

Assessing the ecosystem services associated with organic farming in Scotland

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Introduction

- With its first Land Use Strategy The Scottish Government called for the application of an ecosystem approach to land use.
- There are assumptions that organic farming could have the potential to deliver higher level of ecosystem services than conventional farming. Assumptions made both by the existing public support and scientific studies conducting ecosystem services assessments of organic farming systems in other country (i.e. Sandhu, 2007) or agro-ecosystems following organic farming principles (Porter, 2009).
- Additional support has recently been gained for organic farming in Scotland through the new “Maintenance of Organic farming” option under Land Managers Options part of the Scotland Rural Development Programme.
- However there is still a question whether the public support for organic farming is adequate regarding the range of public good/services it delivers/ensures.

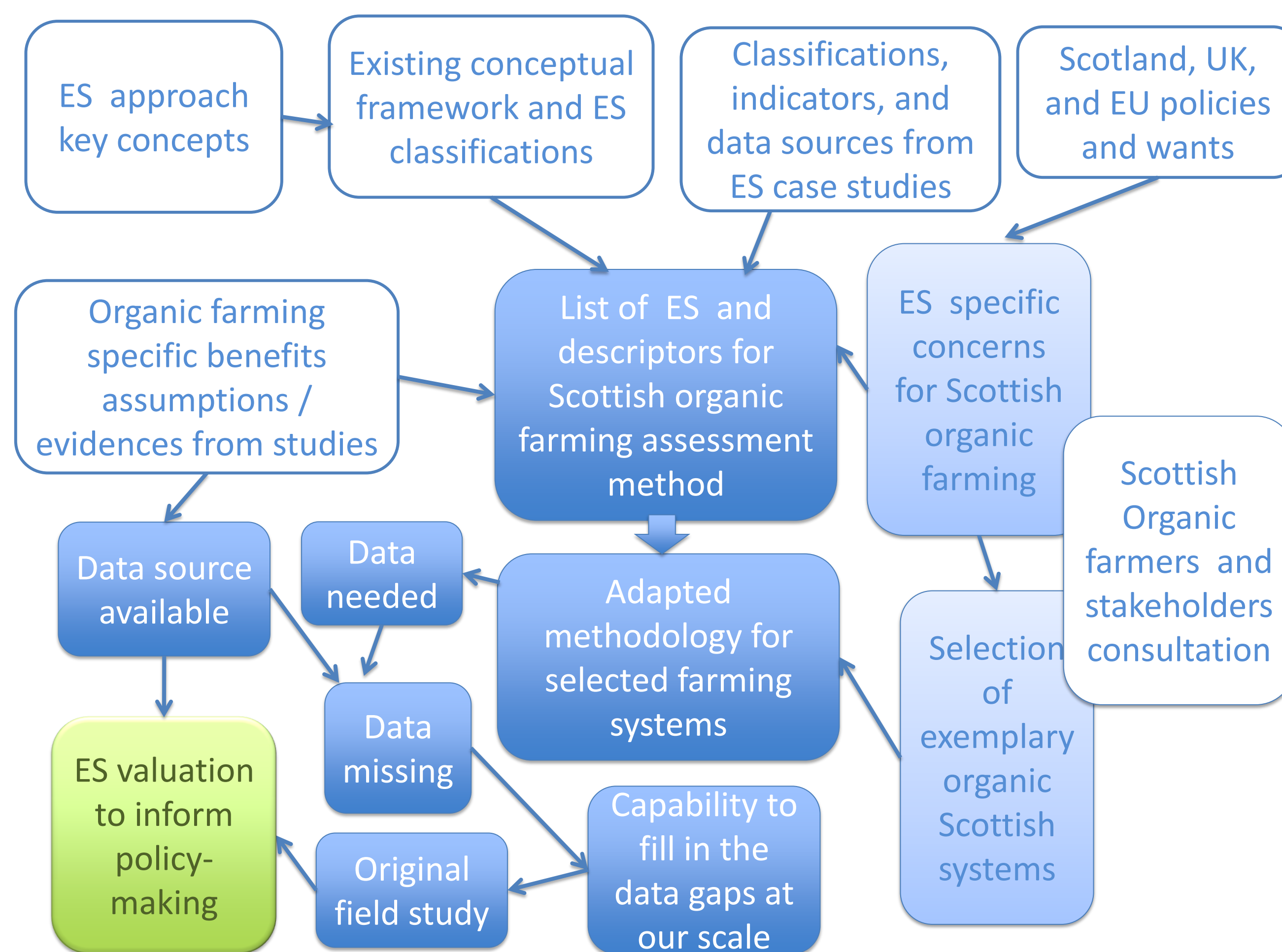
Aims

- To design a relevant Ecosystem Services (ES) approach to assess the benefits drawn by organic agriculture to human well-being in Scotland.
- To assess the potential differences in ES delivery within the range of organic farming systems present in Scotland and between organic and conventional farming systems, pointing out the key-factors driving those differences.

Methods

- Area of study: Scotland
- Literature review of the existing conceptual frameworks for ecosystem services assessment and the associated main issues .
- Drawing out a refined assessment methodology for Scottish Organic farming systems, namely ES classification and suitable descriptors (“measurement endpoints”).
- Adapting the assessment methodology for 3 exemplary products/Scottish organic farming systems (e.g. carrots, lamb, and beer production) stressing different issues.
- Applying the assessment on 4 organic farms associated with SOPA and 4 similar conventional ones in the North-East of Scotland to carry out the comparison.

Figure 1 Project methodology



Findings

- > **Main issues drawn from the literature :**
- existence/use of different Ecosystem services classifications ,
- changes in ecosystem services considered among them,
- difficulty to integrate intermediate services (supporting and regulating services) in ES assessment and valuation,
- associated double-counting issue.
- > **Assessment framework need to be adapted according to aims and scale.**

The table below shows a selection of ES and their associated descriptors (or measurement endpoint) from the literature, which would be relevant for our study (descriptors will need to be adapted to local context and double- counting to be questioned).

It also shows a weakness of most of the case studies reviewed: the lack of socio-economic services consideration.

Ecosystem service classification	Provisioning service (Final)		Socio-cultural service (Final)		Cultural Service (Final)	Cultural/ regulating/ supporting service (Intermediate)	Regulating service (Intermediate/Final)			Supporting service (Intermediate)				
	Food and forage	Raw material	Financial return	Employment			Aesthetics	Biodiversity/ genetic	Carbon accumulation	N regulation: fixation and mineralization	Biological pests control	Soil formation	Pollination	Shelter-belts and hedges services
Measurement endpoint	Crop yield vs gross output	Yield vs gross output	Net margin	Labour			Estimation of carbon stocked via Amount of crop residues via yields	Mineralization of plant nutrient and amount of nitrogen fixed per ha	Predation rate of aphid and eggs of carrot rust fly	Earthworm population and production of soil per ha per year per earthworm	Required period of pollination	Relation between yield increase and Permeability of shelterbelt	Water recharged into the ground	Ability of soil to provide nitrogen via total % of N via soil nutrient analysis
Example of valuation method/ Allocated cost/Unit	Gate price of the product	Gate price of the product	£/ha/year	Man hours/ ha/year	Via monetary value of landscape from Yorkshire Dale national park.	Environmental Stewardship payment	Estimated price in fixed by government for carbon trading	Unit price of N	Avoided cost of aphid pesticides using market prices	Avoided cost of purchased topsoil.	Cost of hiring honey bee hives	Cost of increased yields	Estimated cost of applying the quantity of recharged water	

Figure 2: Table synthesizing agricultural Ecosystem services assessed in different case studies, namely Glaves, 2009 ; Pimentel et al., 2005 ; Porter et al., 2009 ; Posthumus H., et al., 2010.

Ongoing research :

- Agricultural Ecosystem services assessment case studies synthesizing.
- Selection of exemplary Scottish organic farming system.
- Data sources review.