# Stocks, Flows and Scale in Agricultural Ecosystems

Project leader: Laurence Jones, Centre for Ecology and Hydrology, Bangor
LJ@ceh.ac.uk

## 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).

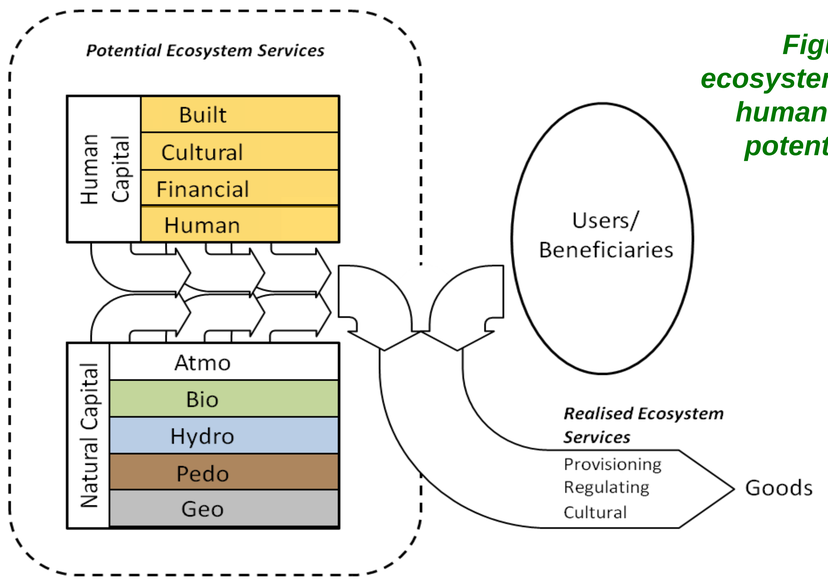
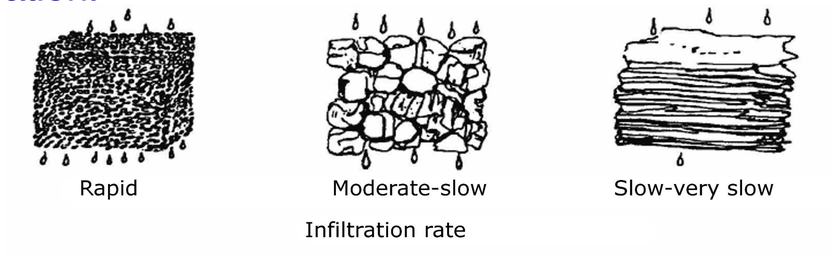



***Figure 1. Co-production of ecosystem services: natural and human capital together create potential ecosystem services***

***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.




- 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.

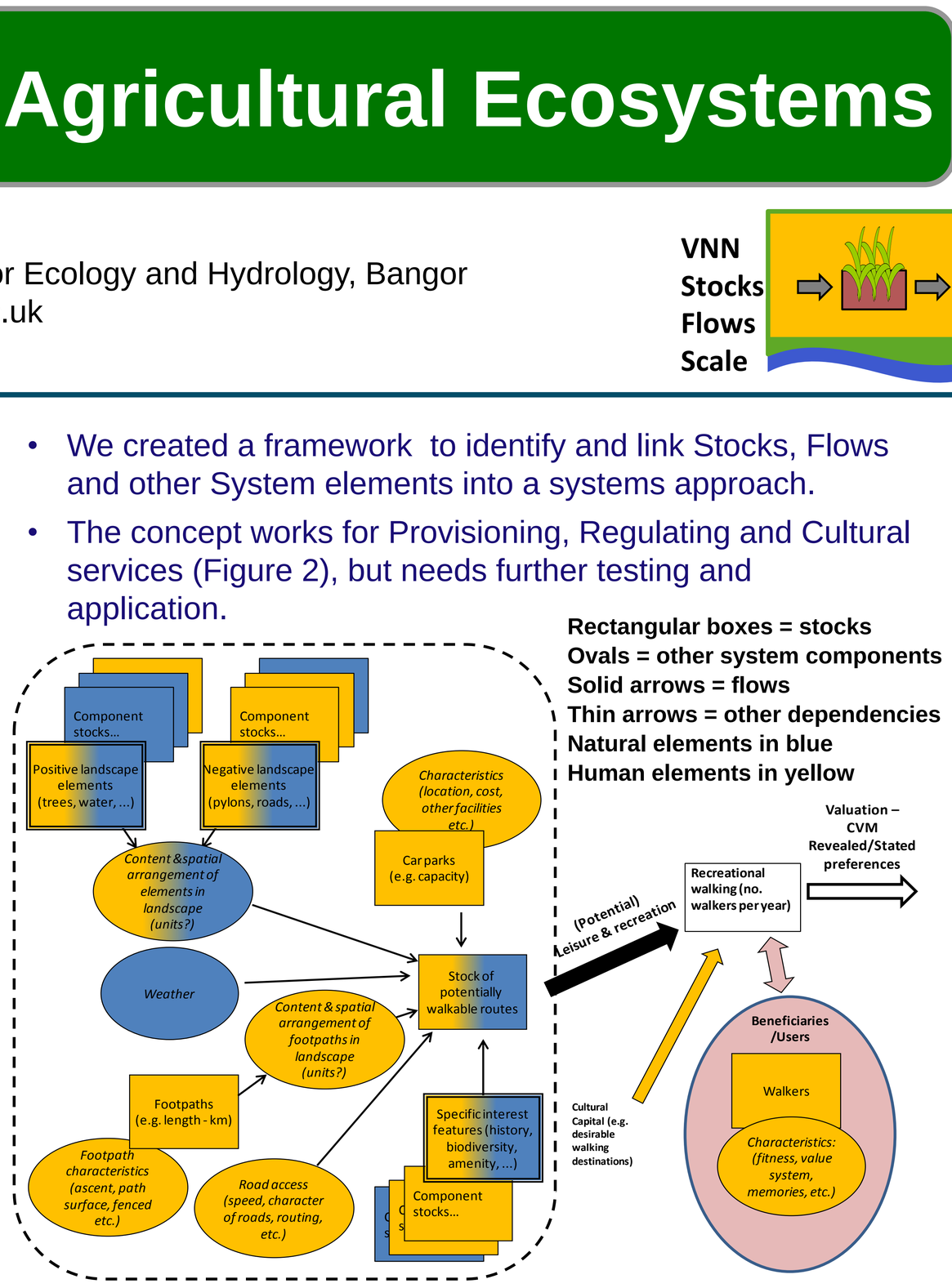



***Figure 2. Conceptual framework for a Cultural Service: Recreational walking/hiking. In this case, the flows are primarily of information, and occur at the point of interaction of the users with the environment where any particular individual is making a decision about where to walk***

## 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.

www.valuing-nature.net/projects/stocks-flows

NATURAL ENVIRONMENT RESEARCH COUNCIL
Living With Environmental Change
Department for Environment Food & Rural Affairs