

# Valuing multiple ecosystem services (ES) from forests

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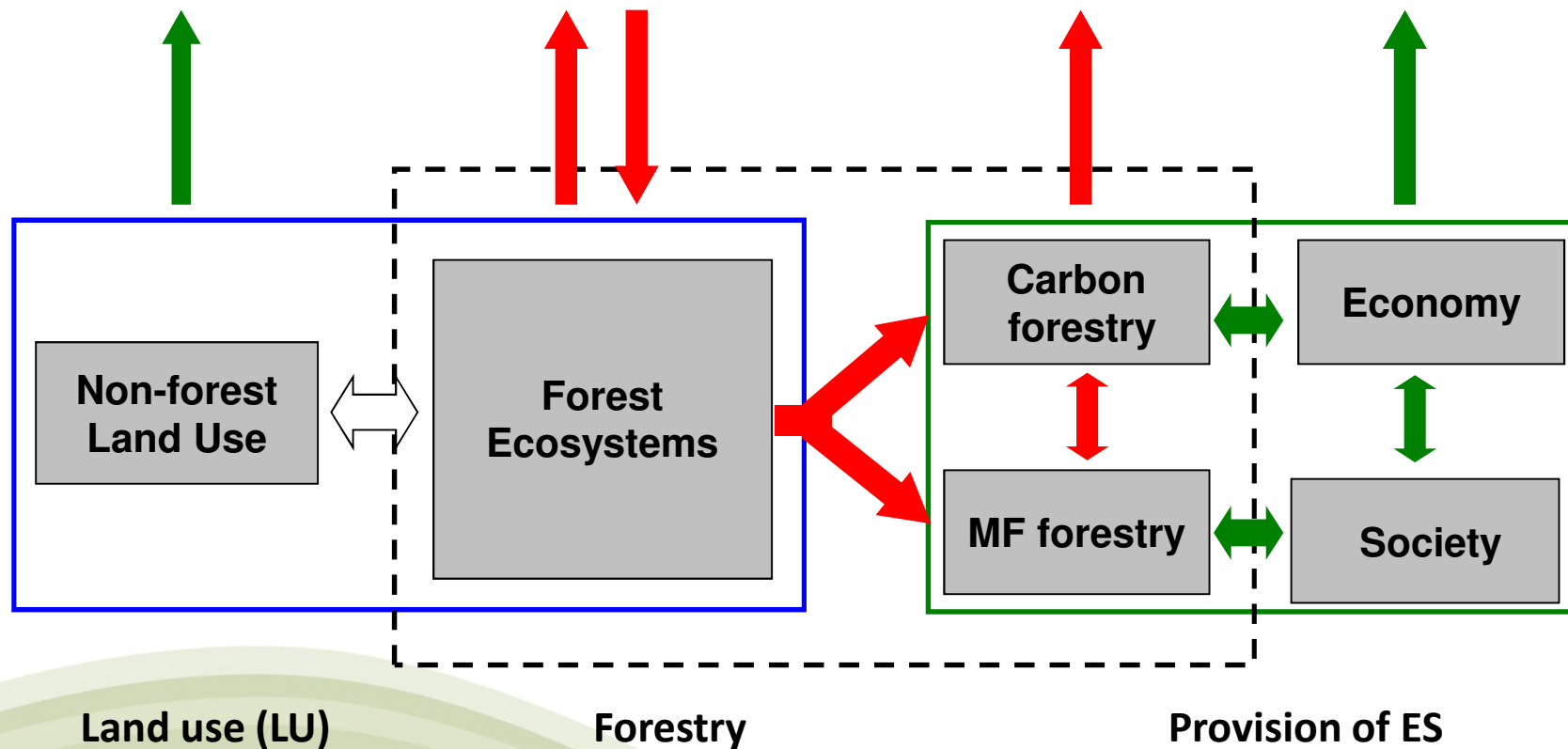


## Valuation of ES: what is the research telling?

- ❑ Assessing the concepts of value: monetary & non-monetary
- ❑ Conceptualising the value of ES of trees
- ❑ Elaborating tools of market & non-market valuation
- ❑ Developing knowledge (KN) of non-monetary valuation
- ❑ Considering valuation of ES from forests at various scales
- ❑ Participatory appraisal (stakeholder evaluation) of ES
- ❑ Integration of techniques to aid decision-making

# FOCUS: Scotland's forests and their services

Minimizing net emissions: living within environmental limits (resilience, innovation and adaptability)



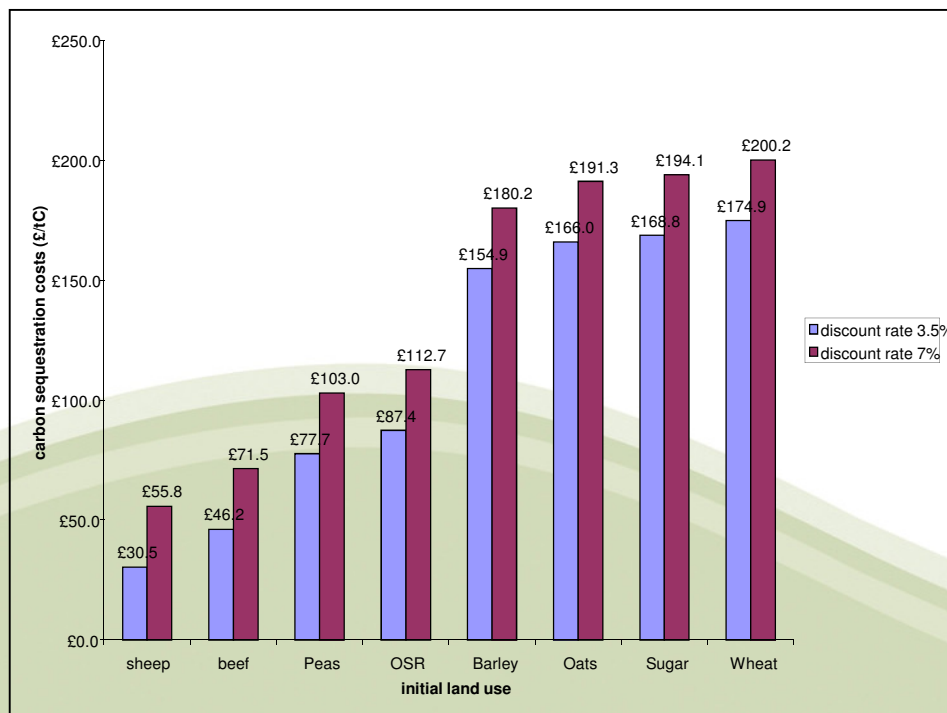
Realising the potential of nature: achieving a sustainable economy

Adapted from the materials of COST Action FP0703 (Peyron, Nijnik *et al*, 2010)

# How can it be used?

## Valuation can help

- Inform resource use and management decisions
- Provide estimates of how forest ES contribute to the wellbeing
- Guide the prevention of damages that inflict costs on society
- Resolve potentially conflicting decisions, e.g. whether or not to replant woodlands for **carbon sequestration** (CS).



PV costs per t C provide **benchmarks** for comparison of alternatives, helping to indicate where & how tree-planting for CS (Nijnik & Bizikova 2008, *Forest Policy and Economics*) & multiple ES (Nijnik et al. 2012, *International Journal of Forestry Research*) can be cost-efficient.

**Fig: CE of afforesting various initial land uses with Sitka spruce**

Nijnik et al. 2012, *Forest Policy & Economics*

## What is known & what's not?

Valuation is case specific, context sensitive & contingent to scales. Values change temporally and spatially; they also vary across stakeholders. The complexity and spatial arrangements pose challenges. ES are being judged on what they are rather than on their potential to become. When markets are explicit, direct economic valuation is applicable (even for some public goods using CVM/TCM). Economic valuation is difficult in the field of biodiversity or landscapes, because of their uniqueness and distinctiveness. Insufficient understanding of ecological processes, HUMAN-ENVIRON relationships & uncertainties (UN) hampers robust economic valuations.

Examples of ES	Valuation method	Value
<b>Provisioning</b>		
Timber	Market valuation	Market prices
Non-timber products	Market valuation	Market prices
Woody biomass for energy	Market valuation	Market prices
<b>Regulating</b>		
CS, Climate regulation	Cost-effectiveness (CE) Market valuation	PV costs per t C, Market prices (if CO <sub>2</sub> is traded)
Erosion alleviation Shelter belts	Replacement, relocation and avoided cost methods	Avoided losses in yields or cost of increased yields
Air quality	Avoided cost methods	Avoided losses
Flood regulation	Benefit transfer (BT) Relocation and avoided cost	BT estimates Avoided losses
<b>Cultural</b>		
Recreation	CVM, Choice experiments (CE) or TC methods, Indirect market valuation	Willingness to pay (WTP) values or TC estimates, market pricing
Landscape beauty	Hedonic pricing (HP) or CE	HP values or WTP values
Health	Indirect market valuation	Changes-in-productivity, cost-of-illness
<b>Supporting</b>		
Oxygen	Replacement cost methods	Cost of oxygen
Soil formation or protection	Avoided cost method	Cost of purchasing top-soil from elsewhere
Species diversity	Indirect market valuation	Donations for conservation

**Table: Selected examples of valuation methods (Nijnik, 2014)**

# Knowledge of data, models, scenarios is incomplete & uncertainties relate to:



- ❑ (Future) *demand & supply* of ES
- ❑ Their *stock, flow & reproduction*
- ❑ Climatic (and other drivers) & their *impacts*
- ❑ *Adaptation capacities & dynamics*
- ❑ (Future) *ecological,*  
*technological,*  
*environmental,*  
*economic &*  
*social* aspects of ES provision, management & use,  
including institutional (IN) settings (e.g. property rights),  
stakeholder preferences/perceptions & managerial aspects

# Multi-functional forestry (MFF)

## Joint production of ES

Multiplicity & complexity may result in conflicts, necessitating end-users' collaboration & capability development

Cross-sectoral *co-operation & spatial integration*

New *(multi-level) governance* with a rising role of government

*Integrated approach* to decision-making

## Non-commodity outputs: externalities and public goods

This leads to *market failures* & thus to a *rising role of governance* structures, *others than markets*

*New methods* (non-market valuation) & novel incentive schemes (PES)



# Why are new methods needed?

Rising inconsistency with neo-classical economics (NCE)

- ❑ Multiple ESS values have a much broader spatial and temporal distribution than the distribution of costs
- ❑ *Public goods: non-rival & non-excludable. Market failures*
- ❑ NCE: *preferences* are *fixed & stable. Value systems & institutions* (IN) are *exogenous*. Their role in optimal outcomes is neglected

**Buy today**, public opinion is crucial for decisions, and governance is often based on collective action.



# Basic Theorems do not hold due to ...



- *Endowment effects* (EE) & *transaction costs* (TC)
- “*Agents*” often *care* of others & may be irrational
- “*Agents*” often behave *non-competitively*
- There is often *interdependency* in decision-making
- The NCE’s *assumption* “if property rights are well-defined & there are no TC” *doesn’t hold*

**Thus**, it is imperative to *incorporate behavioural*, IN & experimental economics, interdependent decision-making, dynamics, EE & TC in our models

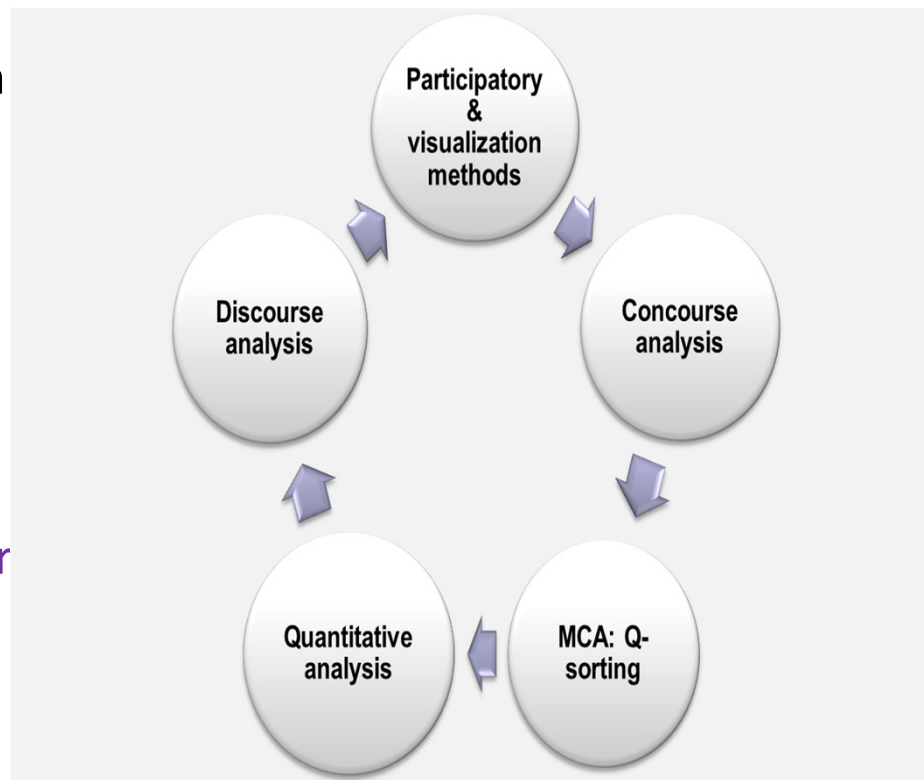
New *methods* are needed to address the complexity & going beyond the NCE postulates

*Non-market valuation* of ESS. *Combine methods* if appropriate.

## Stakeholder evaluation of decision-making in MFF

Socio-economic deliberative support tools (DST) integrating participatory, visualization and analytical techniques have been developed at Hutton to enhance the delivery of forest ES.

The DST (based on action research, visualization and Q-methodology application) have enabled the use of a multi-actor approach to **explain stakeholder values** and identify potential **conflicts to avoid & manage** them and to incorporate existing attitudes and perceptions concerning forest ES into policy design.

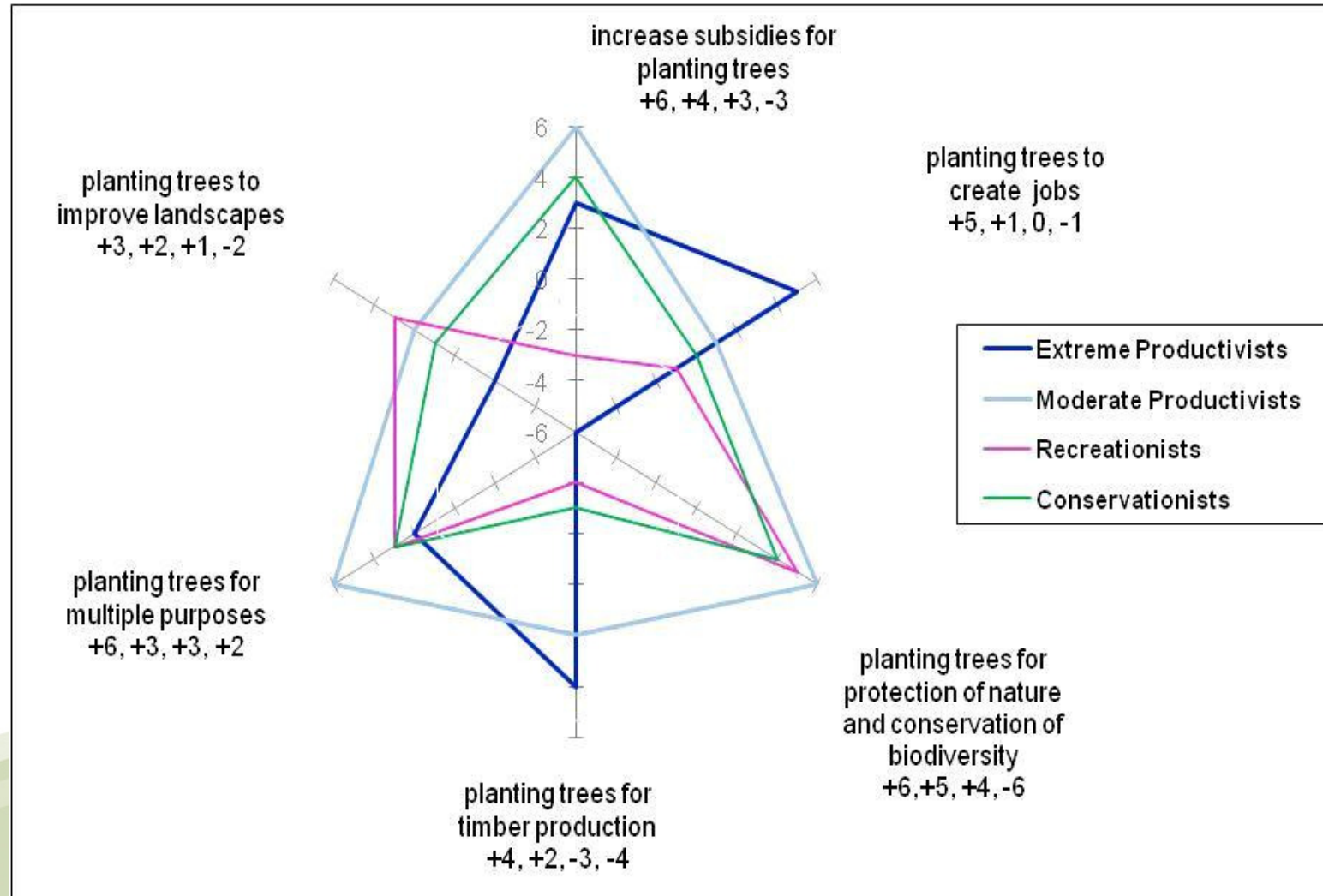


Nijnik M, Miller D et al. 2011. Public participation for planning the sustainable use of natural resources and landscape change: methodology development. *International journal of interdisciplinary social sciences* 5 (11): 303-320

Nijnik M et al. 2013. Linking MF forestry goals with sustainable development objectives. *Journal of settlements and spatial planning* 2:185-190

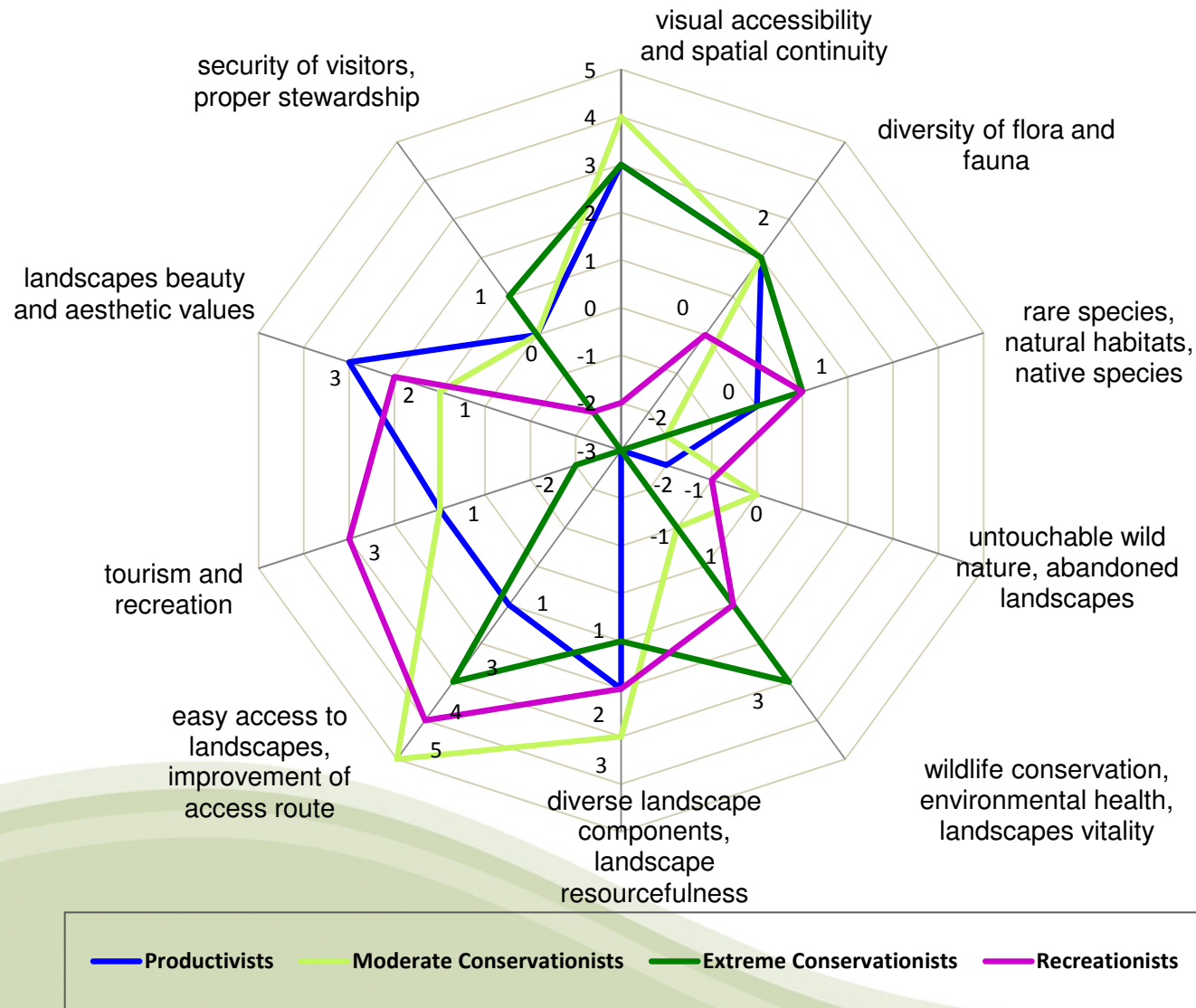
**EAWG5: ES Research: update  
on valuations & values**

# Public evaluation of woodlands expansion

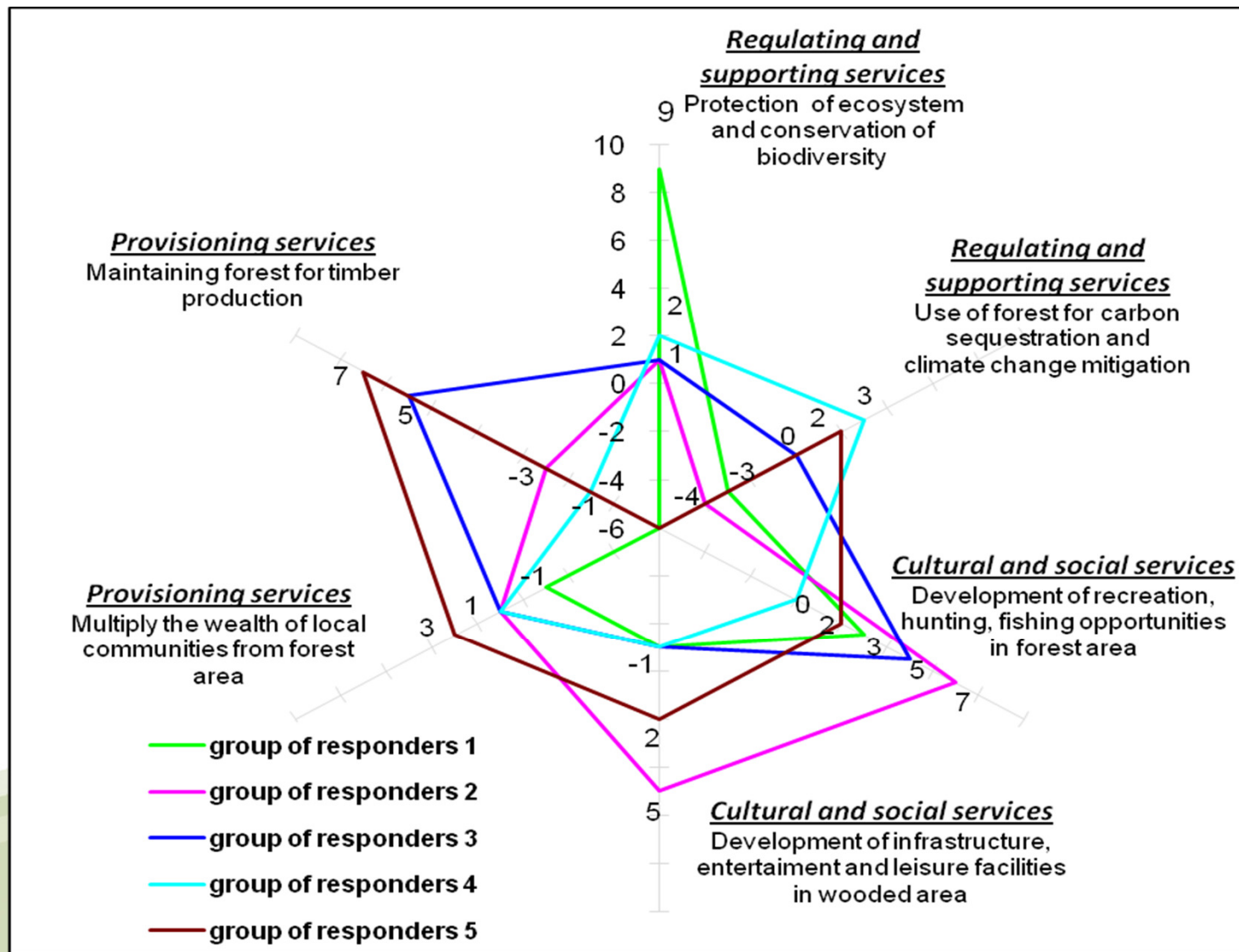


Nijnik & Mather 2008, *Landscape and Urban planning*, 86: 267-275

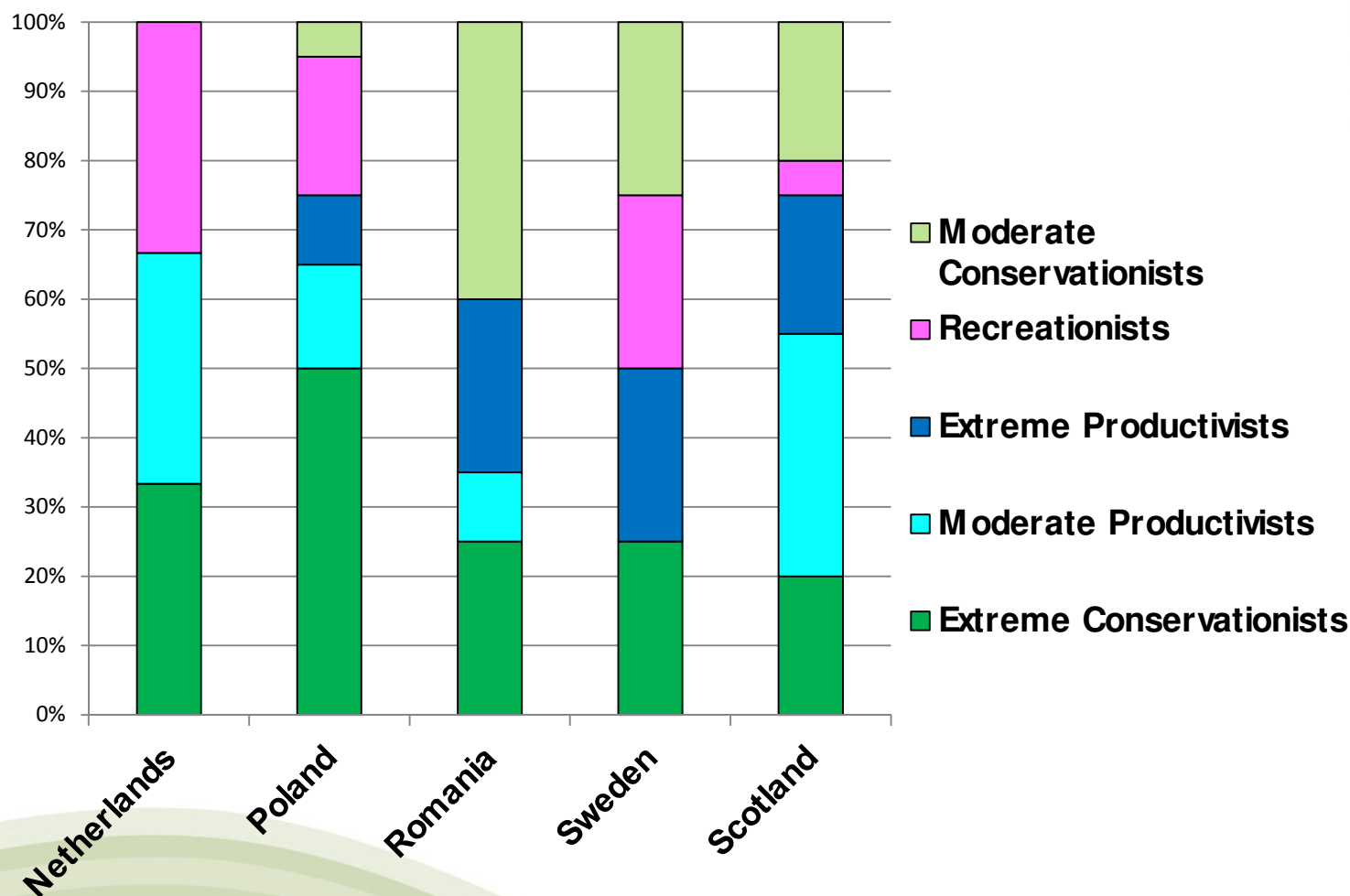
# Stakeholder evaluation of key components and characteristics of wooded landscapes



# An insight into stakeholder evaluation of ES of trees



# Stakeholder evaluation of ES in MFF: attitudinal grouping



Note: each column totals 100%, showing the percentage of respondents which belong to different attitudinal groups in each of the countries analysed

Nijnik *et al.* 2010, *Forests, Trees & Livelihoods* 19: 23-34



# Conclusions



While markets can provide tools in many cases, they do not work everywhere. Therefore, wider social science approaches and their proper combination can assist in valuation.

Valuation should be wider incorporated into decision-making processes; but when public good and intrinsic values issues are concerned, ethical and political choices must be made carefully and deliberately agreed.

Much then depends upon government involvement and proper incentives towards the changing of our behaviours for a more sustainable use of forests.

- Sustainable provision of ES from forests requires understanding of
  - Public & stakeholder attitudes, preferences and perceptions, and
  - How this KN can be used for different parties at the most appropriate times in decision-making processes

Valuation work and tools designed at Hutton seek to assist in doing this.