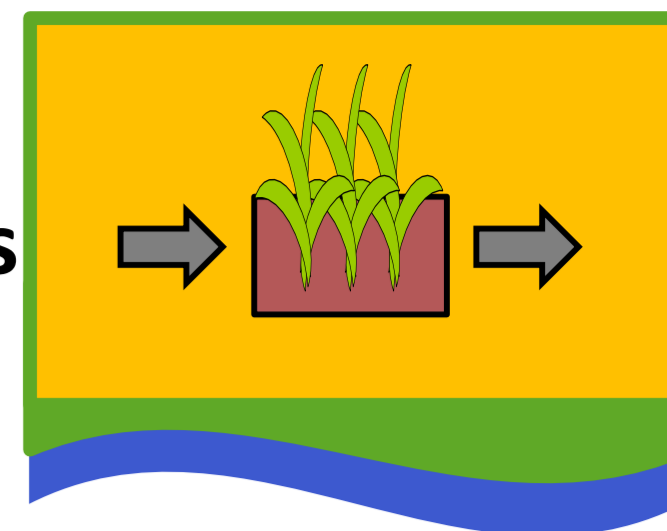


# Stocks, Flows and Scale in Agricultural Ecosystems



## Aims

- Conceptualising how the delivery of ecosystem services depends on 'stocks' and 'flows' of natural capital.
- Identify scale issues in valuing ecosystem services.
- Identify knowledge gaps and set priorities for further research.

## Research

- The project team included 24 people with diverse skills: environmental scientists, social scientists, economists, policy makers and farmer representatives.
- Much of the thinking was done in 2 workshops, with follow-up work done in smaller groups by email and teleconference.



## Findings

- To clarify thinking on the role of people in ecosystem services we need to separate 'Potential Services' provided by the social-ecological system, and the 'Realised Ecosystem Services' which are used by them (Figure 1).

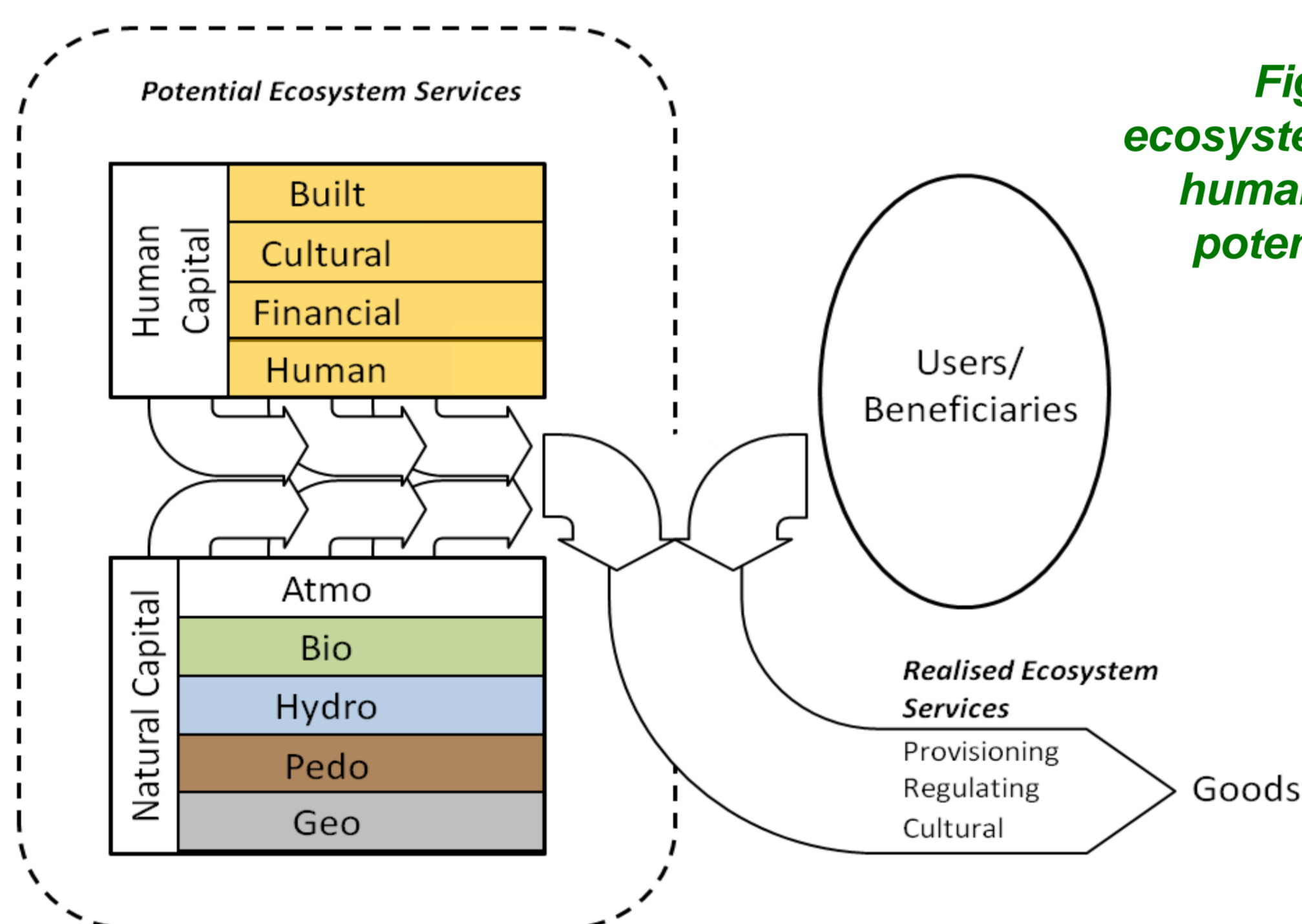


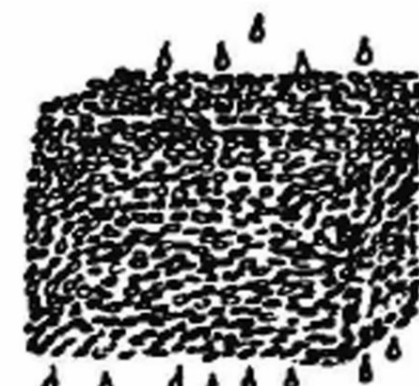
Figure 1. Co-production of ecosystem services: natural and human capital together create potential ecosystem services

It is the interaction with users & beneficiaries which then defines the nature, quantity (and ultimately value) of the realised ecosystem services and the goods they provide

- Spatial and temporal scales are important, for example, the arrangement of trees in the landscape alters their aesthetic value and their biodiversity role.



- Soil structure affects plant growth, flooding regulation and carbon sequestration.



Rapid



Moderate-slow



Slow-very slow

Infiltration rate

- The timing of flood peaks in individual streams within a catchment controls downstream flooding.

- We created a framework to identify and link Stocks, Flows and other System elements into a systems approach.
- The concept works for Provisioning, Regulating and Cultural services (Figure 2), but needs further testing and application.

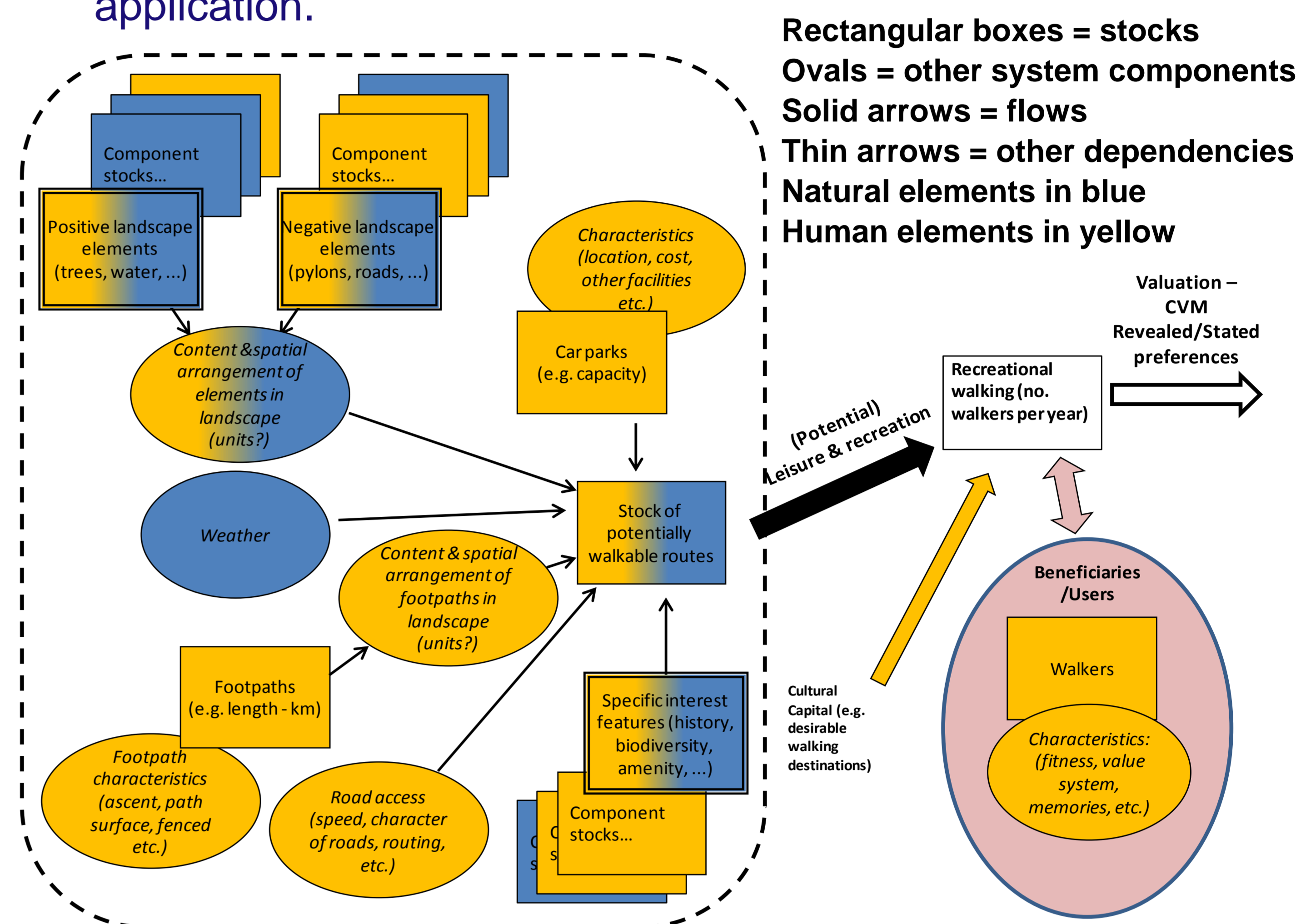


Figure 2. Conceptual framework for a Cultural Service: Recreational walking/hiking. In this case, the flows are primarily of information, and occur at the point of interaction of the users with the environment where any particular individual is making a decision about where to walk

## Conclusions

- The environment is a **social-ecological system**, involving co-production by both humans and natural processes.
- That co-production is dependent on stocks of natural capital AND human capital **at all stages** in the supply chain
- Not everything can be described as stocks or flows; the **quality, condition** or **other attributes** of stocks also determine their ability to provide services.
- Spatial and temporal scales are important in delivering and valuing ecosystem services.
- The values of ecosystem services (whilst ultimately dependent on sustainable use of natural capital) are currently set within a context of property rights and ownership, regulation and policy.
- Working with a large interdisciplinary team is difficult but we managed to understand each other in the end.



## Next steps

- Incorporate stocks and flows thinking into a modelling framework.
- Test the model in a data-rich catchment-based case study.
- Further develop the implications for valuation of ecosystem services.