>Forest values</b> criteria are baskets of values: - biodiversity (ecosystem, species & genetic) - ecosystem condition and productivity - soil and water - role in global carbon cycle - socio-economic and socio-political values
<b>ELC (Hills)</b>	<b>Land capability</b> land, associated organisms are a biological productivity system for human use, e.g., forest land provides production of wood, wildlife habitat, recreation, watershed protection
<b>McHarg</b>	<b>Natural processes with social values</b> natural processes and structures have social values (non-monetized), e.g., - wetlands: flood water buffering, habitat - forests: microclimate modification, water quality & quantity regulation, scenic qualities & habitat
<b>Urban Design (Hough)</b>	<b>Natural processes</b> natural processes in urban areas valued for conservation, restoration or emulation, e.g., - natural structures, materials buffer & clean water; - biodiversity supports health, environmental literacy

## Situating ecosystem services concepts

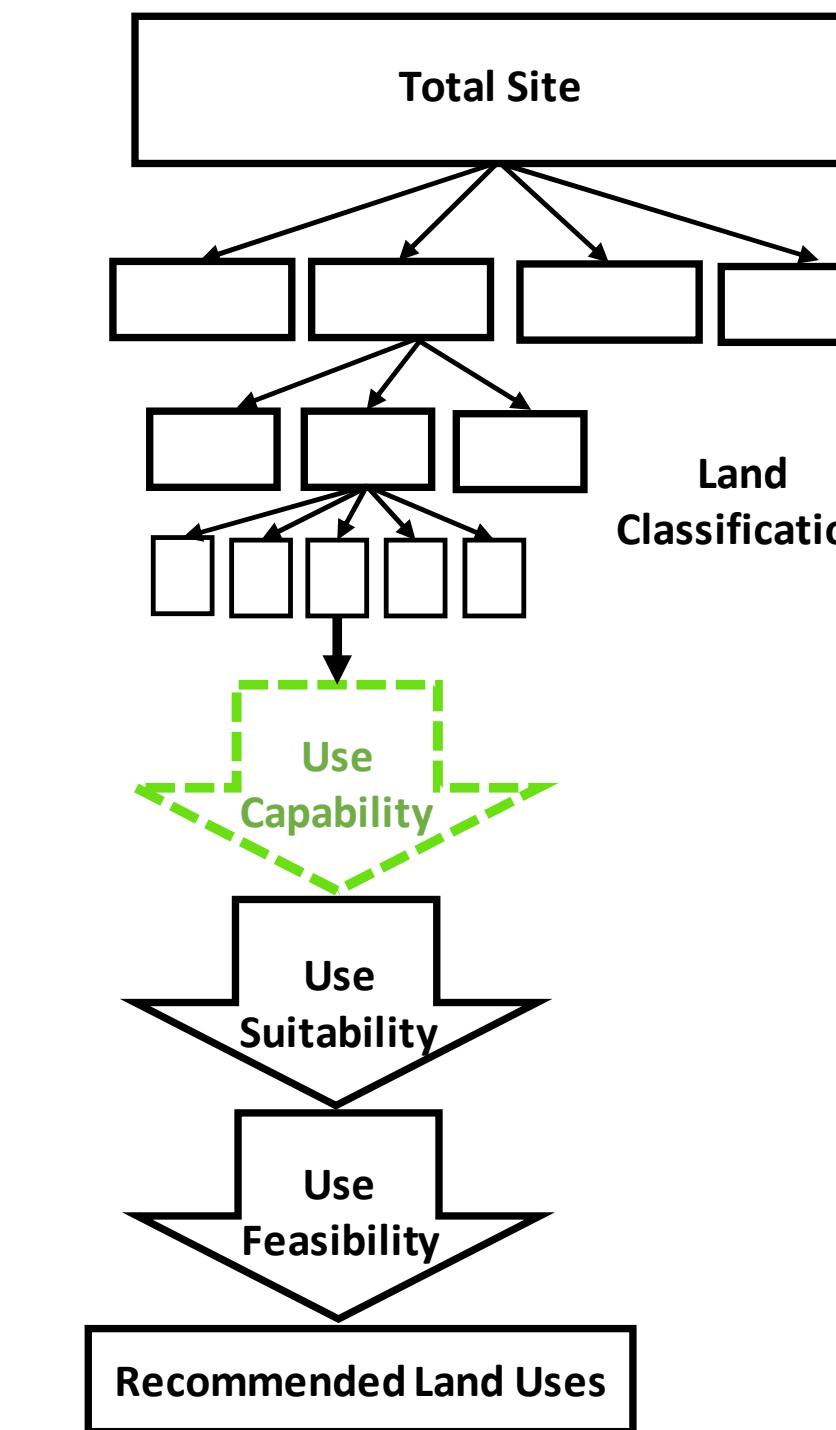
Services or analogous concepts in green.



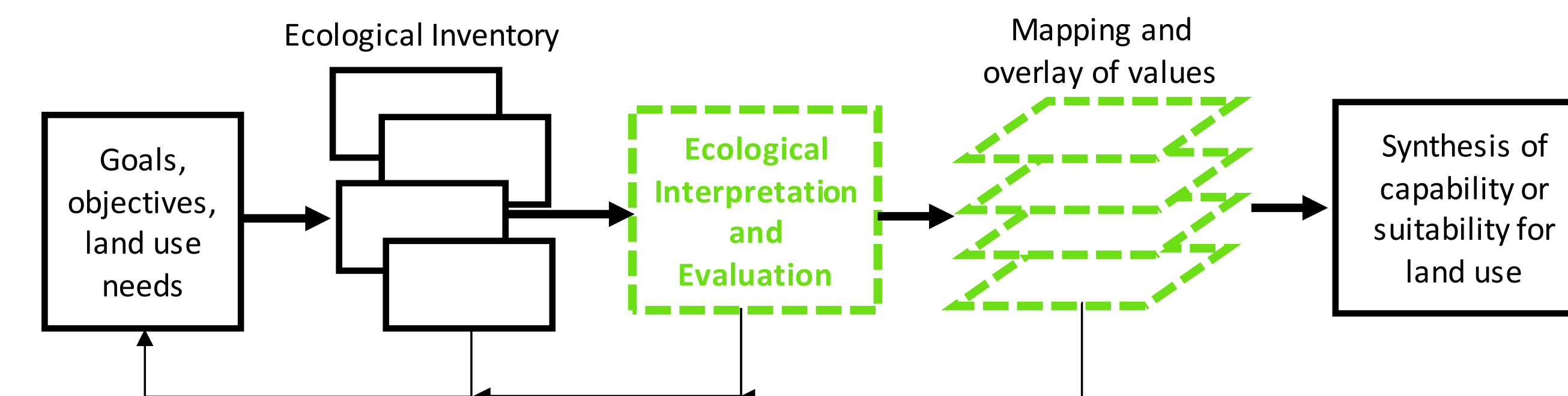
MA Framework  
Adapted from Carpenter et al. (2009)



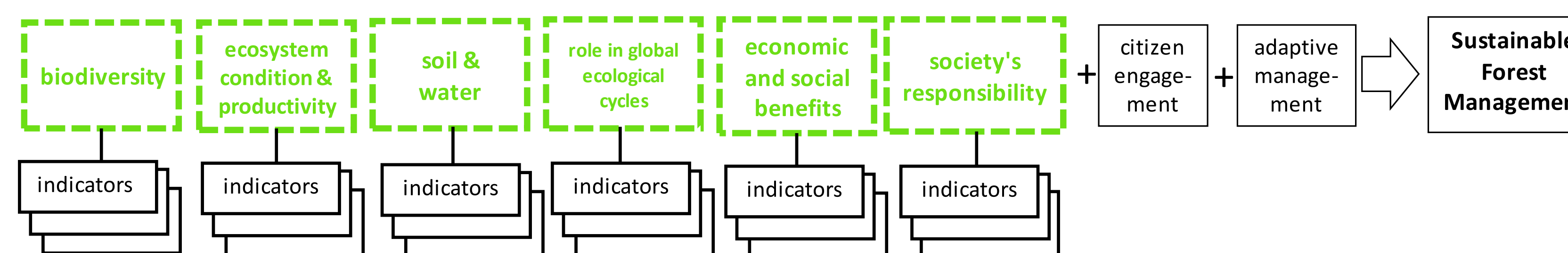
Urban Design (Hough)  
Adapted from Hough (1984)



ELC  
Adapted from Hills (1961)



McHarg  
Adapted from McHarg (1969)



C&I-SFM  
Adapted from CCFM (2005) and Duinker & Trevisan (2003)

## Key observations

### General

- MA provides the broadest set of services
- MA and C&I-SFM are remarkably similar
- MA is a warning message; C&I-SFM is designed for utility
- Implementation of the MA framework is at research or pilot stage (Ruckelshaus et al., 2015); local implementation dominates in the other approaches.

### Data

- MA and C&I-SFM are data-centred
- Hills' approach was designed to cost effectively gather and evaluate data
- McHarg's social values are bundled within landscape processes and structures

### Drivers of Change and Uncertainty

- Each approach's capacity to deal with change and future uncertainty is unique
  - MA: drivers of change are leverage points for interventions; suggests active adaptive management in context of uncertainty
  - C&I-SFM: addresses drivers of change at local level; deals with uncertainty through C&I framework and adaptive management
  - Hills assumed enduring characteristics of the land
  - McHarg prescribed avoiding areas of natural sensitivity
  - Hough designed-in resilience using natural processes

## Discussion

- MA framing: a strong message about sustainability of ES flow
- MA draws attention to land-use change as a driver; cannot provide guidance to local decision-makers
- C&I-SFM framework has great local utility: integrated, well-scaled, relevant criteria, integrates expert opinion and citizen participation, and connected to implementation and governance (CSA, 2010).
- McHarg: the strong ES-like elements may partly explain modest uptake of explicit ES concepts in land-use planning to date
- Assumptions in the older land-use planning approaches about ecosystem stability contrast with new understanding about drivers of change and uncertainty included in the MA and C&I-SFM

## Recommendations

- Examine the lessons from the application of C&I-SFM as a robust, carefully bounded and tested approach
- Given new knowledge and changing context (Steiner, 2016), apply critical reflection and awareness in using McHarg's methods
- Examine the capacity of current land-use planning theory, education, and practice to deal with challenges related to the supply of ES

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