

Diversity of tree-related ecosystem services demands among stakeholders in agroforestry landscape

Gauthier FERRIER¹, Camille JAHEL², Juliette LAIREZ³, Louise LEROUX^{1,4}

¹CIRAD UPR AIDA, ²CIRAD UMR TETIS, ³INRAE UMR AGIR, ⁴IITA



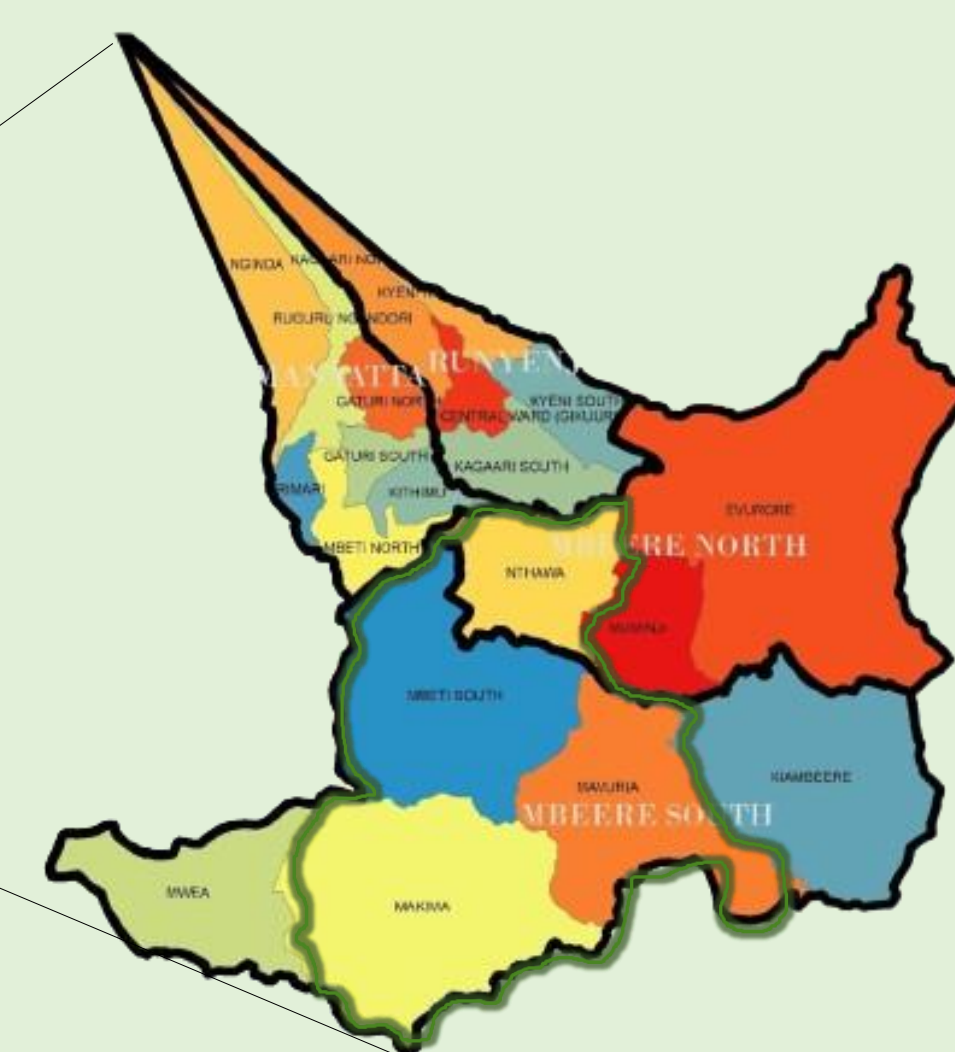
Introduction

- Agroforestry is widely promoted for its potential to enhance food security, livelihoods and climate mitigation.
- But its effects are context-dependant and may involve synergies and trade-offs.
- Understanding the diversity of tree-related ecosystem services demands across society and landscape is crucial to adapt agroforestry initiatives to local contexts.

Research questions

What are the ecosystem service demands of stakeholders regarding trees?
How do these demands interact among stakeholders within the landscape?

Study case of Embu Living Lab in Kenya



Study area

Area : 1,000 km² - Altitude : 600 - 1280 m
Semi-arid zone with high variability of rainfall
Main activity is mixed agriculture (agro-pastoralism)

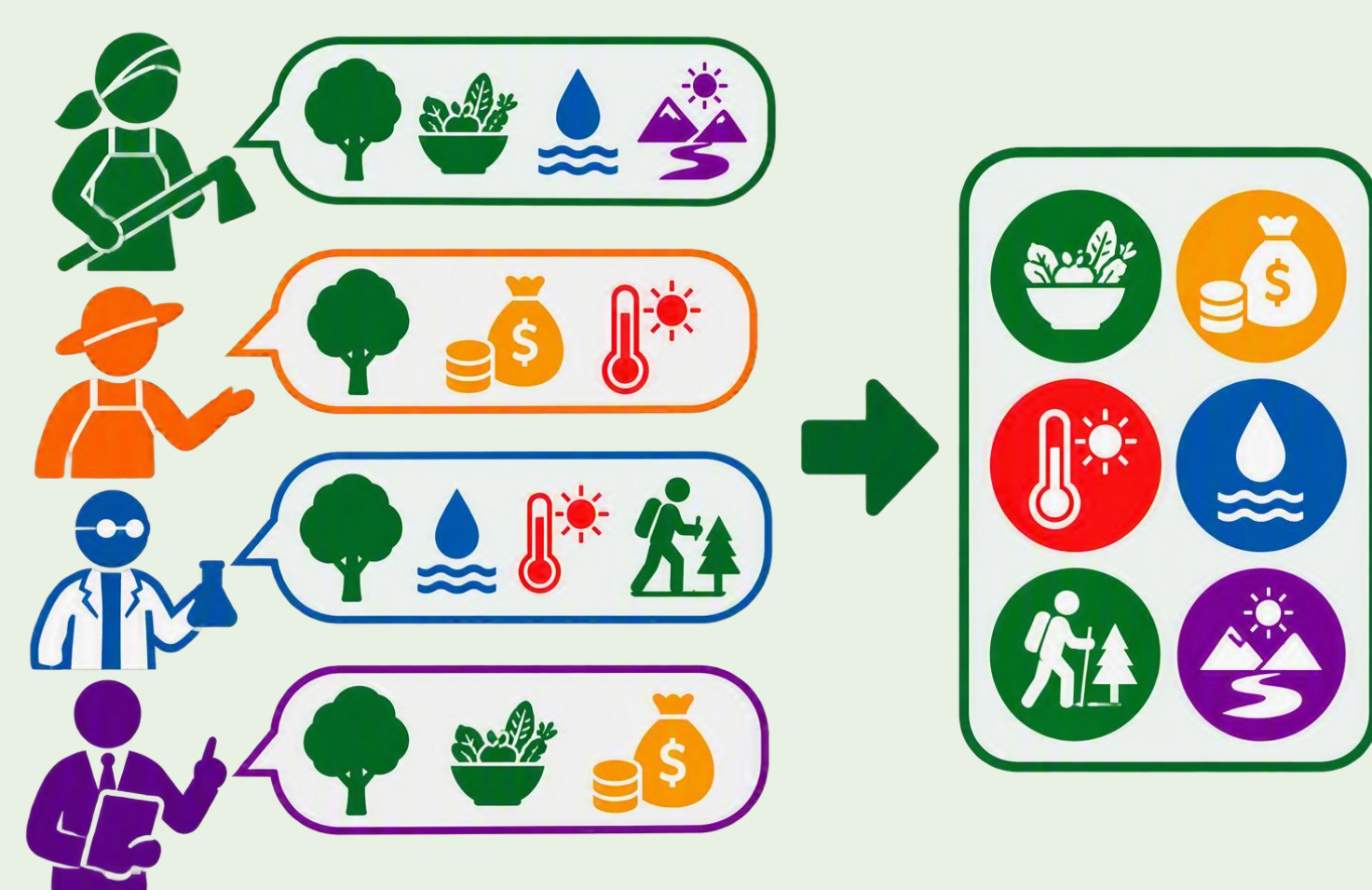
Method to study tree-related ecosystem services (ES) demand in society & in landscape

Step I – Tree-related ES identification by interviews

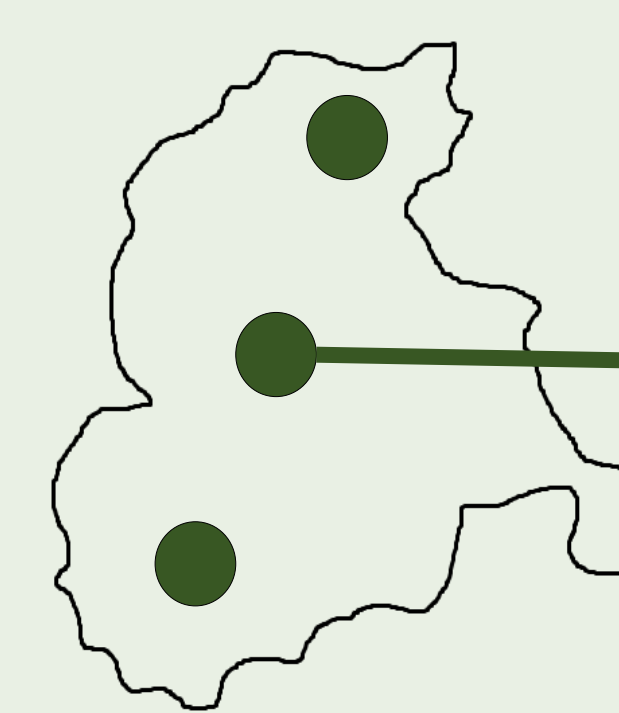
25 interviews

Stakeholders describe **benefits and detriments** (or disadvantages) of trees they perceived.

Responses are analysed to obtain a **list of tree-related ES**.



Landscape characterisation by participatory mapping



3 contrasted villages in the study area



3 to 6 inhabitants describe the area



Identification of main landscape units

Step II – Scoring of the tree-related ES by stakeholders

50 directive surveys

Each individual allocates tokens to each identified ES.

The number of tokens given to each ES represents the **level of importance** according to each respondent.



Spatial characterization of ES demand by stakeholders

50 directive surveys

Each individual identifies the locations associated with their ecosystem service demands.

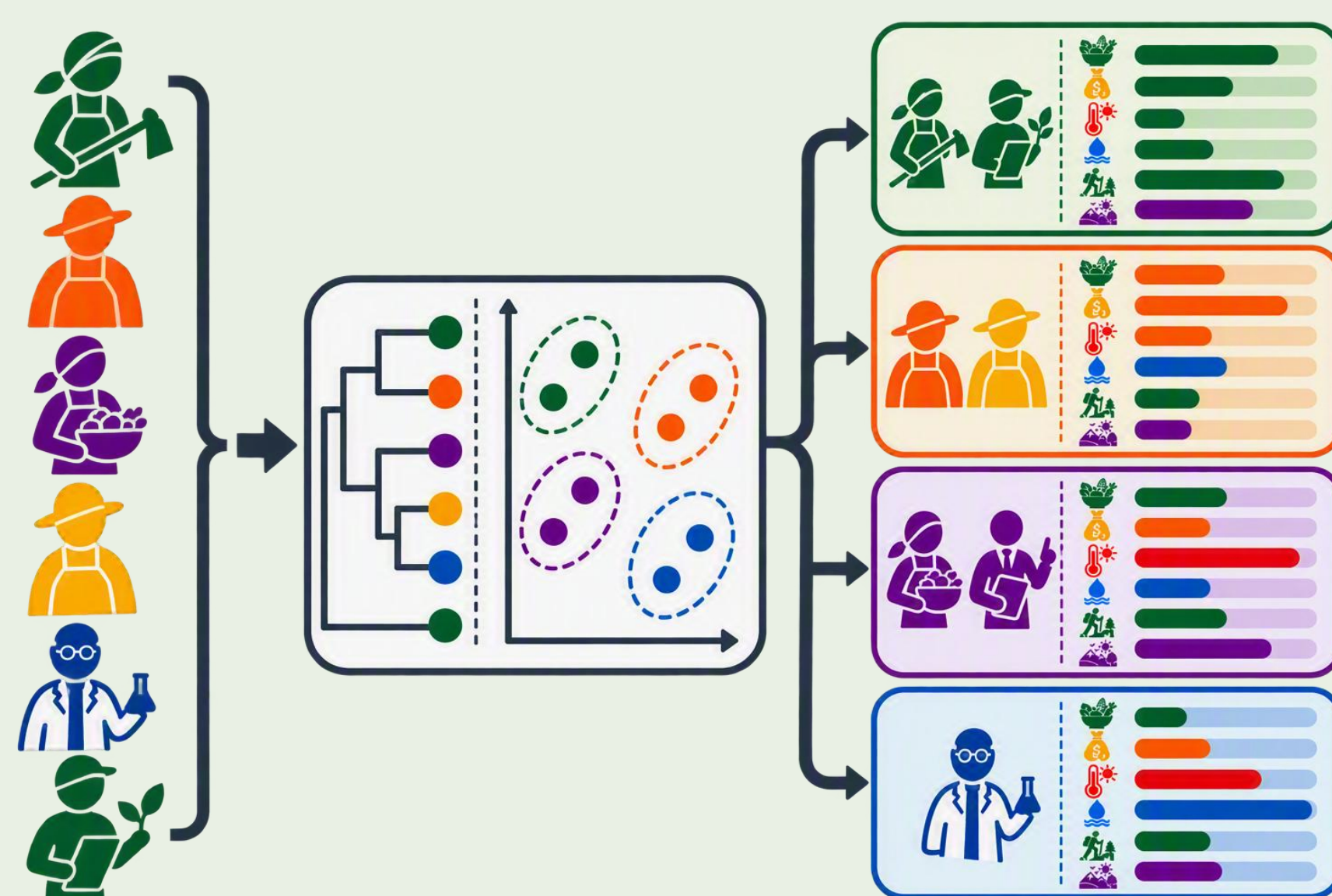
Each landscape units is associated with ES demands.



Step III – Clustering analysis

Surveyed stakeholders are classified in a **typology based on how they scored ES** through clustering analysis.

Profiles of tree-related ES demands are built.



Overlap analysis



ES demands are analysed through overlap analysis among stakeholders and for each landscape unit.

Bundle of ES demands are revealed.

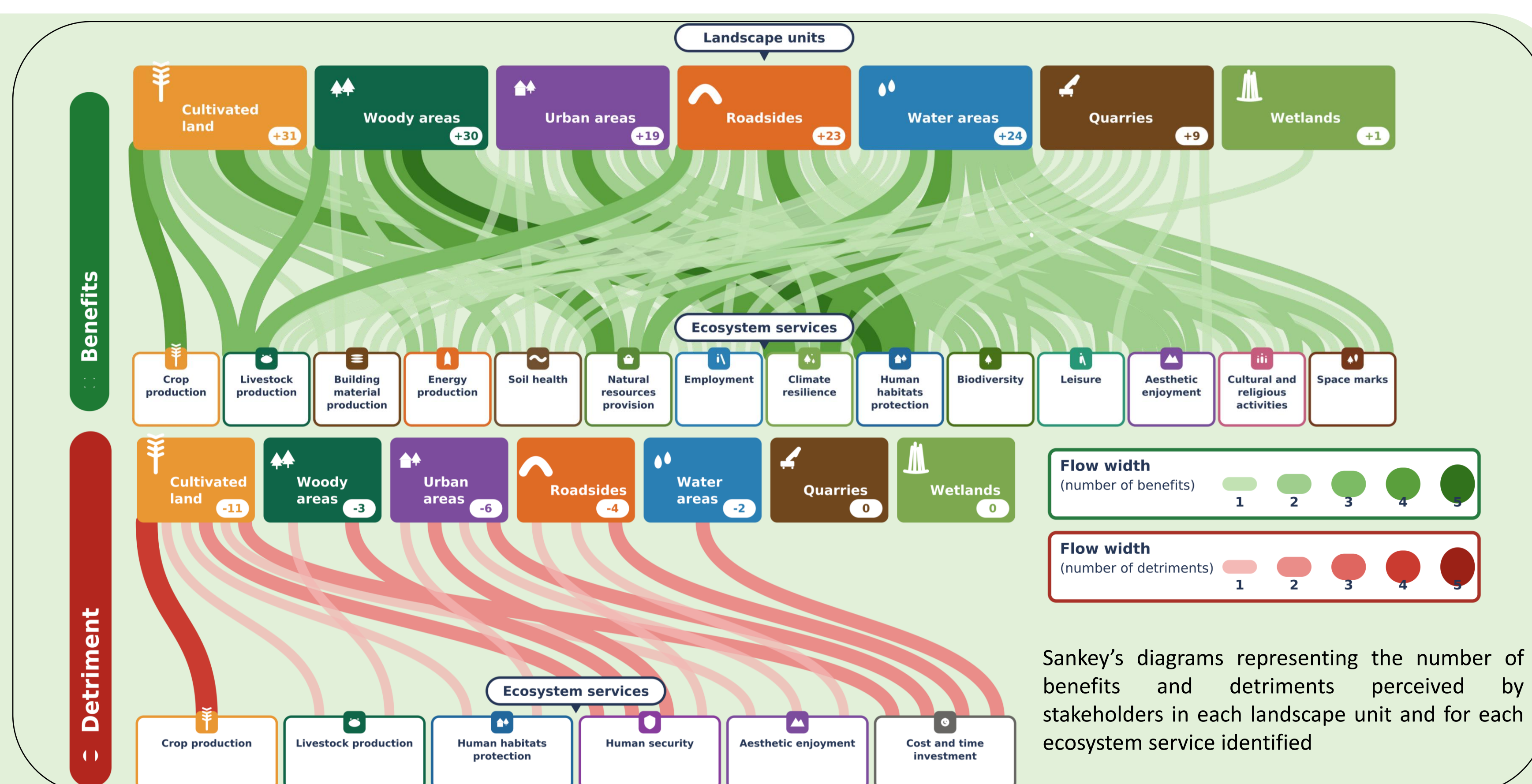
In each bundle, **interactions between demands** are classified (synergies, trade-off, neutral).

First results from step I

7 landscape units identified
51 perceived benefits and detriments grouped in **16 tree-related ES**.

Each landscape unit is associated to several perceived benefits and detriments linked to ES categories.

Number of benefits/detriments associated with each landscape unit are indicated in the diagram.



First conclusions

High diversity of demands across the landscape units
=> **High multifunctionality**.

Most diverse demands of **benefits** about trees in **cultivated land and woody areas**.

Larger number of **detriments of trees** in **cultivated land**, especially for **competing with crop production**.