Selecting Ecosystem Service methods with the OpenNESS decision tree

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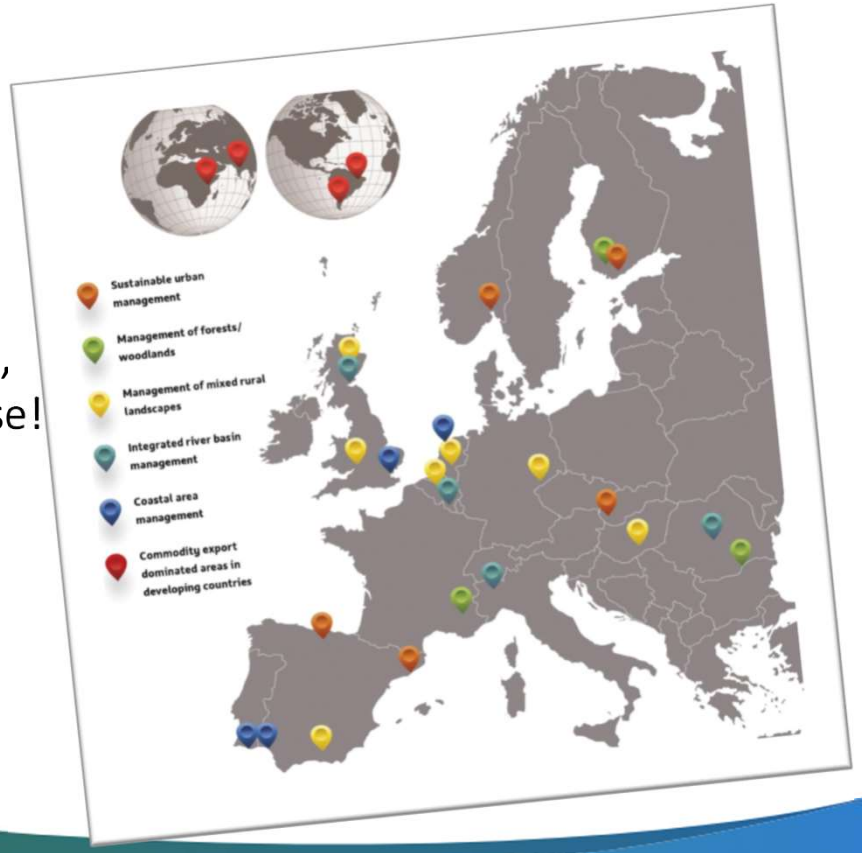
UK Centre for Ecology & Hydrology

The OPENNESS PROJECT

"Operationalising the concepts of natural capital and ecosystem services"

- EU FP7 Project
- Project duration: 2012-2017
- 27 cases studies across EU28+3 and wider (Africa, India, S. America) with many sub-projects per case!
- Wide range of practical examples across a wide range of contexts (urban, forests, catchments, mixed rural, coastal)



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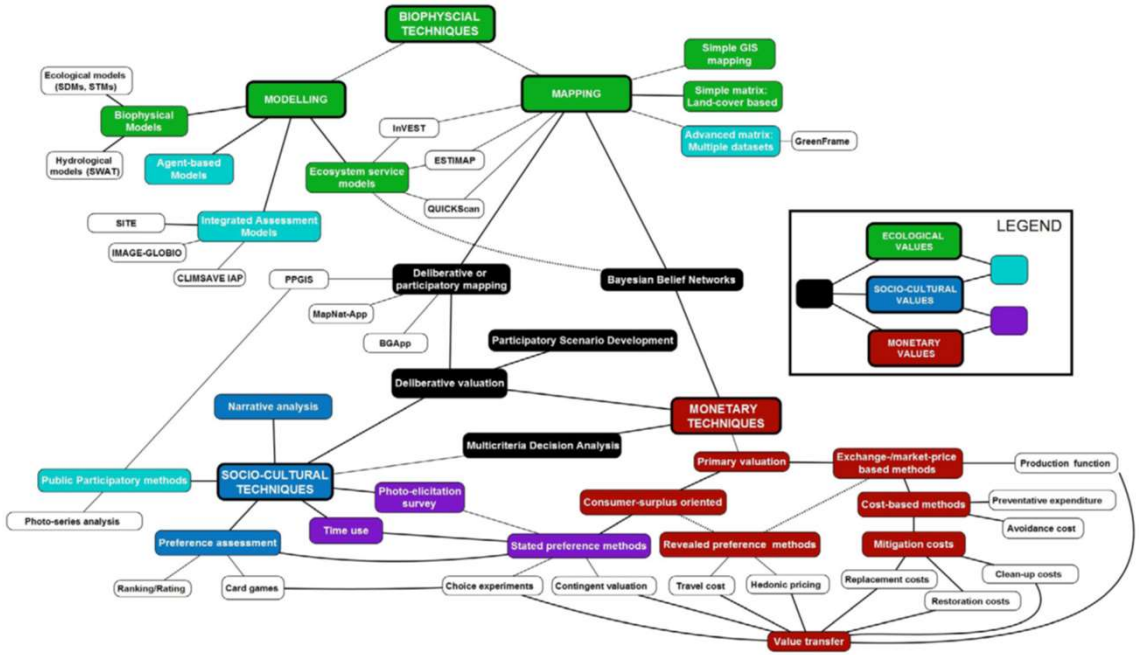
Lots and lots of options…

Across the consortium there were many methods across three broad classes – with overlaps!

- Biophysical models
- Ecosystem service models
- Agent-based models
- Integrated Assessment Models
- Simple GIS mapping
- Matrix-based approaches (simple and advanced)



… and that was just the broadly biophysical approaches…

- 8 socio-cultural & 10 monetary too…

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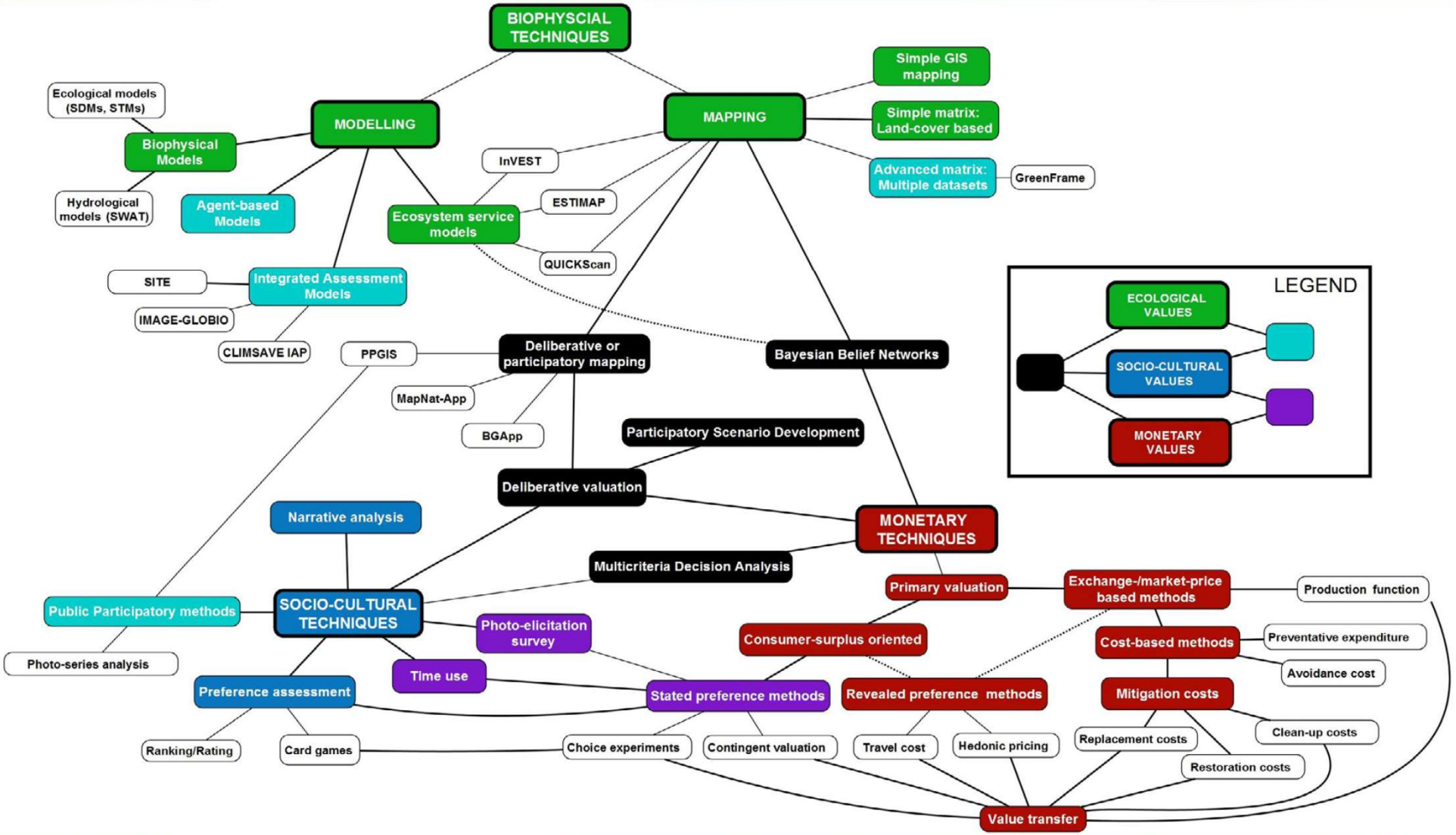

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Case study-driven

- Iterative process between methods experts and case study partners
  - Method guidelines
  - Meetings and workshops
  - Surveys of reasons for selection

Developing the decision trees with case studies:

1) What considerations led-their decision process?

2) Did the decision trees match their experiences?

3) How would they improve the decision trees as a means to advise others?

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What factors were a consideration?

Criteria for selecting different methods. Key: X = key feature or very important criteria for method selection; * = possible feature/some importance for method selection; ~ rare feature; + = only a relevant criteria if integrated or combined with other ecosystem service mapping or modelling techniques.

a) Biophysical methods

Criteria	Biophysical models	Ecosystem service models	Agent-based models	Integrated assessment models	Deliberative/ participatory mapping	Simple matrix	Advanced matrix	Bayesian Belief Networks
Characterisation of current state	X	X	X	X	X	X	X	X
Exploration of futures	X	X	X	X				*
Holistic understanding of social-ecological system dynamics		*	X	X	*		*	X
Addresses multiple ecosystem services		X	+	+	X	X	X	X
Enables trade-offs to be explored		X	+	+	X	X	X	X
Facilitates social learning	*	*	X	*	X	X	X	*
Informs decision-making	*	*	*	*	X	*	X	*
Stakeholder participation	*	*	*	*	X	*	X	*
Incorporates local knowledge	~	*	X		X	*	X	*
Easy to communicate					X	X	X	~
Transparent (easy to understand)					X	X	X	*
Integrated treatment of issues		X	X	X	X	*	*	X
Integration across disciplines		X	X	X	X	X	X	X
Integration of socio-ecological processes		*	X	X	~		~	*
Integration of spatial scales (cross-scale)	*	*	*	*				
Integration of temporal scales (cross-scale)	*	*	*	*				
Spatially-explicit	*	X	*	*	X	X	X	*
Temporally-explicit	*	*	X	X	*	*	*	*
Requires time series data	*		*	*				*
Mainly quantitative data	X	X	X	X	*	X	X	*
Mainly qualitative data		*	*		X	*	*	X
Data intensive	X	X	X	X			*	X
Addresses uncertainty	*	*	*	*				X
High level of expertise needed	X	X	X	X			*	X
Large amount of resources needed	X	X	X	X	*		*	X

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a) Biophysical methods

Criteria	Ecosystem service models	Agent-based models	Integrated assessment models	Deliberative/ participatory mapping	Simple matrix	Advanced matrix	Bayesian Belief Networks
Characterisation of current state	X	X	X	X	X	X	X
Exploration of futures		X	X				*
Holistic understanding of		X		*		*	X
Addresses multiple				X	X	X	X
Enables trade				X	X	X	X
Facilitat				X	X	X	*
Inf				X	*	X	*
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Main							
Mainly							
Data int							
Addresse							
High level							
Large amou							

Preference assessment | Photo-elicitation | Photo-series analysis | Narrative analysis | Participatory scenario development | Deliberative valuation | Time use | Multi-criteria decision analysis (MCDA)

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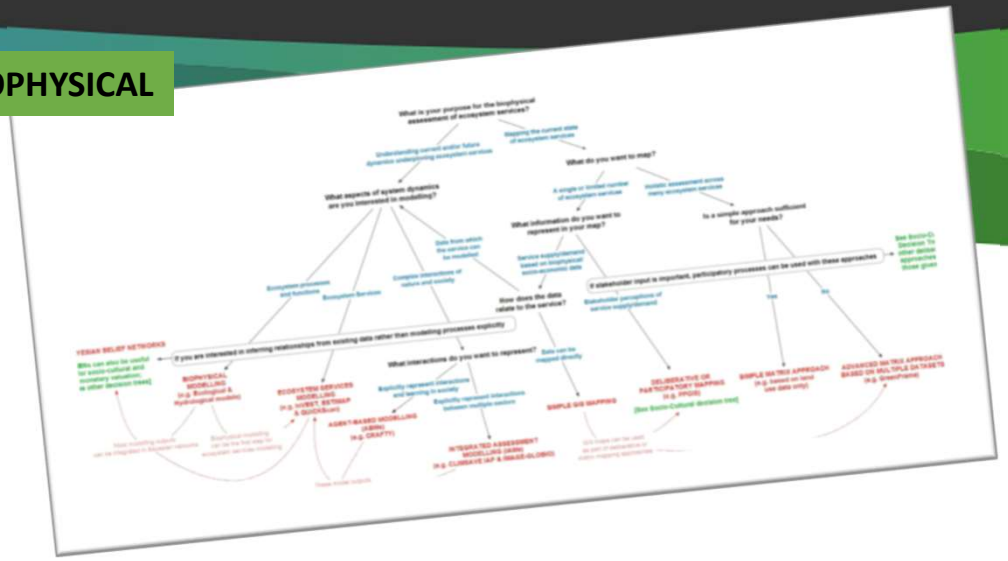
AND THE SAME FOR SOCIO-CULTURAL AND MONETARY METHODS

	Source of data		Types of individual valuation methods			Decision-support tools	
	Primary study	Value transfer	Stated Preference	Revealed preference	Exchange-based & cost-based	CEA	BCA
Decisive – Priority-setting	*	X	X	*	*	X	X
Technical – Incentive design, pricing	*		X	~	*		*
Technical – Litigation/Fines	~		~	~	*		*
Addresses multiple ecosystem services	*	*	*	*			X
Enables trade-offs to be explored	*	*	X	X			X
Stakeholder participation			*	~		X	X
Incorporates local knowledge			X			*	*
Easy to communicate	X	*	X	*	X	X	*
Transparent (process easy to understand)	X	*	*	*	*	*	*
Integrated treatment of issues			X	*	*	*	*
Integration across disciplines			X	*		*	X
Integration of processes (with governance)			*	~	X	*	X
Integration of spatial scales (cross-scale)			~			*	~
Integration of temporal scales (cross-scale)			~			~	*
Spatially-explicit			*			X	X
Temporally-explicit			X	X	~	*	*
Requires time series data				X	X	*	X
Mainly quantitative data	X	X	X	X	*	*	X
Mainly qualitative data					X	X	X
Data intensive	X		X	X	*	*	X
Addresses uncertainty:	X	*	X	X	*	*	*
High level of expertise needed	X	*	X	X		*	X

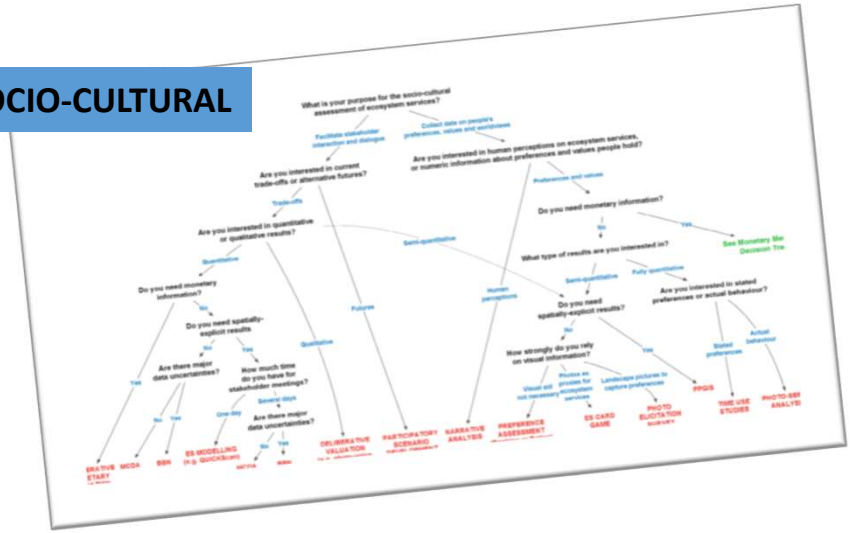
Decision trees

- Three trees – biophysical, socio-cultural and monetary
- BUT links *between* decision trees and feedbacks and links between methods
- Similar starting points “what is the purpose of your study”
- Multi-modal options

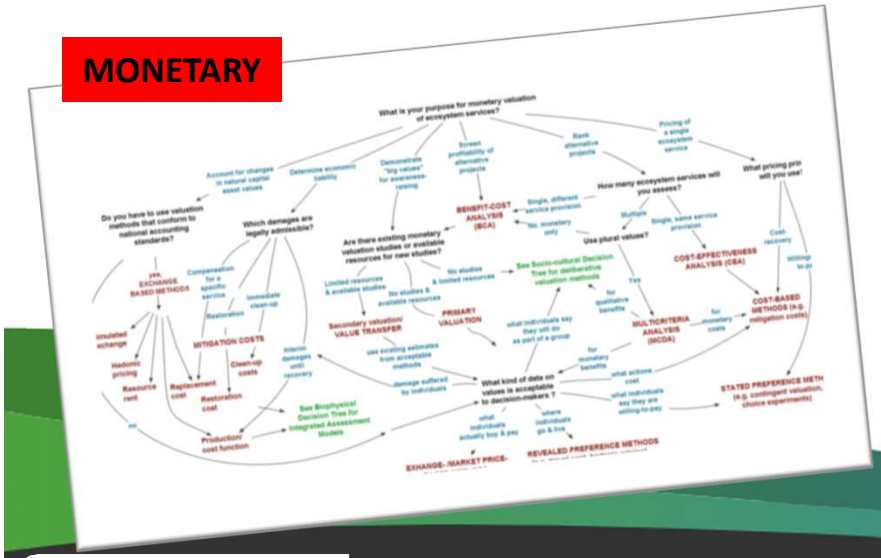
BIOPHYSICAL



SOCIO-CULTURAL



MONETARY



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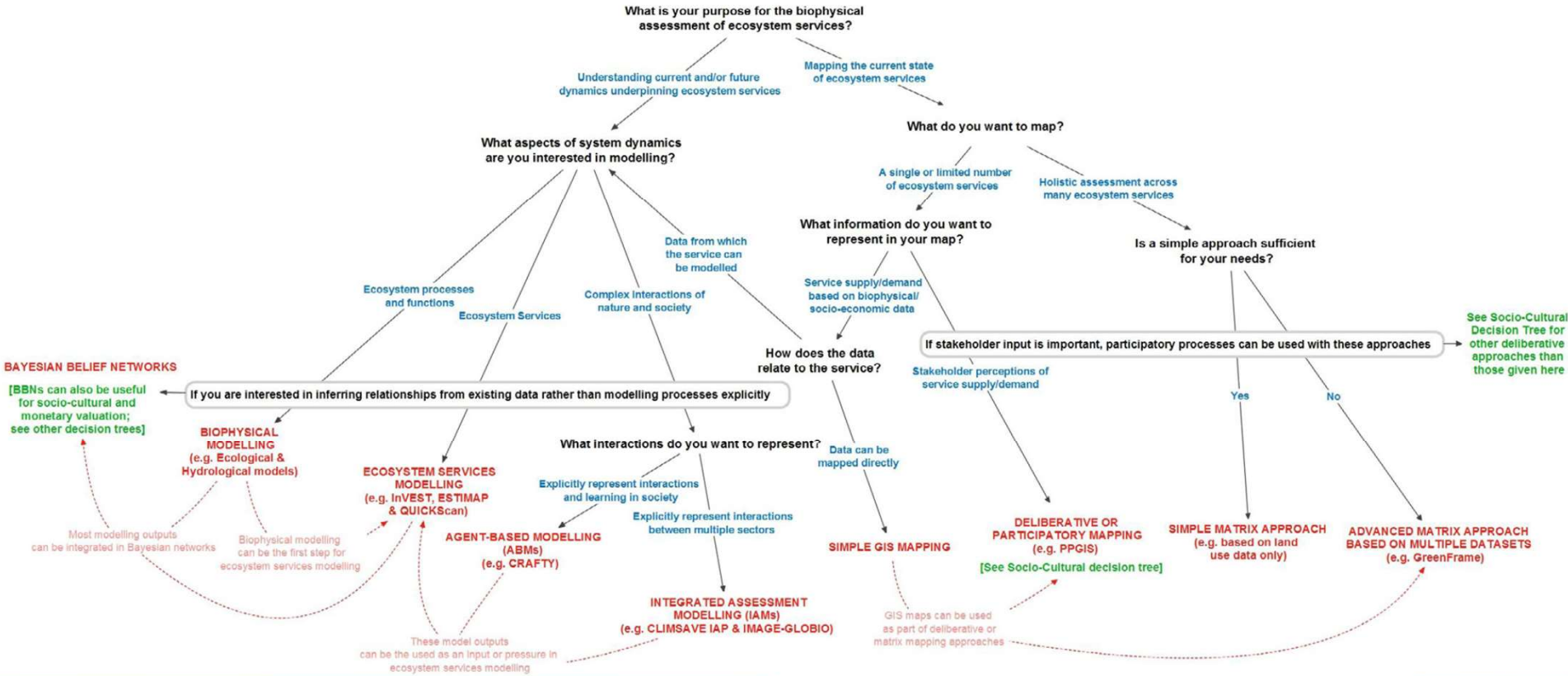
Example: the Biophysical tree

(a) Biophysical methods decision tree:



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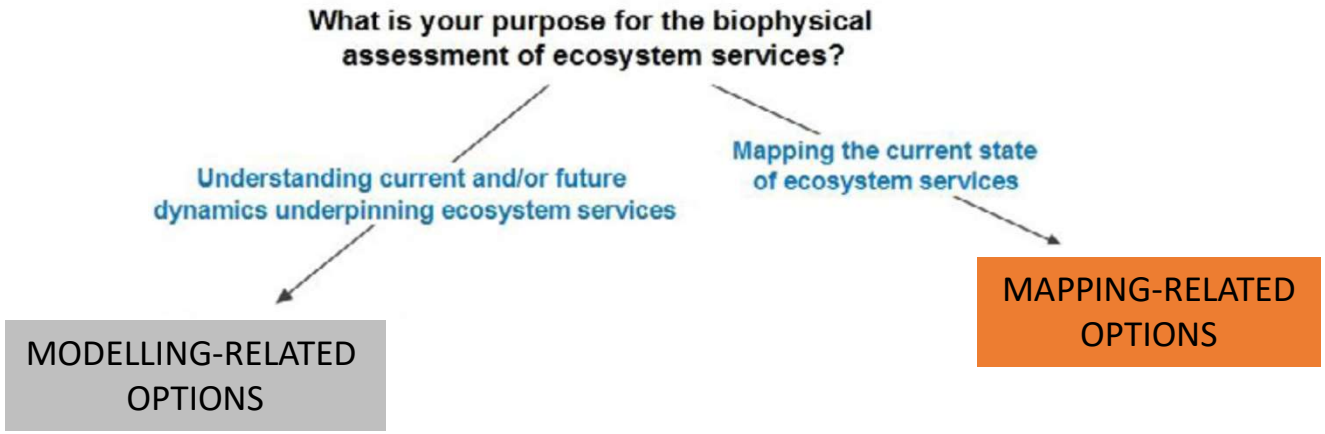
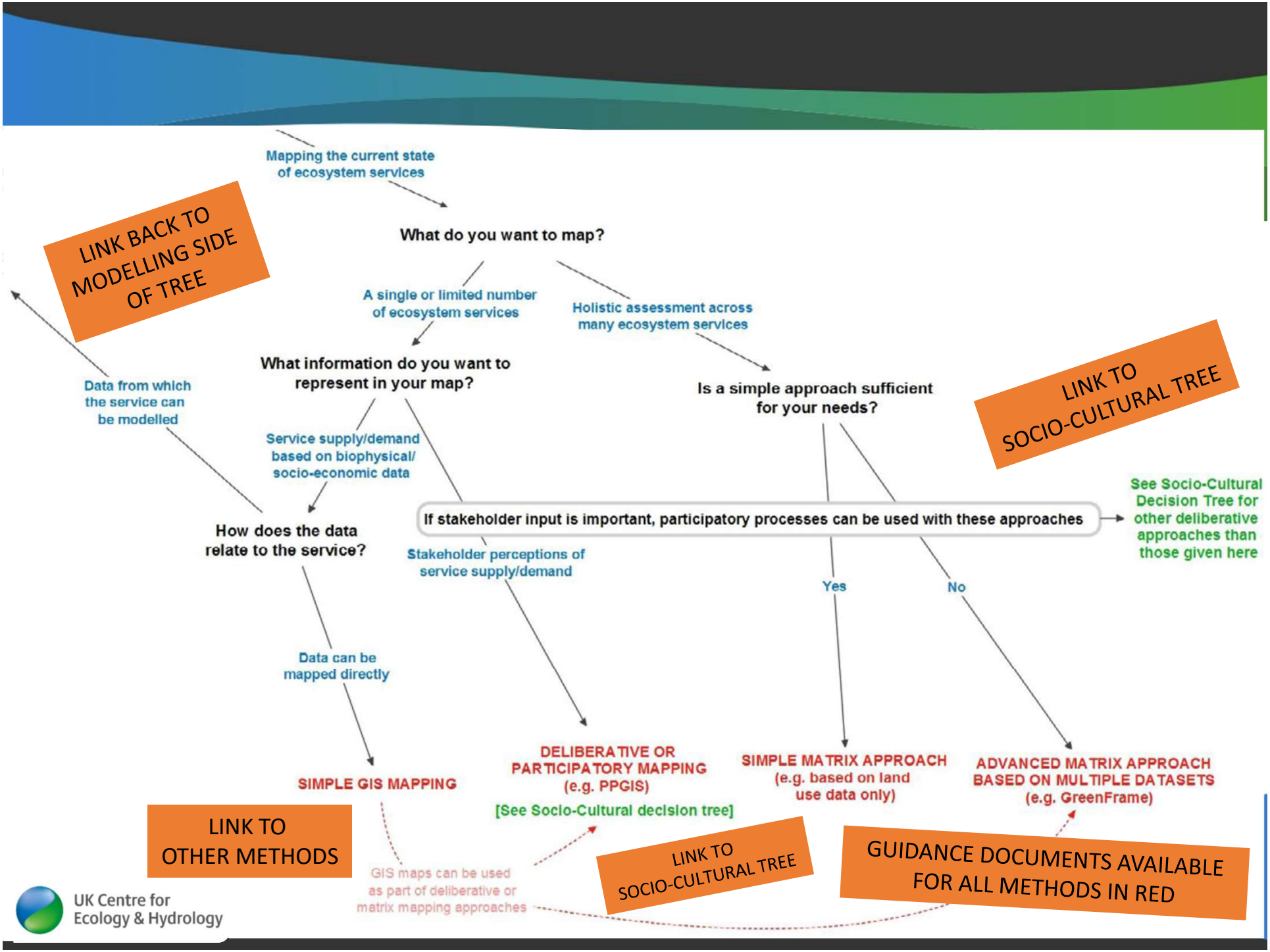
Example: the Biophysical tree

SIMPLE START QUESTION SAME ON ALL TREES




Mapping the current state of ecosystem services
What do you want to map?
LINK BACK TO MODELLING SIDE OF TREE
A single or limited number of ecosystem services
Holistic assessment across many ecosystem services
What information do you want to represent in your map?
Is a simple approach sufficient for your needs?
LINK TO SOCIO-CULTURAL TREE
Data from which the service can be modelled
Service supply/demand based on biophysical/ socio-economic data
If stakeholder input is important, participatory processes can be used with these approaches
See Socio-Cultural Decision Tree for other deliberative approaches than those given here
How does the data relate to the service?
Stakeholder perceptions of service supply/demand
Yes
No
Data can be mapped directly
SIMPLE GIS MAPPING
DELIBERATIVE OR PARTICIPATORY MAPPING (e.g. PPGIS)
[See Socio-Cultural decision tree]
SIMPLE MATRIX APPROACH (e.g. based on land use data only)
ADVANCED MATRIX APPROACH BASED ON MULTIPLE DATASETS (e.g. GreenFrame)
LINK TO OTHER METHODS
GIS maps can be used as part of deliberative or matrix mapping approaches
LINK TO SOCIO-CULTURAL TREE
GUIDANCE DOCUMENTS AVAILABLE FOR ALL METHODS IN RED
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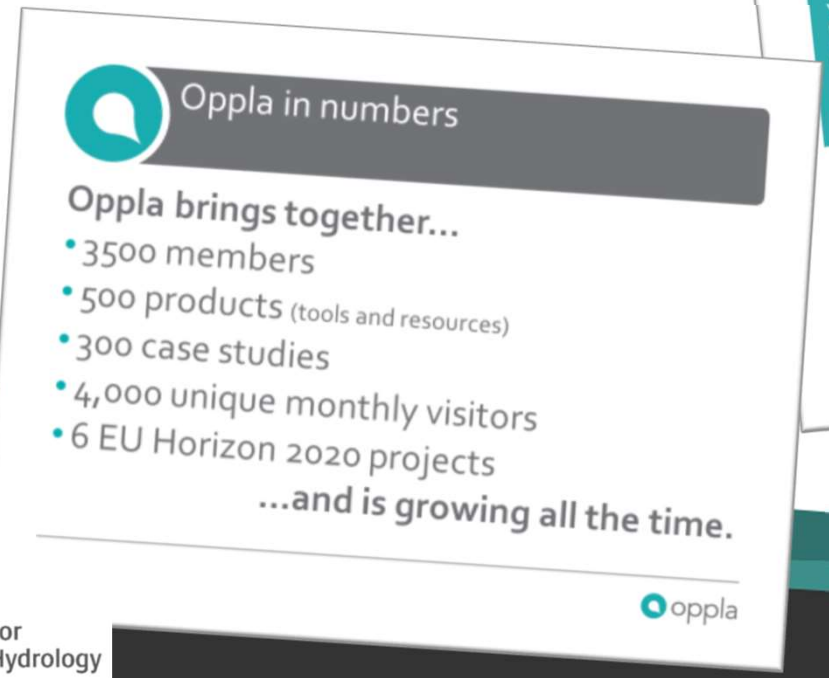
Conclusion

- There are many methods to choose from and many ways to select methods
- The OPENNESS decision tree is a high-level approach designed to:
  - stimulate awareness of the range of tools and their interconnections
  - encourage the exploration of potential methods for a given operational context
- There is no perfect or correct solution. Within OPENNESS appropriate methods were those which could be:
  - operationalised within a case study context
  - clearly address a defined study purpose within constraints on budget, time, data and expertise
  - address a range of ecosystem services which are relevant for the study purpose
- Methods can be combined to make up for advantages/disadvantages in individual methods
- For more detail on the decision trees and the trees themselves see Harrison et al. (2017)*
- Method fact sheets are available at http://oppla.eu (search: “Method factsheet”)

***Harrison PA, et al. (2017). Selecting methods for ecosystem service assessment: A decision tree approach. Ecosystem Services. DOI: 10.1016/j.ecoser.2017.09.016**

Oppla

1. Repository for (practical) case studies
2. Marketplace for methods
3. Community for advice



https://oppla.eu/

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