Defining ecosystem services-based approaches

Klaus Glenk, Julia Martin-Ortega, Didac Jorda-Capdevila & Kirsty Holstead

Water World Congress Special Session - *Ten sears since the Millennium Ecosystem Assessment: a Global Perspective on Water Ecosystems Services.*

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Jorda-Capdevilla et al. (2015)

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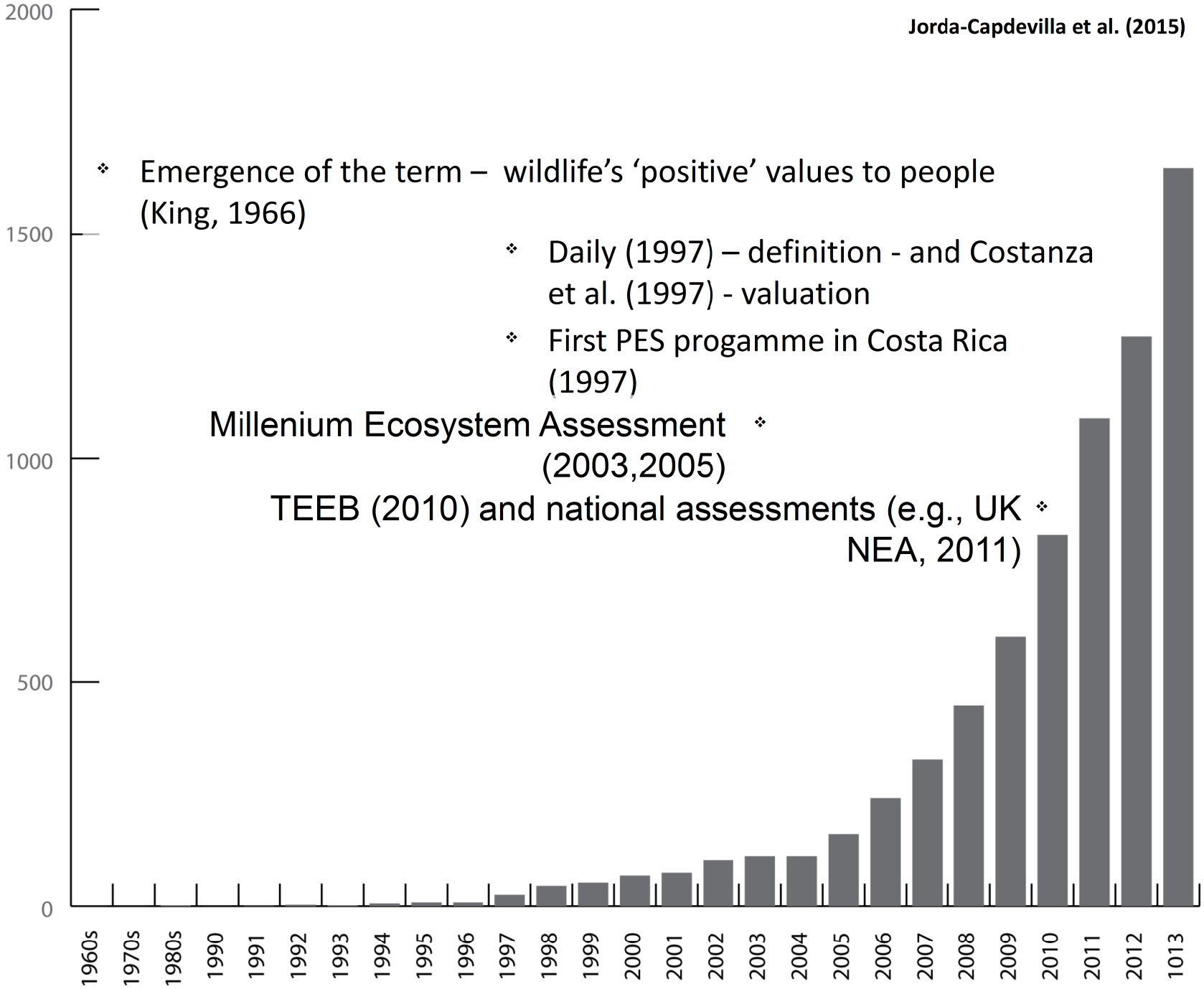
- Emergence of the term – wildlife's 'positive' values to people (King, 1966)
  - Daily (1997) – definition - and Costanza et al. (1997) - valuation
  - First PES progamme in Costa Rica (1997)
  - Millenium Ecosystem Assessment (2003,2005)
  - TEEB (2010) and national assessments (e.g., UK NEA, 2011)



‘Ecosystem services’: uses and roles

- Education and awareness over the dangers for humans of ecosystem decline
- Normative use: provide a platform for normative assessments on how natural resources should be managed
  - *The normative use of the concept is often related to economic analysis which has raised concerns about commodification of nature*

The power of communicati...

- ‘Ecosystem services’ inspired collaboration and enhanced communication between *scientists of different disciplines* to address complex socio-ecological problems
- Increasingly, a transdisciplinary perspective uses ‘ecosystem services’ or related concepts as a foundation for collaboration and communication of *scientists with practitioners and policy makers*
- Powerful *communication ‘tool’* that has experimented great popularization

Popularisation and its effe

- Confusion/lack of clarity regarding the meaning of ecosystem services and related terminology e.g. ‘Ecosystem Approach’
- Difficult access for ‘non-specialists’ to complex terminological discourses and debates (e.g. functions, services, benefits, goods, regulating supporting, etc.)
- Risk of making it devoid of much meaning
- Gap between conceptualization and incorporation into actual management practice and conservation

Key questions

- When is it important to apply a uniform understanding of the use of ecosystem services and related concepts across all contexts?
- Who has standing in this understanding?
- Applying ecosystem services or using ecosystem services-based approach to do something?

Aim

- Development of a definition of ***ecosystem-service-based approaches***
- Understood as a **'boundary object'** that
  - provides and maintains some *coherence* towards a common goal across actors (sustainable use, management and conservation of natural resources)
  - But can be *flexibly adapted* to needs of the work at hand (policy, research or other)
  - provides a means of *translation* of knowledge for different actors through a common and recognizable structure

(Star & Griesemer, 1989, p. 408)

A definition

*An ecosystem service-based approach is **a way of understanding** the complex relationships between nature and humans to support decision-making, with the aim of reversing the declining status of ecosystems and ensuring the sustainable use/management/conservation of resources*

…a way of understanding

- **Not a framework of action** – but it can be related and connected with frameworks of actions such as The Ecosystem Approach or Integrated Water Resources Management
- **Not a recipe book - ** can be applied in many different ways depending on the specific aims of the tasks at hand (e.g. public awareness raising and education vs developing a ‘green’ national accounting system)

Four core elements or guiding principles….

1. Focus on the status of ecosystems, and the recognition of its effects on human well-being
2. Understanding of the bio-physical underpinning of ecosystems in terms of service delivery
3. Integration of natural and social sciences and other knowledge domains for a comprehensive understanding of the service delivery process
4. Assessment of the services provided by some ecosystems for its incorporation into decision-making

Element 1: Relevance of ecosystem status human well-being

- Emphasis on benefits humans obtain from ecosystems

- Recognition that it is humans who assign value to changes in ecosystems
  - *There are no ecosystem services if there is nobody to be 'served'*
  - *Anthropocentric instrumentalism*

Element 2: Biophysical underpinnin

- (Re-)design of natural science towards ‘endpoints’ defined in terms of
  - how nature delivers benefits to humans
  - the role of humans play in the mechanism that underlies delivery
- Description (and quantification) of interactions of ecosystem components and their effects on individual services or a range of services
- Necessary consideration of the role of temporal and spatial scales in service delivery

Element 3: Knowledge integration

- *Towards* transdisciplinarity
- Integration of different academic disciplines e.g. via jointly developed models
- Consideration and integration of non-academic strands of knowledge
  - Consideration of stakeholder views at relevant spatial scales
  - Co-construction of knowledge with stakeholders
  - Enhance legitimacy of decisions based on ecosystem services quantification and valuation

Element 4: Assessment for decision-making

- Ecosystem service-based approaches are defined through their aim at informing natural resource management decisions

- Implies need for qualitative or quantitative assessment of the services delivered by ecosystems in relation to management decisions

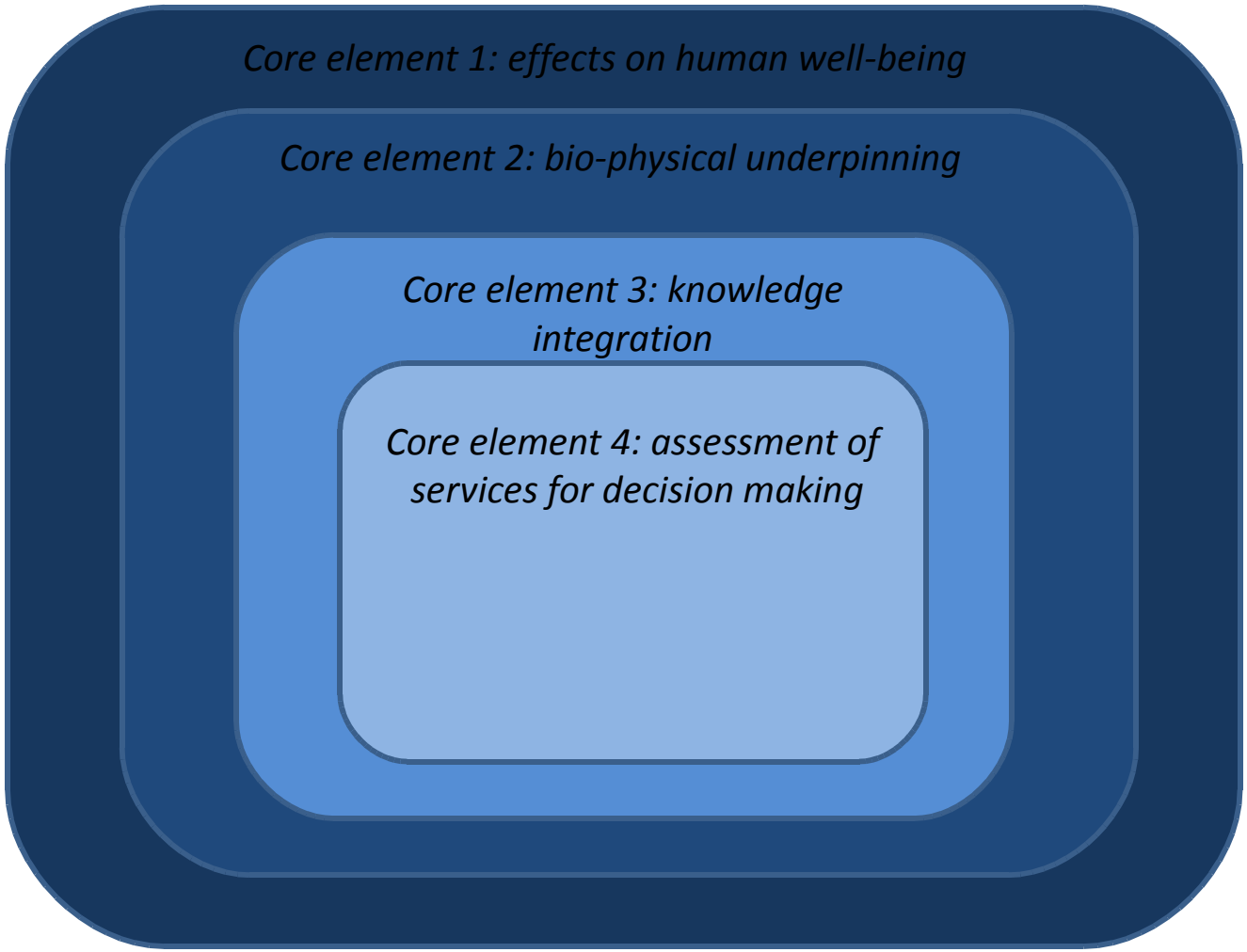
- Requires identification of (social) values of services in monetary and/or non-monetary terms

Characterising an ES-based approach

- In an ecosystem service-based approach, all four core elements need to be present

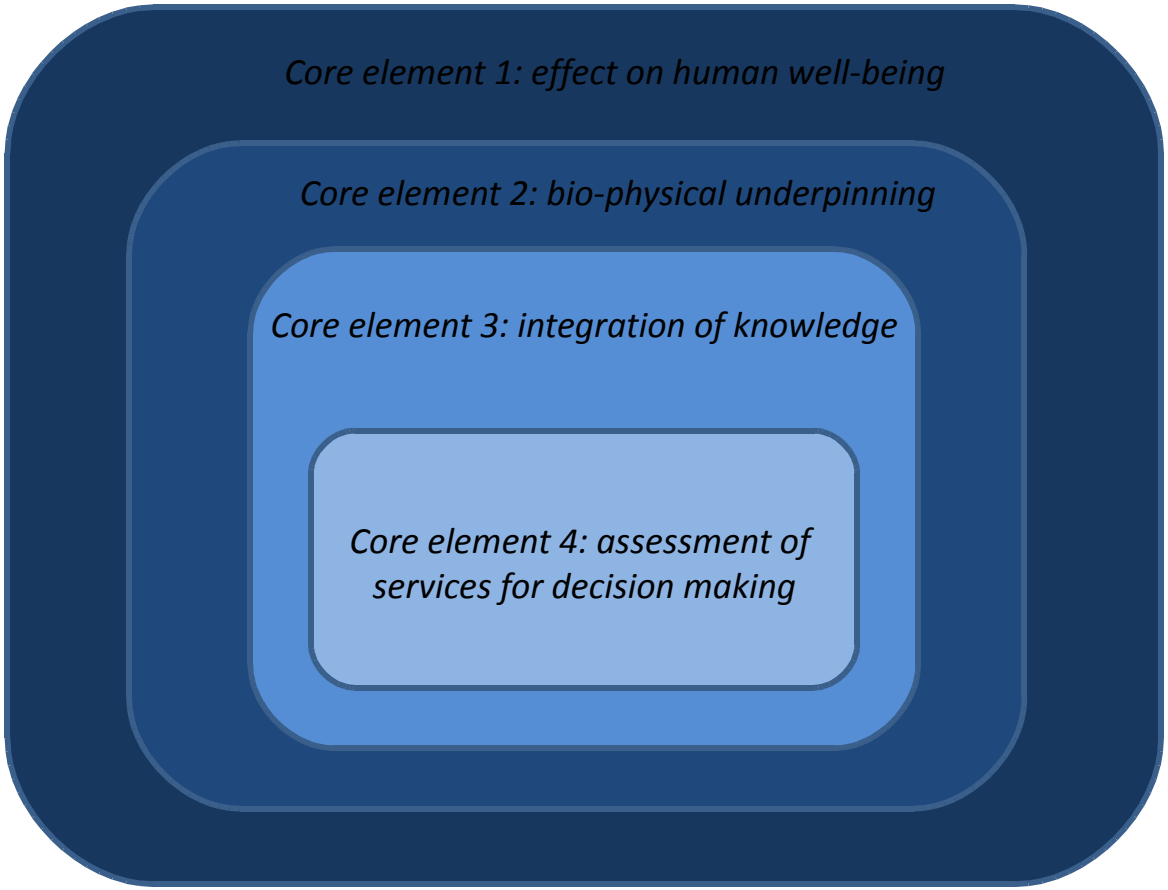
- Adherence to each core element can vary, making the definition flexible and adaptable to future developments

- Core elements are logically related to each other


Core element 1: effects on human well-being
Core element 2: bio-physical underpinning
Core element 3: knowledge integration
Core element 4: assessment of services for decision making

Nested core elements

Core elements



Nested core elements

Level of 'adherence'

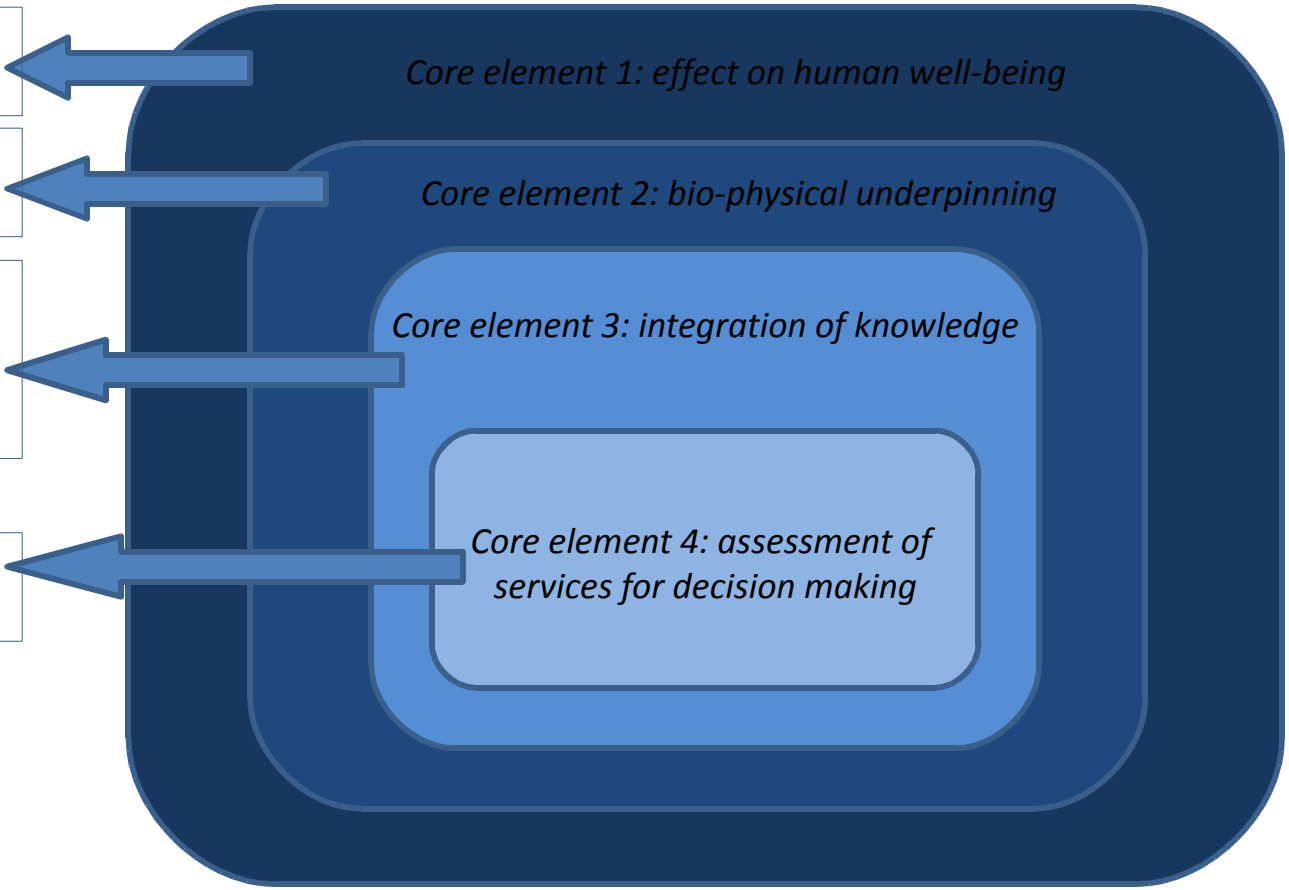
Core elements

Comprehensive or limited to specific dimensions

Specific or generic; based on measurement or modelling

Levels of interdisciplinary integration; static or dynamic adaptive; consultation or co-construction

Quantitative or qualitative; monetary or non-monetary



Key messages

- Ecosystem services-based approaches are to be understood as boundary objects:
  - No ‘ultimate’ definition
  - A flexible ‘way of understanding’ complying with 4 core elements
- Ecosystem-service based approaches no silver bullet or panacea
  - Whether they will make a significant positive difference in sustainable management of natural resources remains to be seen
  - The ‘economic production’ metaphor might risk

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Example: water-related forest ecosystem ser

1. Effects on human well-being

- Structural changes to forests can affect watershed processes, e.g.
  - erosion, sediment load, water chemistry, flow regime, groundwater recharge
- Changes in processes can affect human well-being, e.g.
  - cost of water purification
  - fertilisation of floodplains
  - reservoir capacity (and energy yield) due to siltation
  - flood damage

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2. Bio-physical underpinning

- Understanding of how bio-physical processes are affected by changes in forest cover and structure, soil-vegetation dynamics

- Understanding of how this affects the quantity and quality of freshwater and groundwater to the extent that it impacts on human well-being (through use and non-use) by beneficiaries

3. Knowledge integration

- Natural science knowledge of service delivery processes
  - Ecology, hydrology, plant physiology
- Social science knowledge on policy drivers and impacts
  - Economics, psychology, political science
- (Local) stakeholder knowledge on e.g. understanding where benefits arise relative to where changes in the ecosystem take place; or on distributional impacts
  - Farmers, drinking water users, floodplain residents, hydropower companies, regulators

4. Assessment for decision making

- Some form of quantification of how structural change in forest affects services that directly impact on well-being
  - e.g. changes in total, seasonal and peak water flow associated with changes in forest cover
- At least qualitative appraisal of the impacts of these changes on well-being, possibly non-monetary or monetary valuation of impacts
- Appraisal of impacts can be used to inform decision making