# EVAMAB results from Mt. Elgon BR

**EVAMAB** CROSS-FERTILIZING WORKSHOP,
14TH MAY 2019, BLUE NILE RESORT HOTEL, BAHIR DAR- ETHIOPIA.

# EVAMAB project

Focus on 4 Biosphere Reserves (buffer + transition areas):


Pendjari National Park, Bénin

Lake Tana, Ethiopia

Mount Elgon, Uganda

Lake Manyara, Tanzania

# Contents

- Mt. Elgon National Park (Fredric Kizza, Chief Warden MENP )
- **Perceptions** on PES of local people (Zerubabeeli Naturinda, Busitema university)
- Mapping & Marketing **Carbon** (Koen Vanderhaegen & Bruno Verbist, KULeuven)
- **Watershed** functions (Bruno Verbist, KULeuven)
- Impact of voluntary standards on **biodiversity** and development in the coffee belt (Koen Vanderhaegen, KULeuven)

# Management of the Mt. Elgon National Park and links with PES (Fredric Kizza)

# Mount Elgon MAB


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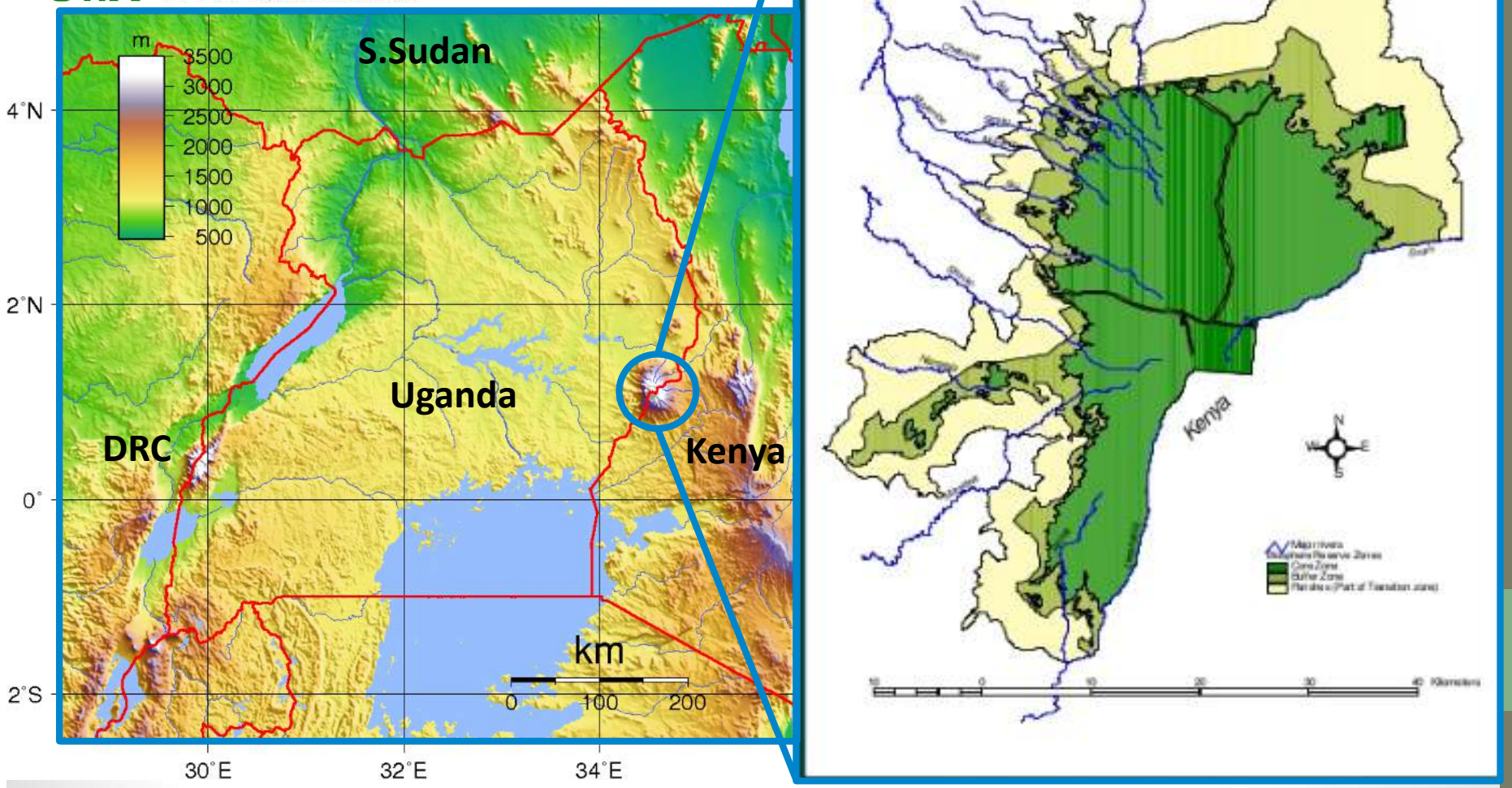
# Mount Elgon


m
3500
3000
2500
2000
1500
1000
500
S.Sudan
Uganda
DRC
Kenya
4°N
2°N
0°
2°S
30°E
32°E
34°E
km
0
100
200
Mt. Elgon Biosphere Reserve - Uganda
Proposed Zonation
Kenya

# Afromontane Rainforest

# Tourism

# Firewood and timber

# Non-wood forest products

Wild mushrooms

Honey

Medicines

Bamboo shoots (malewa)

# Water provisioning

Gravity water flow schemes provide clean drinking water to downstream communities

# Erosion and Landslide Control

Landslides are yearly causing casualties at Mt. Elgon…

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# Cultural sites

Bagishu culture

Elgon = Mount Masaba

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# Local people's perceptions on (P)ES in Mt. Elgon landscape

**Zerubabeeli Naturinda**[1], Bruno Verbist[2], Koen Vanderhaegen[2]

[1] *Faculty of Natural Resources and Environmental Sciences, Department of Natural Resources Economics, Busitema University*

[2] *Division Forest, Nature and Landscape, Department of Earth & Environmental Sciences, KU Leuven*

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*Part of Mt. Elgon forest ecosystem*

*Banana- coffee system at forest edges of Kapkwai, Kapchorwa district*

*Silted stream with sugarcane growing on its banks, Manafwa district*

*Protected stream in Bushiyi, Bududa district*

Forest collected mushrooms for sale, Bunamubi market, Bududa district

# Rapid assessment of ES

**The Protected Areas Benefits Assessment Tool**

A methodology

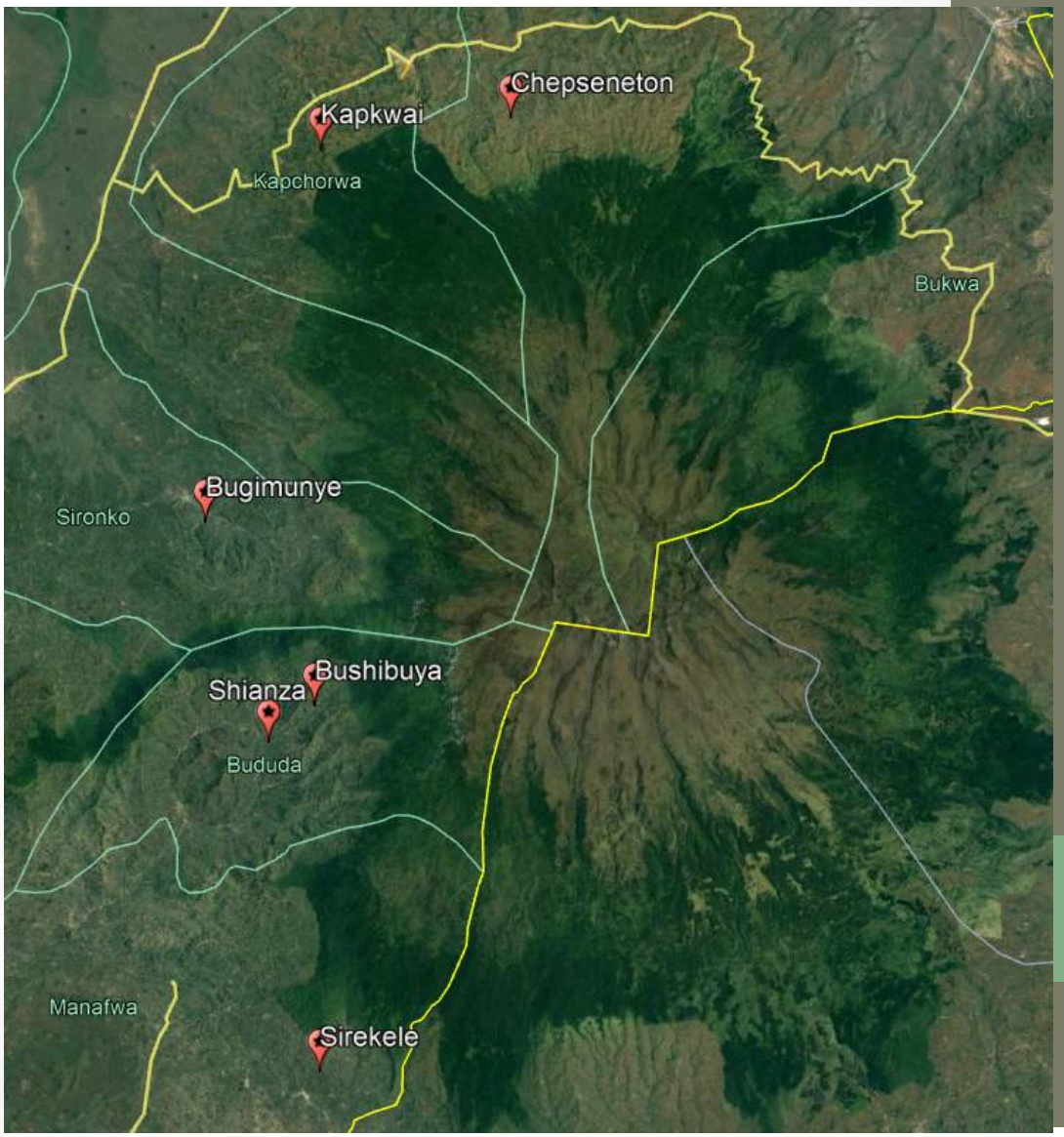
Nigel Dudley and Sue Stolton, Revised October 2012

WWF

DINARIDES

tessa

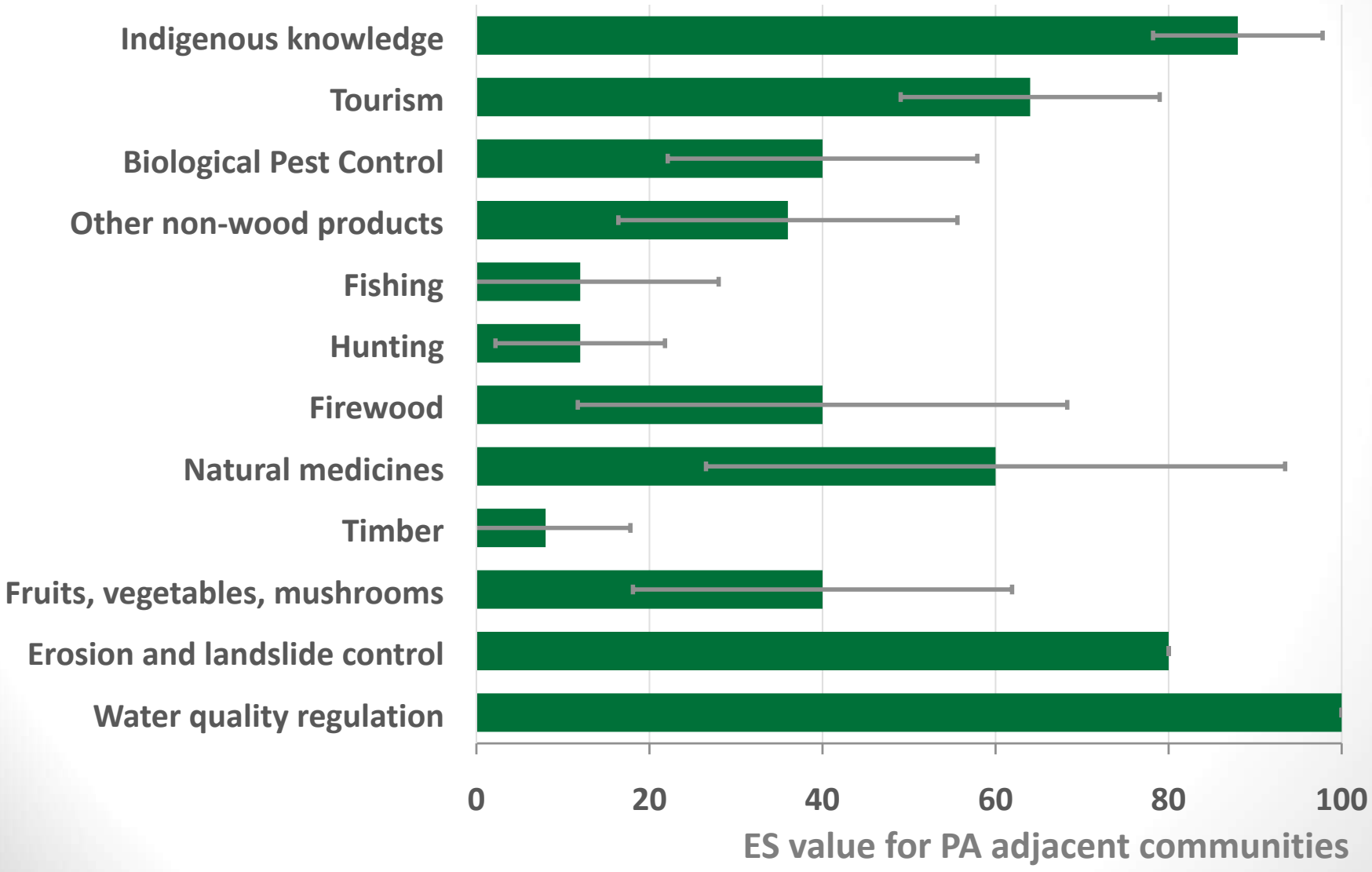
Toolkit for Ecosystem Service Site-based Assessment



# Rapid assessment of ES

- TESSA-tool and PA-BAT tool pilot study in Mt. Elgon region (Uganda)

# Rapid assessment of ES

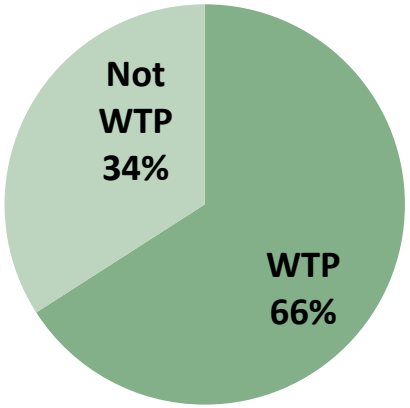


# Local experiences with PES

- Looking at past & existing PES in the Elgon area KII (UWA, ECOTRUST, IUCN, ICRAF, …)

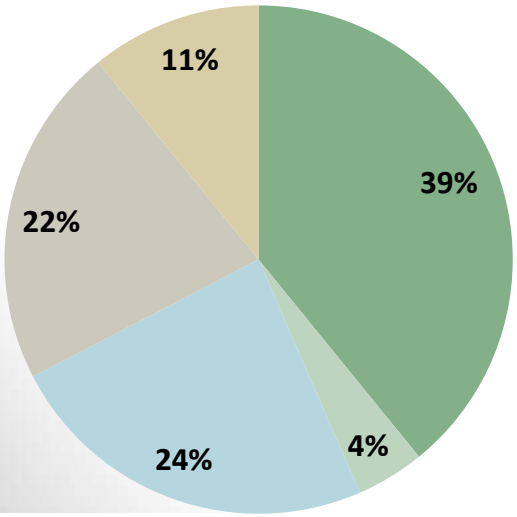
- Household interviews (>100):
  - Perceptions on ES and their willingness to pay for them

# Attitudes towards PES




- 66% expressed that they would be willing to pay for continued provision of the ES
- 34% were not willing to pay for ES delivery

***Reasons for not willingness to pay for the ecosystem services***




- I have a right to forest use
- We already pay much taxes
- This cost should be paid from the national budget
- I can't answer this question
- Forest services' have no monetary value

Mt. Elgon forest adjacent communities are very poor Low income earners & would be willing to pay very little or nothing for conservation

# Relationship of willingness to pay for the ecosystem services and socio-economic characteristics

- Correlation analysis show that distance to the forest & economic activities carried out in the area had a significant relationship with WTP for ES (P-Value<0.05)

  **Implication:** Closeness to the forest increased the urge to pay for continued benefits
- Forest adjacent communities are majorly smallholder farmers with a high dependency on the ecosystem.
- There is a close link between people's WTP to pay for ES and economic activities.
- Most of the respondents were much aware of how important the ecosystem was in supporting agriculture

  (Water provision & pollination services).

# Farmers experiences, ECOTRUST

- The incentives awarded are not commensurate to the efforts put in by local people, but more farmers are on the waiting list to join ECOTRUST activities.
- Most vulnerable groups such as the landless do not benefit
- PES fund boosted local people's involvement in restoration and conservation measures such as agroforestry
- Mt. Elgon region having suffered several disasters such as landslides, land degradation, the local people have moved in fast to engage in EBA measures for sustainable development

# Assessment of aboveground carbon in the Mt. Elgon area

Vanderhaegen K.[2], Verbist B.[2], Muys B.[2], Z. Naturinda[1], Isabirye M.[1]

[1] *Faculty of Natural Resources and Environmental Sciences Department of Natural Resources Economics, Busitema University*

[2] *Division Forest, Nature and Landscape, Department of Earth & Environmental Sciences, KU Leuven*

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# Research question

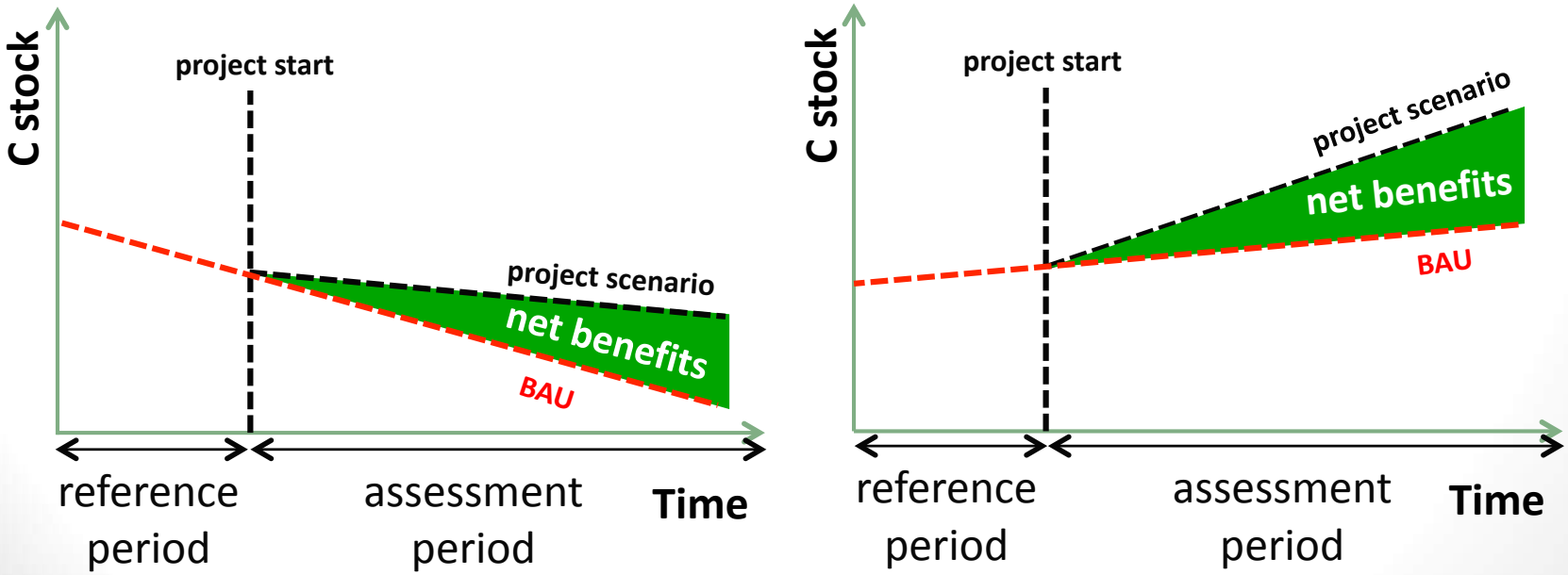
Would carbon projects in the Mt. Elgon region be viable under the current conditions?

*Scientific information needed:*

- Assess carbon stocks all main LU systems
- Develop a baseline scenario
- Estimate the carbon storage potential

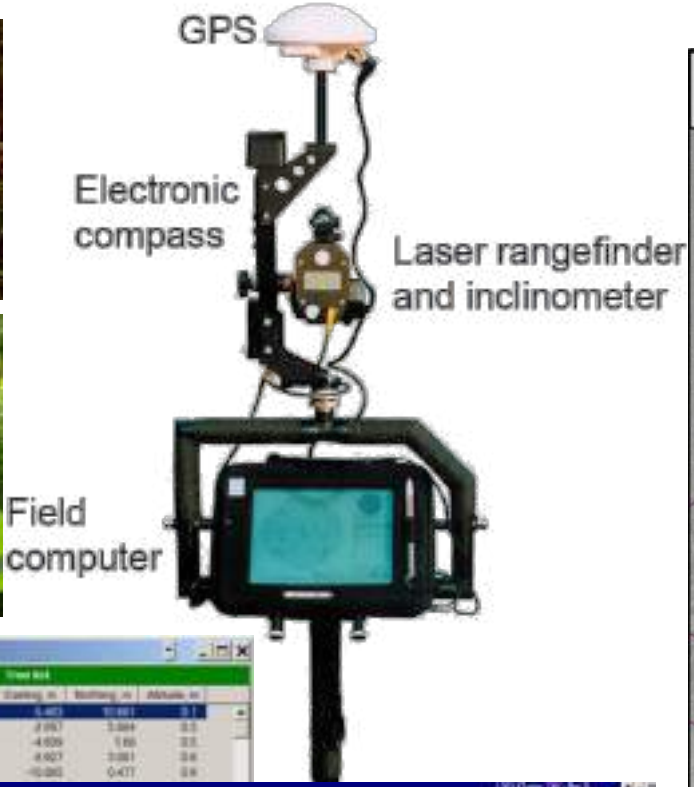
# Baseline Scenario ?

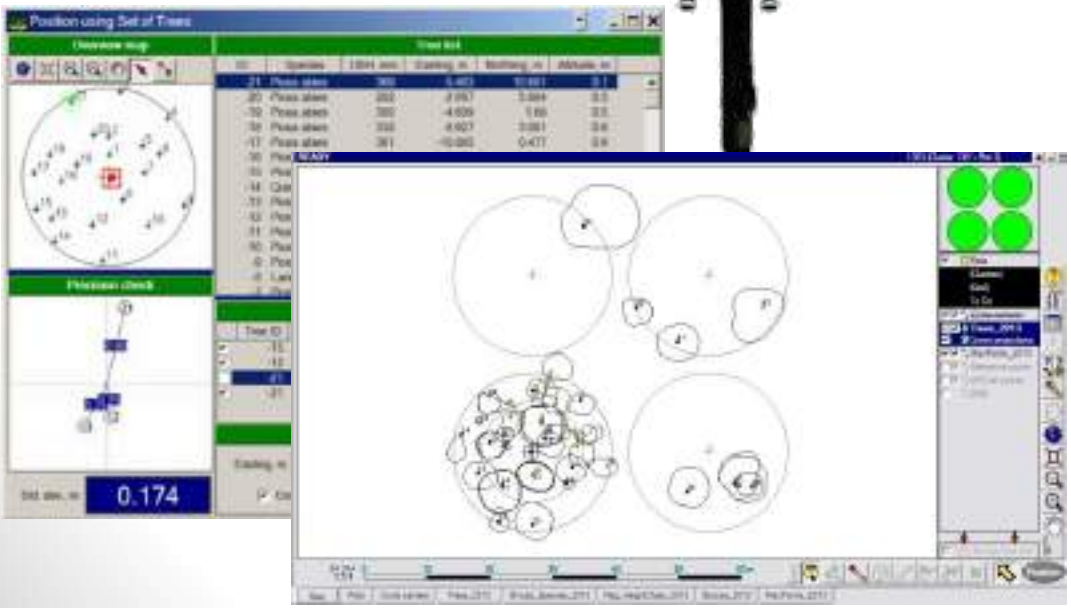
- Assess carbon stocks all main LU systems
- **Develop a baseline scenario**
- Estimate the carbon storage potential

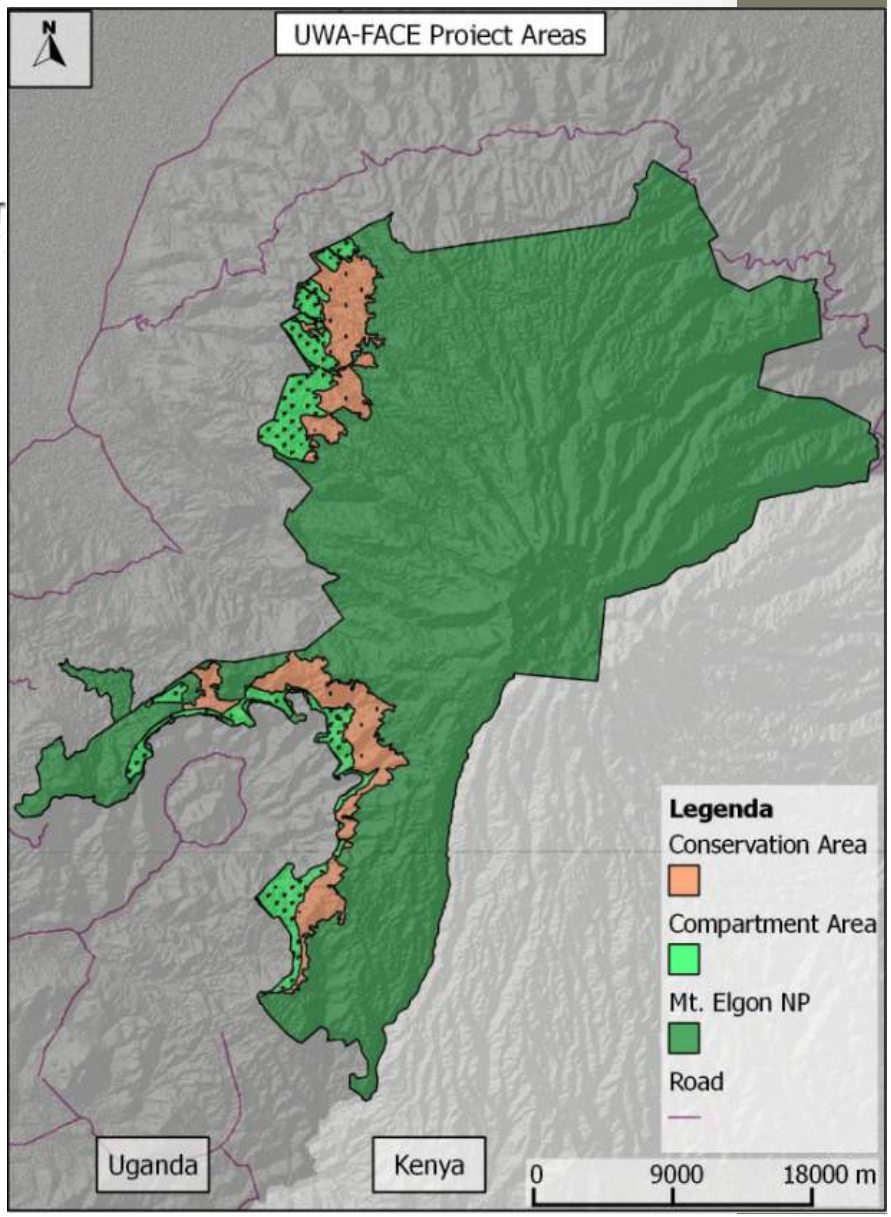


# Mt. Elgon National Park



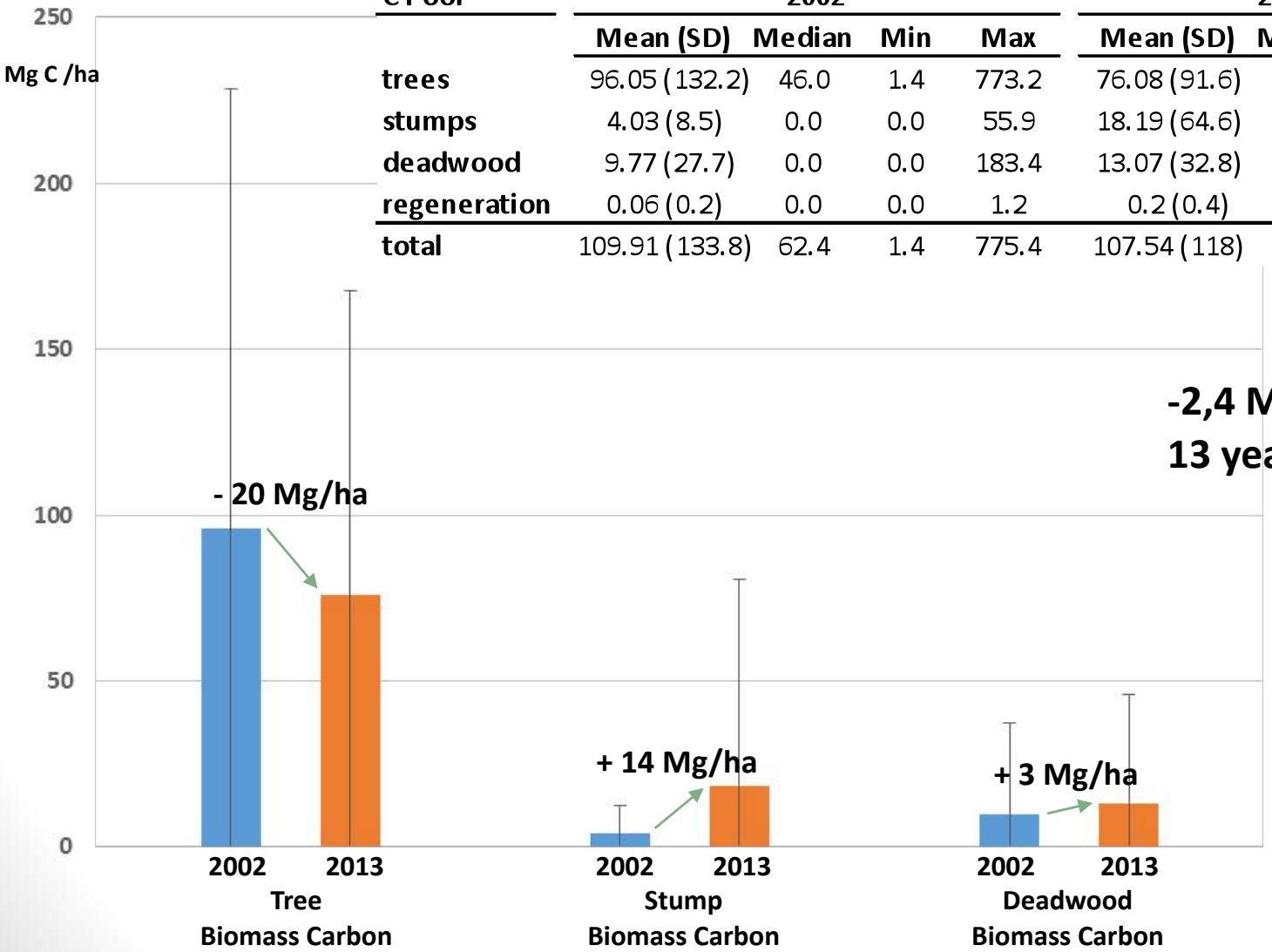


# C stock changes

| C Pool | 2002 | | | | 2013-2015 | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean (SD) | Median | Min | Max | Mean (SD) | Median | Min | Max |
| trees | 96.05 (132.2) | 46.0 | 1.4 | 773.2 | 76.08 (91.6) | 40.8 | 0.3 | 438.9 |
| stumps | 4.03 (8.5) | 0.0 | 0.0 | 55.9 | 18.19 (64.6) | 1.4 | 0.0 | 482.8 |
| deadwood | 9.77 (27.7) | 0.0 | 0.0 | 183.4 | 13.07 (32.8) | 0.9 | 0.0 | 224.8 |
| regeneration | 0.06 (0.2) | 0.0 | 0.0 | 1.2 | 0.2 (0.4) | 0.0 | 0.0 | 2.1 |
| total | 109.91 (133.8) | 62.4 | 1.4 | 775.4 | 107.54 (118) | 57.3 | 0.3 | 574.8 |




**-2,4 Mg C ha$^{-1}$ in 13 years**

# Upscaling

**Boosted Regression Trees in R**

**3 models**

- Model 1

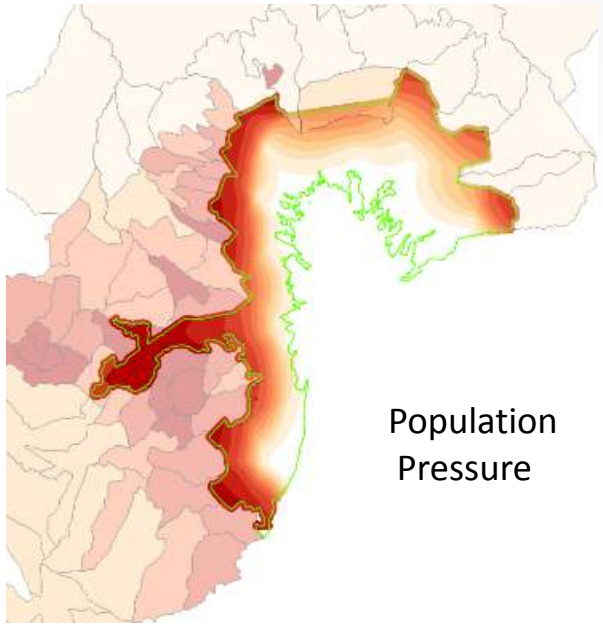
upscaling C 2002 data 250 plots

- Model 2

predict C change for 174 non-re-measured plots

- Model 3

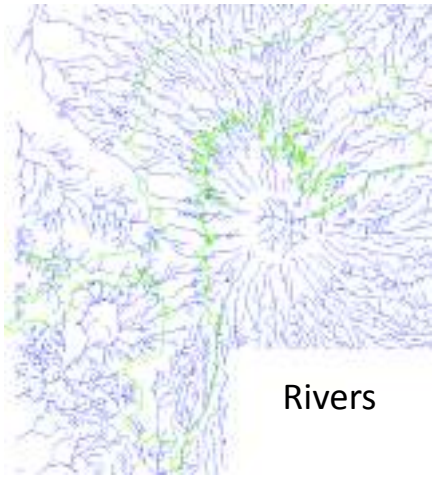
upscaling measured and modelled C change 250 plots



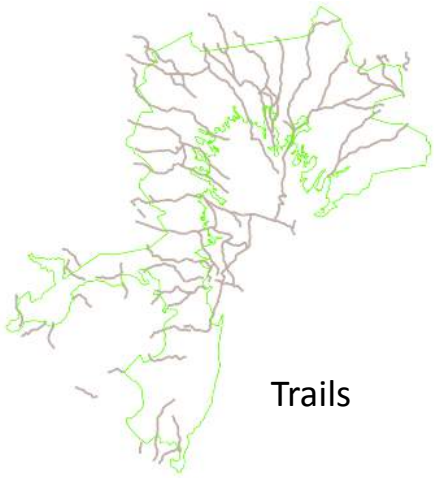
Population Pressure

**46 input variables**

- Environment
- Anthropogenic pressure
- Field measurement data
- Remote sensing data



Rivers



Trails

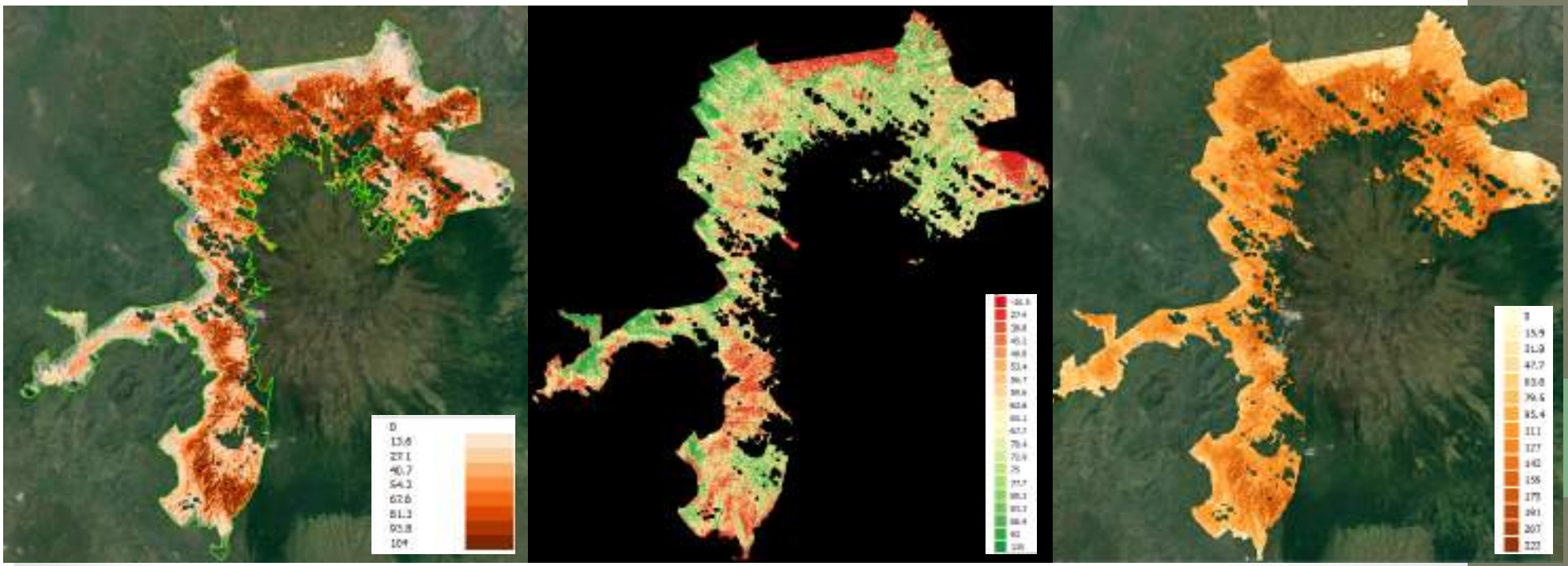
# Modelling

**Mean: 49 Mg C ha$^{-1}$**

**Mean change: +5 Mg C ha$^{-1}$ yr$^{-1}$**

**Mean: 108 Mg C ha$^{-1}$**

**Carbon Stock 2002** → **Carbon Stock Change** → **Carbon Stock 2015**



# Viable

- **BAU**: +5 Mg C $ha^{-1}$ $yr^{-1}$
- **Project**: +7.5 Mg $ha^{-1}$ $yr^{-1}$

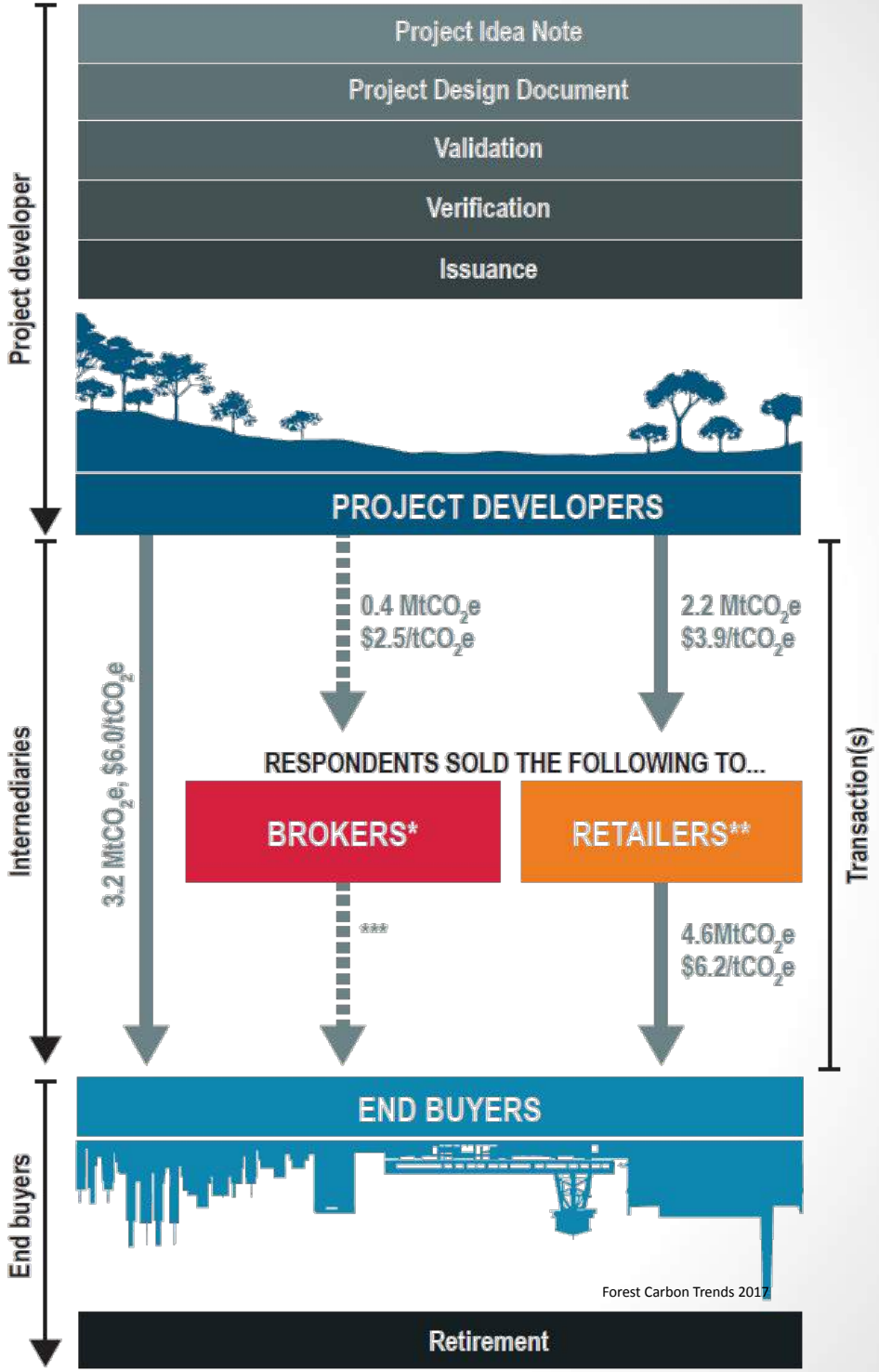
Addition of **2.5 Mg C $ha^{-1}$ $yr^{-1}$**

UWAFACE (13248 ha)
High estimate **$ 6** /Mg $CO_2$ eq:
**$ 728 585 $yr^{-1}$**

Low estimate $2.5 /Mg $CO_2$ eq:
$ 303 600

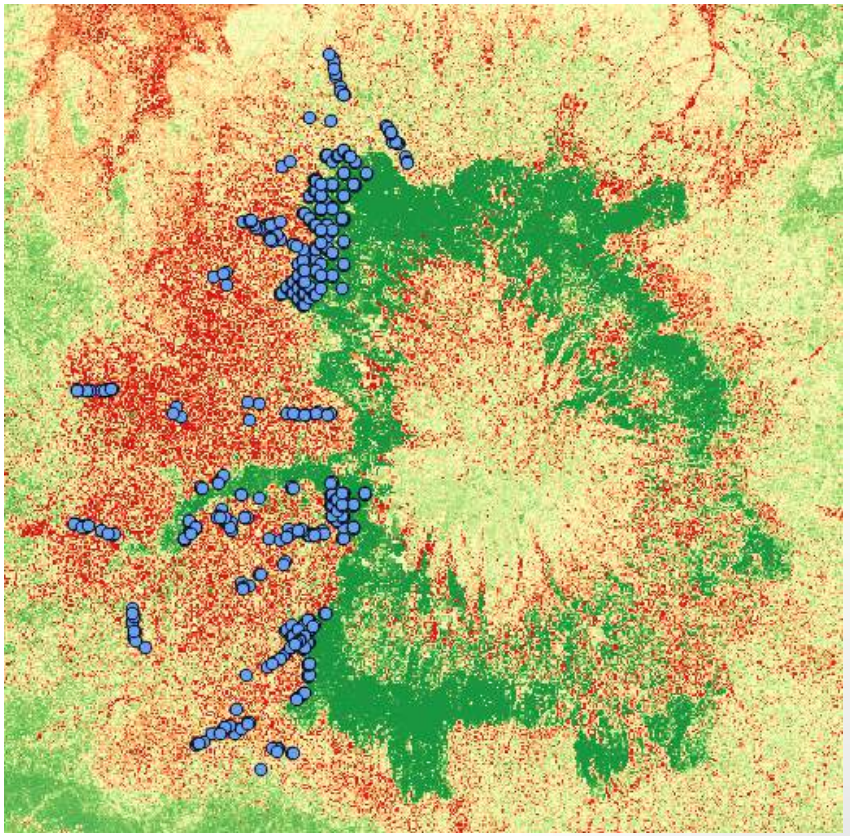
Whole MENP (85822 ha)
**$ 4 720 209 $yr^{-1}$**

Or
$ 1 966 754 $yr^{-1}$



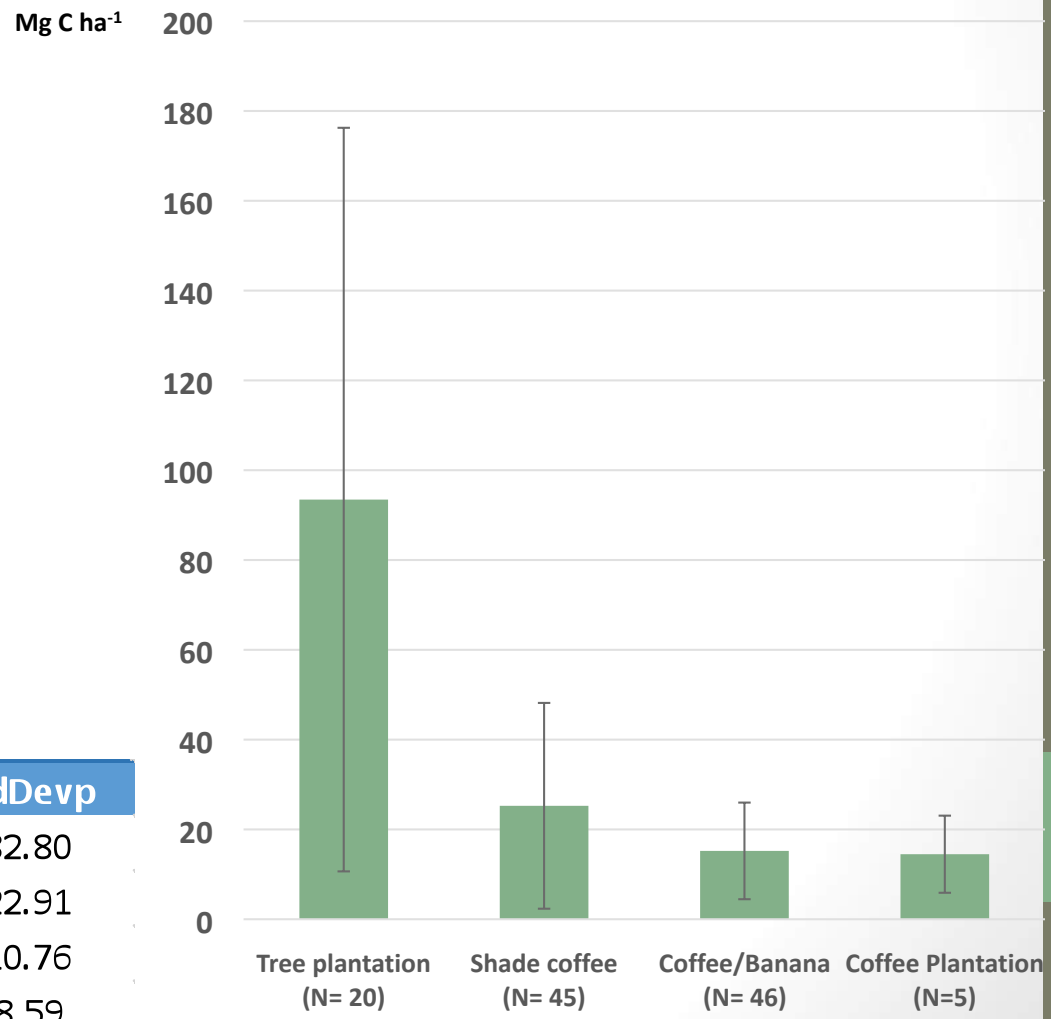
# Landscape

- Coffee gardens 2014: 74 plots
- All LU groundtruth points 2015: 581 waypoints
- Detailed inventories all LU 2015: 141 plots



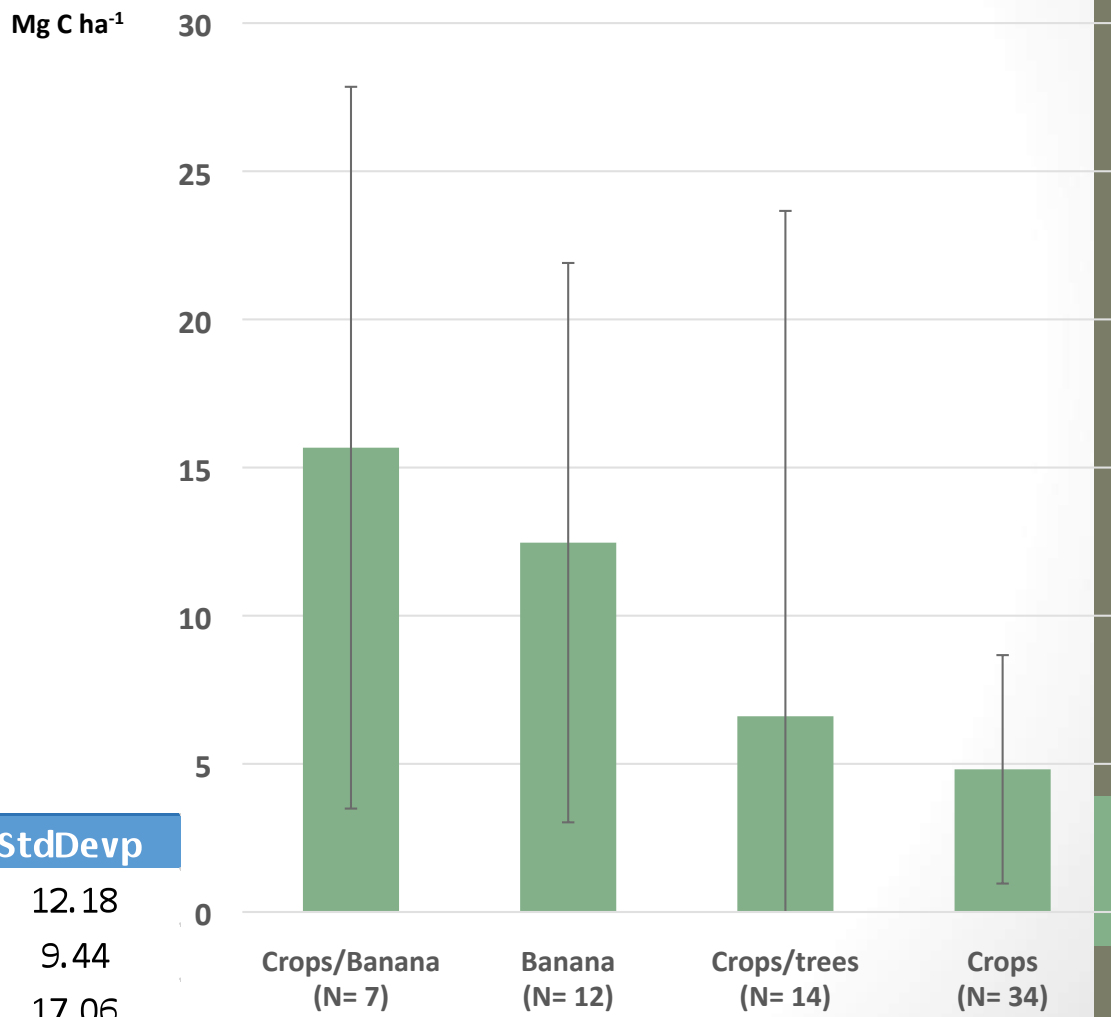
# Tree plantations & Coffee

| Land Cover | Biomass C stock | StdDevp |
|---|---|---|
| Tree plantation (N= 20) | 93.46 | 82.80 |
| Shade coffee (N= 45) | 25.26 | 22.91 |
| Coffee/Banana (N= 46) | 15.22 | 10.76 |
| Coffee Plantation (N=5) | 14.48 | 8.59 |



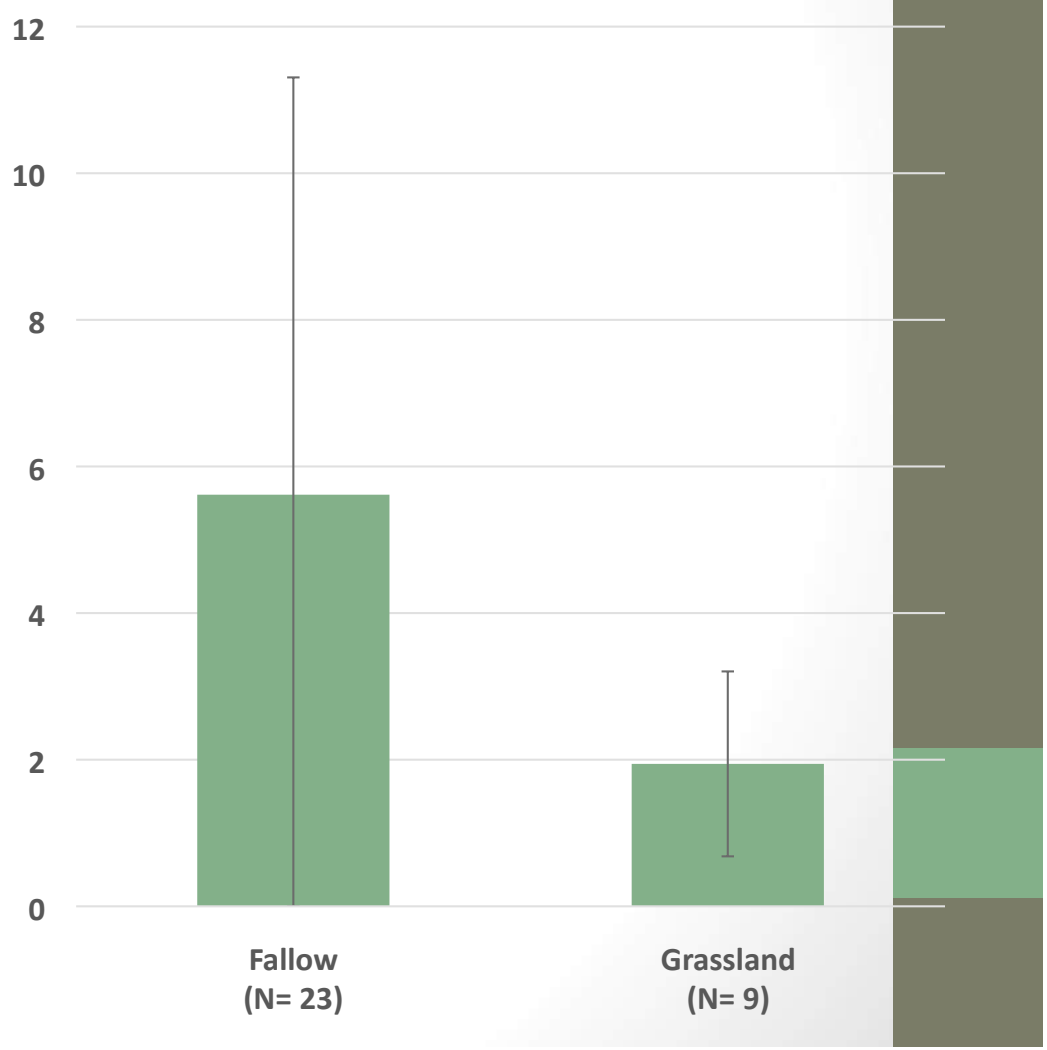
# Banana & annual crops

| Land Cover | Biomass C stock | StdDevp |
|---|---|---|
| Crops/Banana (N= 7) | 15.67 | 12.18 |
| Banana (N= 12) | 12.47 | 9.44 |
| Crops/trees (N= 14) | 6.61 | 17.06 |
| Crops (N= 34) | 4.82 | 3.85 |



# Fallow & grazing land

| Land Cover | Biomass C stock | StdDevp |
|---|---|---|
| Fallow (N= 23) | 5.61 | 5.69 |
| Grassland (N= 9) | 1.94 | 1.26 |



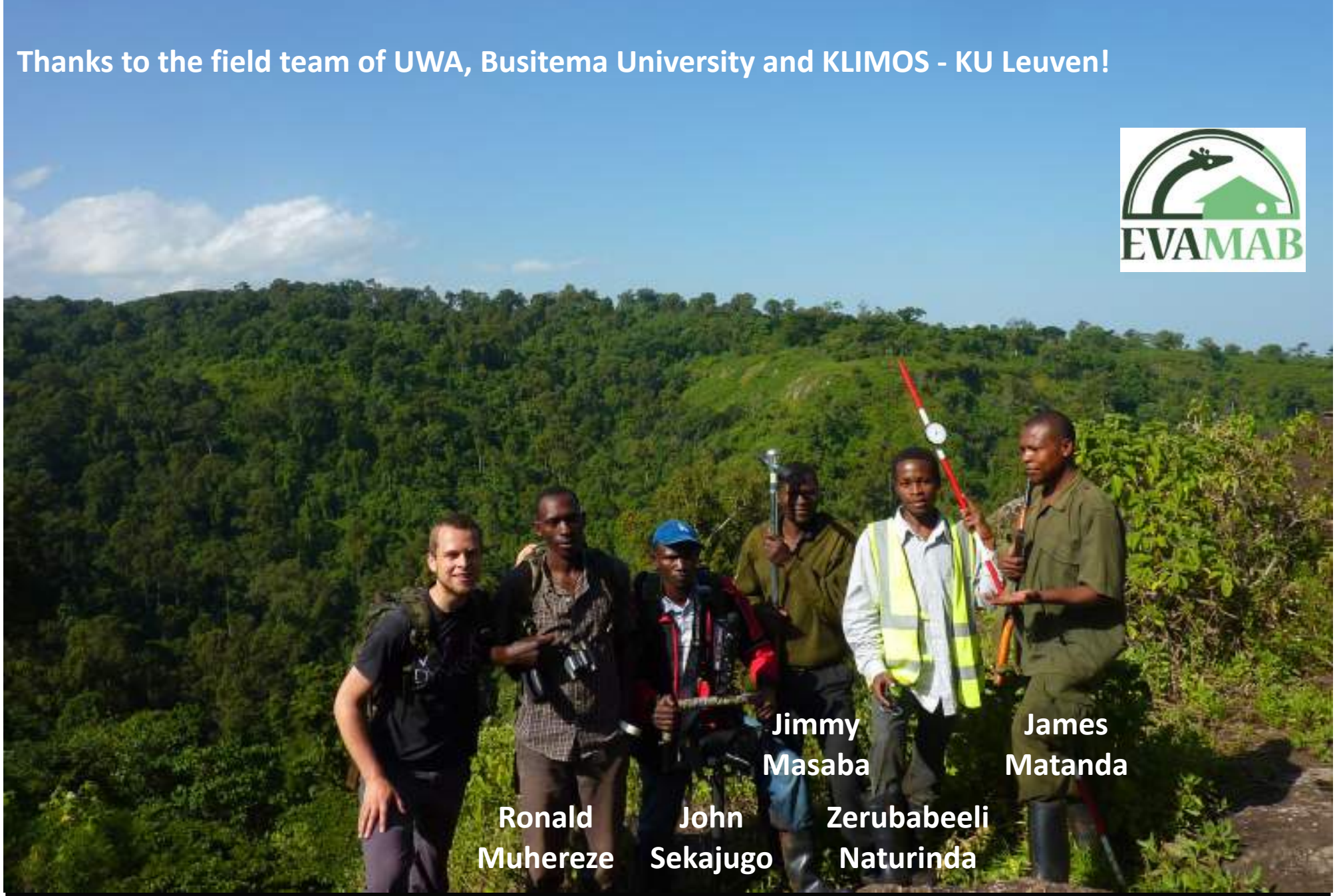
# Conclusions

- Carbon stock data of all land uses available.
- Idem for maps of MENP's biomass stocks with unprecedented level of detail.

- A baseline scenario for MENP is made, on average 5 Mg C is stored per ha per yr.

- Under effective forest protection an additional 2.5 Mg C/ha/yr can be stored.
- Large landscape based C storage potential with agroforestry.

Thanks to the field team of UWA, Busitema University and KLIMOS - KU Leuven!

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vliruos
SHARING MINDS, CHANGING LIVES

KU LEUVEN

KLIMOS
GENERATING CAPACITY FOR THE SUSTAINABILITY TRANSITION

UWA

BUSITEMA UNIVERSITY
Pursuing Excellence

# Potential of carbon payments Trees for Global Benefits

Sanne Baeten[2], Zerubabeeli Naturinda[1], Bruno Verbist[2], Koen Vanderhaegen[2]

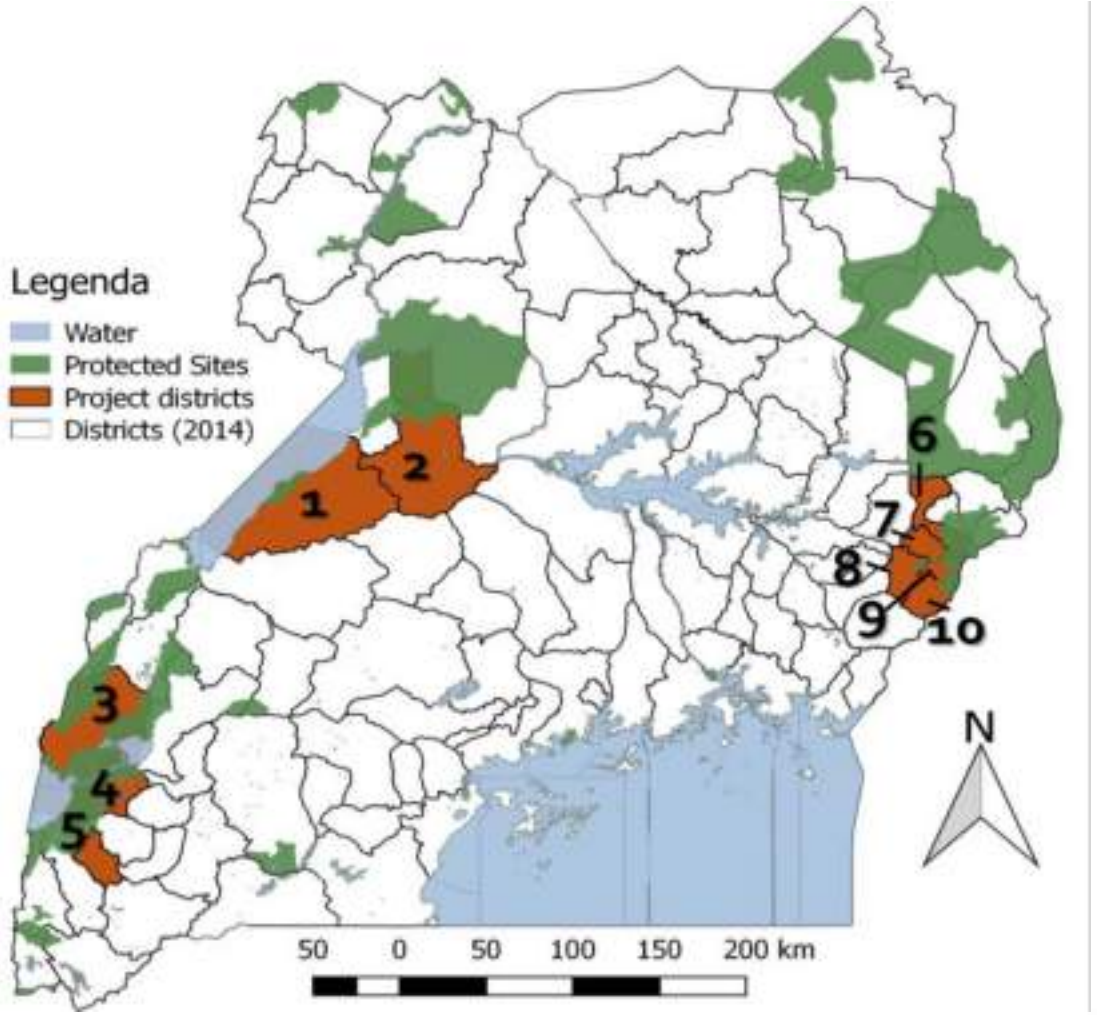
[1] *Faculty of Natural Resources and Environmental Sciences, Department of Natural Resources Economics, Busitema University*
[2] *Division Forest, Nature and Landscape, Department of Earth & Environmental Sciences, KU Leuven*

- Agroforestry PES project by Ecotrust (Ugandan NGO)
- Ex-ante purchases with Plan Vivo Standard
- °2003 → 2013 in Elgon
- Farmers → responsible for management trees for 25 years
- Conditional payments: first 10 years
- Monitoring, reporting and verifying
- Woodlots → agroforestry

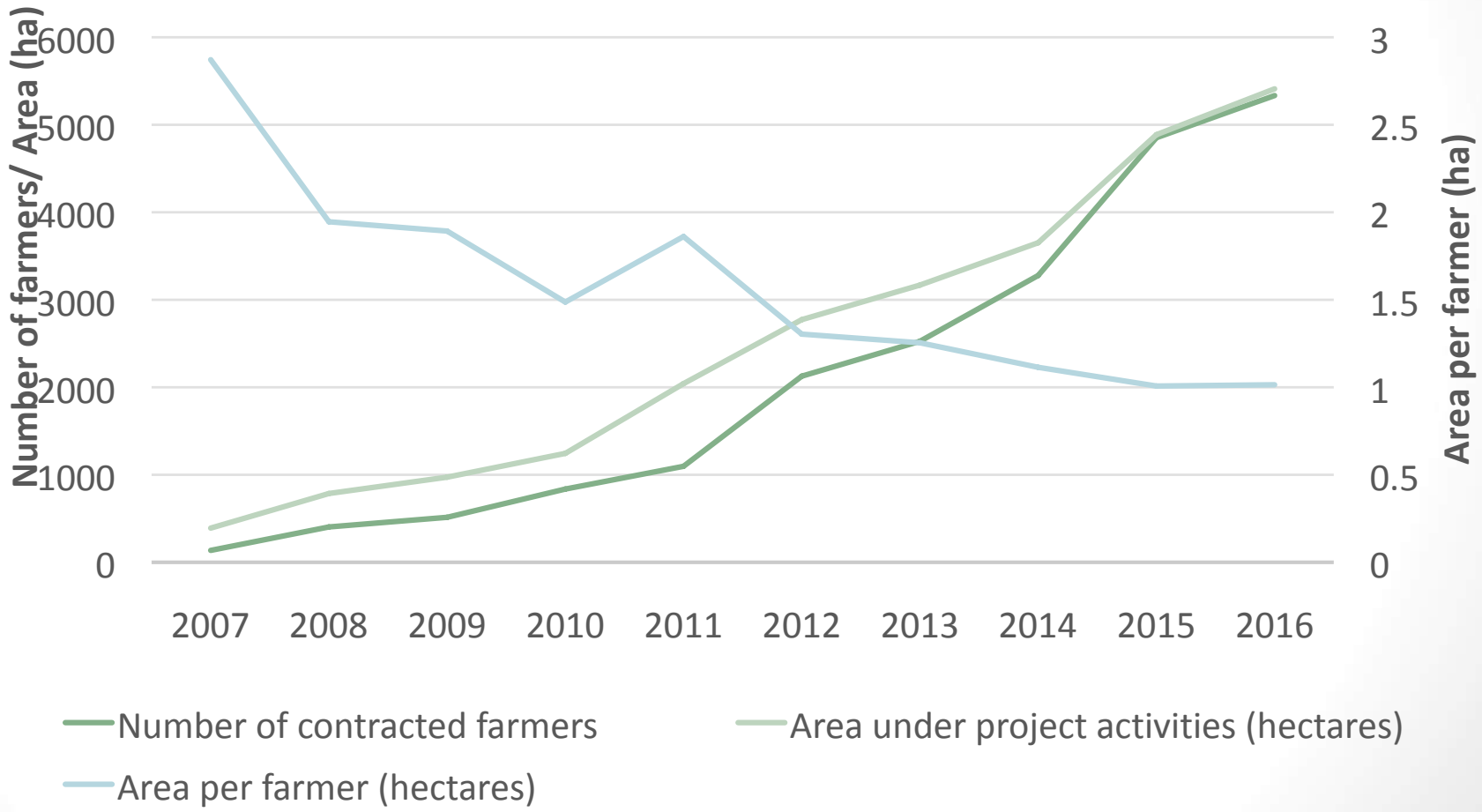
ECOTRUST

Plan Vivo

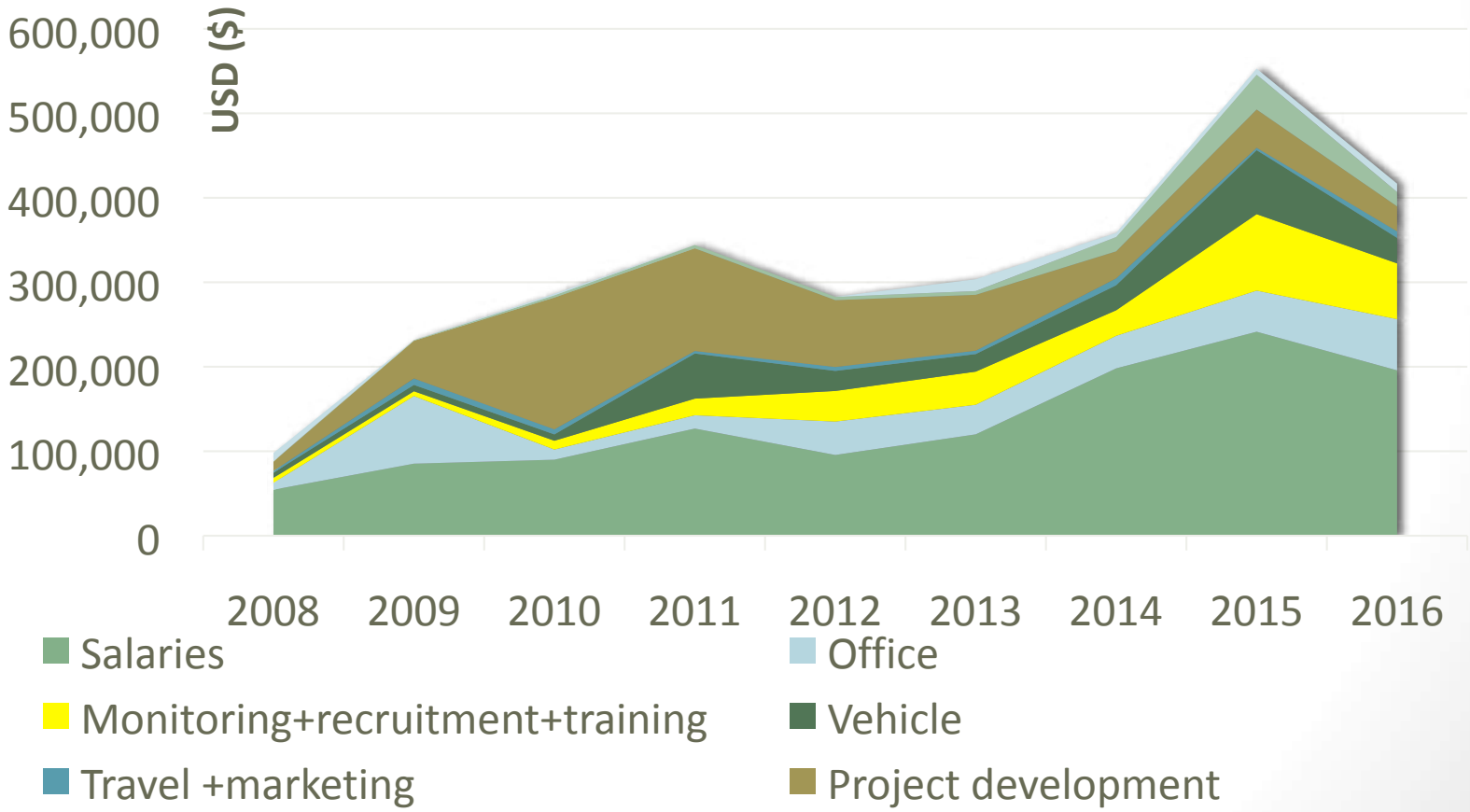
# Project areas Trees for Global Benefits?



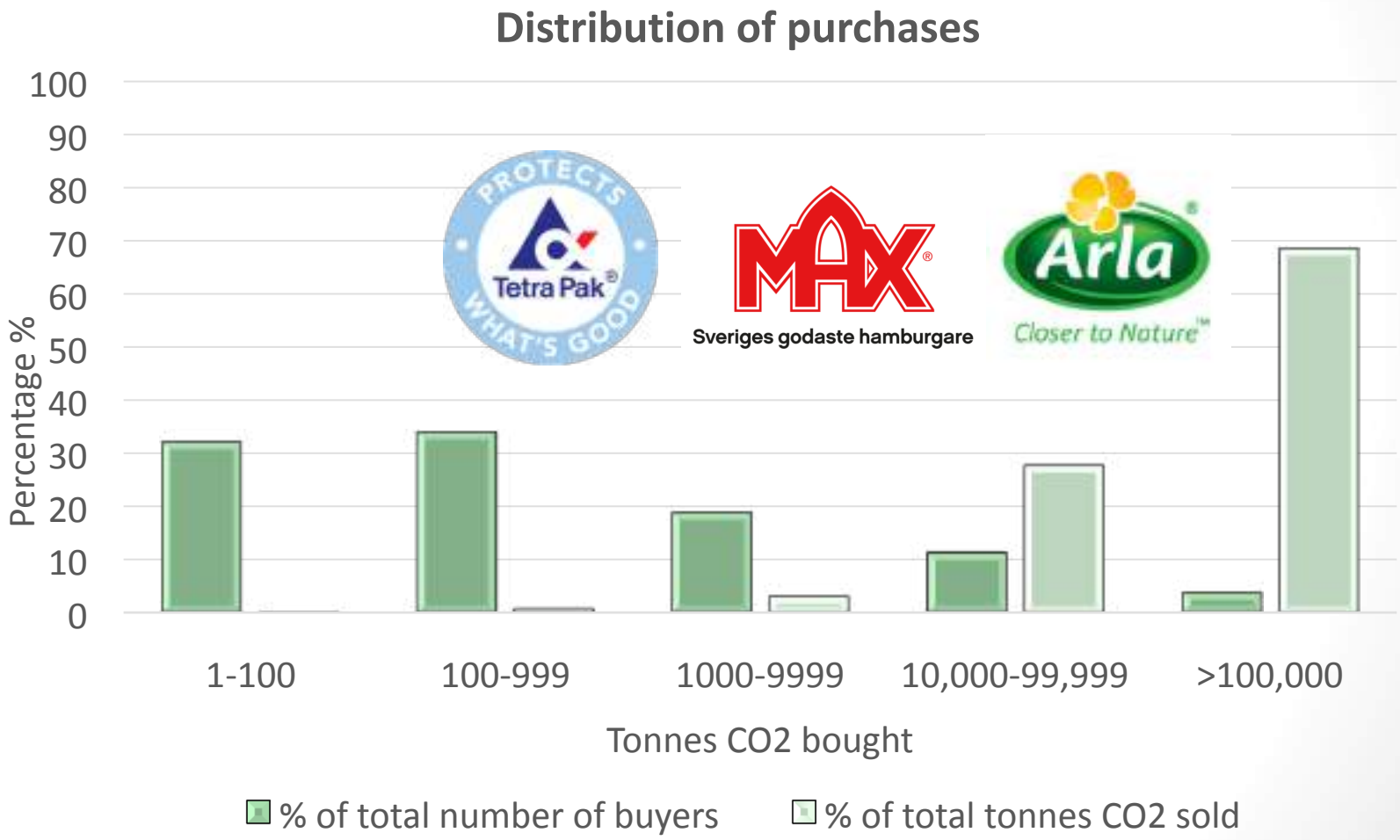
# Evolution of farmers and area



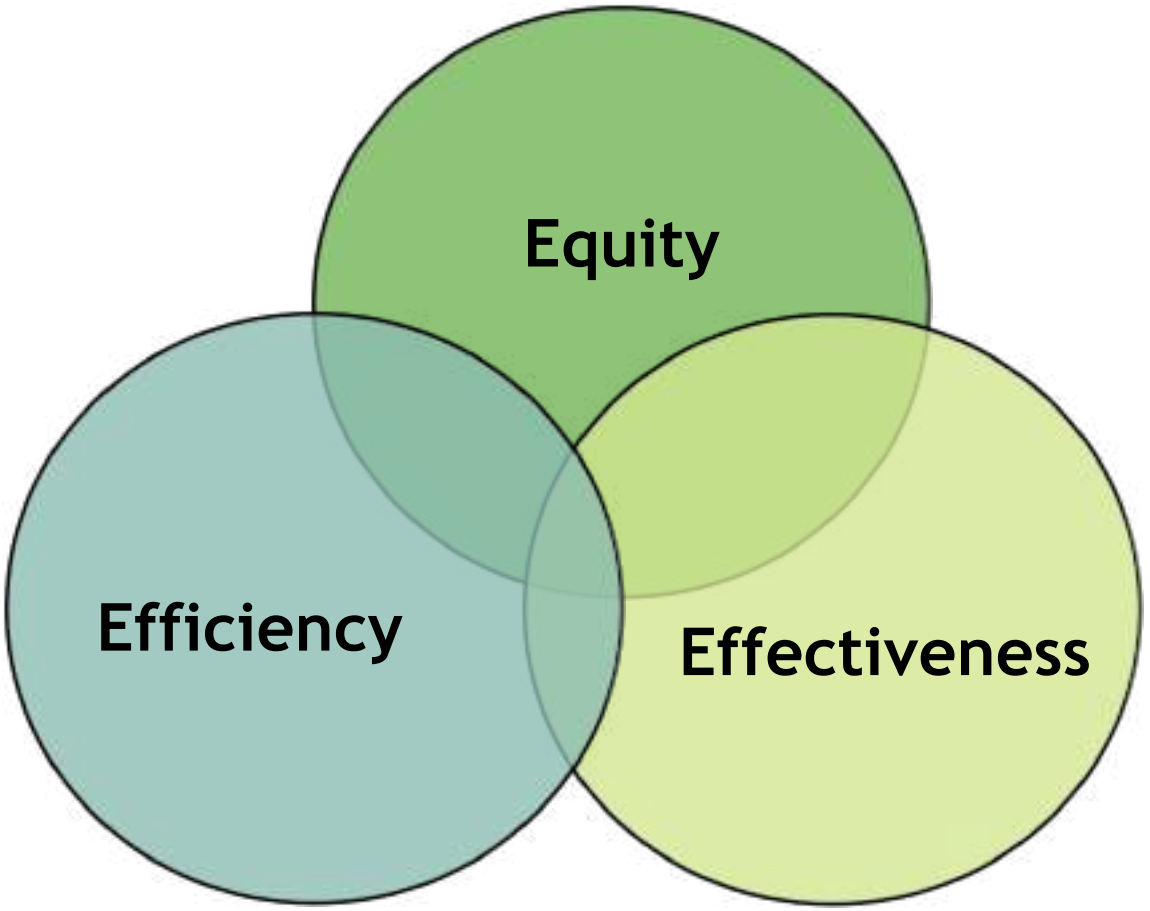
# Increasing monitoring costs



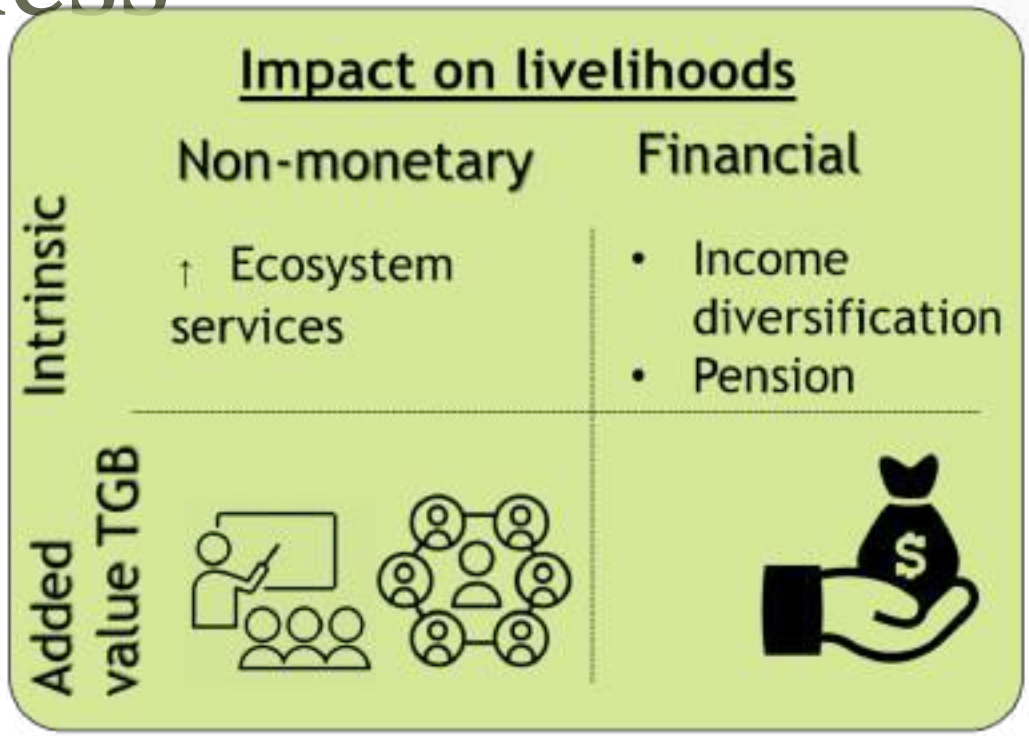
# Dependency on few buyers

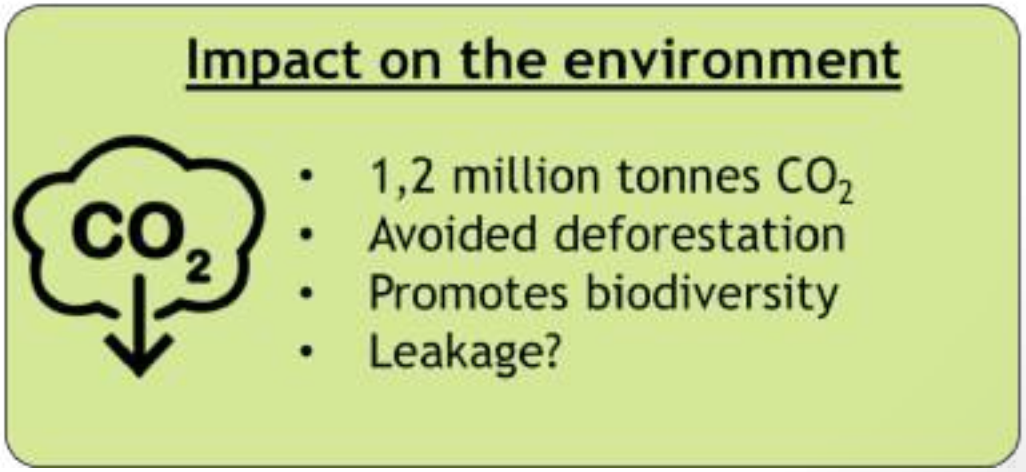


# Methodology: 3-E approach



# Effectiveness



# Efficiency

## BENEFITS

- Reward in 6 stages
  - ~ buyer
  - ~ exchange rate
- Sale timber, firewood

## COSTS

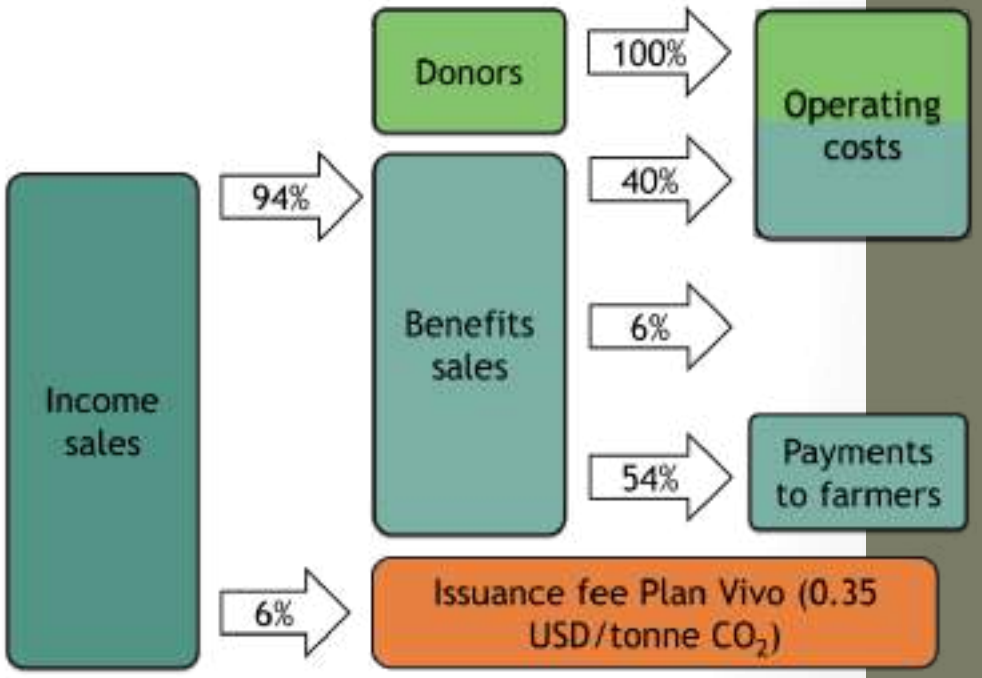
- Inputs
- Seedlings
- ↑ discount rate → ↑ opportunity cost

ECOTRUST


- ↑ monitoring costs
- ↑ issuance fee

# Efficiency


350 000
300 000
250 000
200 000
150 000
100 000
50 000
0
Tonnes CO2
7
6
5
4
3
2
1
0
$/tonne CO2
Pre 2008
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Sold volume
Unsold volume
Price per volume


Income sales
94%
6%
Donors
Benefits sales
Issuance fee Plan Vivo (0.35 USD/tonne $CO_2$)
100%
40%
6%
54%
Operating costs
Payments to farmers

# Equity

Barriers:

- Poverty
- Education
- Gender

≠ Outcome

- Farmer's reward
- Within household
- Communities

# Watershed services Mt. Elgon

Katrien Geussens[1], Goedele Van den Broeck[1], Miet Maertens[1], Bruno Verbist[1], Koen Vanderhaegen[1], Mary Immaculate Awori[2] , Zerubabeeli Naturinda[2], Moses Isabirye[2]

[1]*Department of Earth & Environmental Sciences, KU Leuven*
[2] *Department of Natural Resources Economics, Busitema University*

**Mount Elgon region:**

- High population pressure
- Unsustainable agricultural practices

} Land degradation, erosion, landslides …
Lot of sediment in rivers

➢ Can economic incentives help farmers to conserve the soil?



# Information gathering

- Group discussions
- Individual interviews
  - Stakeholders
  - Project participants
- Project documents
- Other research

Background

Analysis

# Research objectives

- **Identify beneficiaries** of water related ES that could and want to pay for this ES
- Assess **preferences** of land users for
  - different soil conservation measures
  - different types of positive incentives/rewards
- Calculate the **willingness to accept** of farmers for implementing soil conservation measures
- Conclude on overall PES feasibility

# Existing Projects and Potential Buyers

- Two PES projects in the past five years using international funding:
  - Community Ecosystem Conservation Fund
  - Ecosystem Based Adaptation

Funding stopped and projects were terminated in 2016
-> Project dependence: **Lack of permanence!**

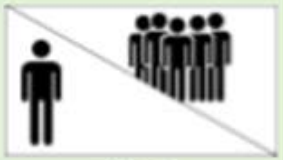
- Future PES project with local, user-based funding:
  - National Water and Sewerage Corporation (NWSC)
  - (Doho Rice Scheme)

# What is the farmer interested in?

## Choice Experiment

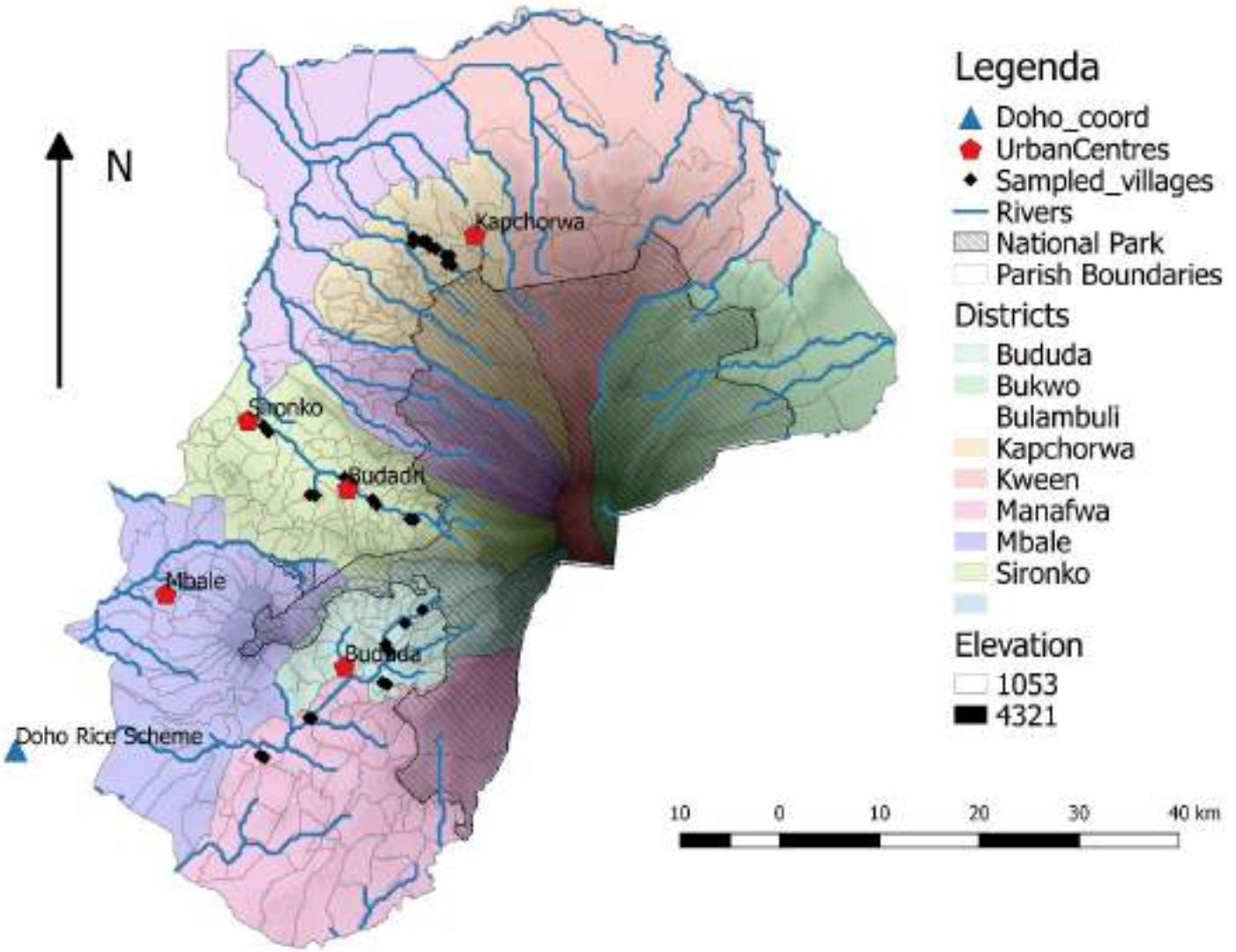
Twelve choice cards for representation

1. Width of to be protected river banks?
2. What soil conservation measures?
3. What agricultural practices?
4. Compensation amounts?
5. Private vs. Communal compensation?
6. Assistance needed?

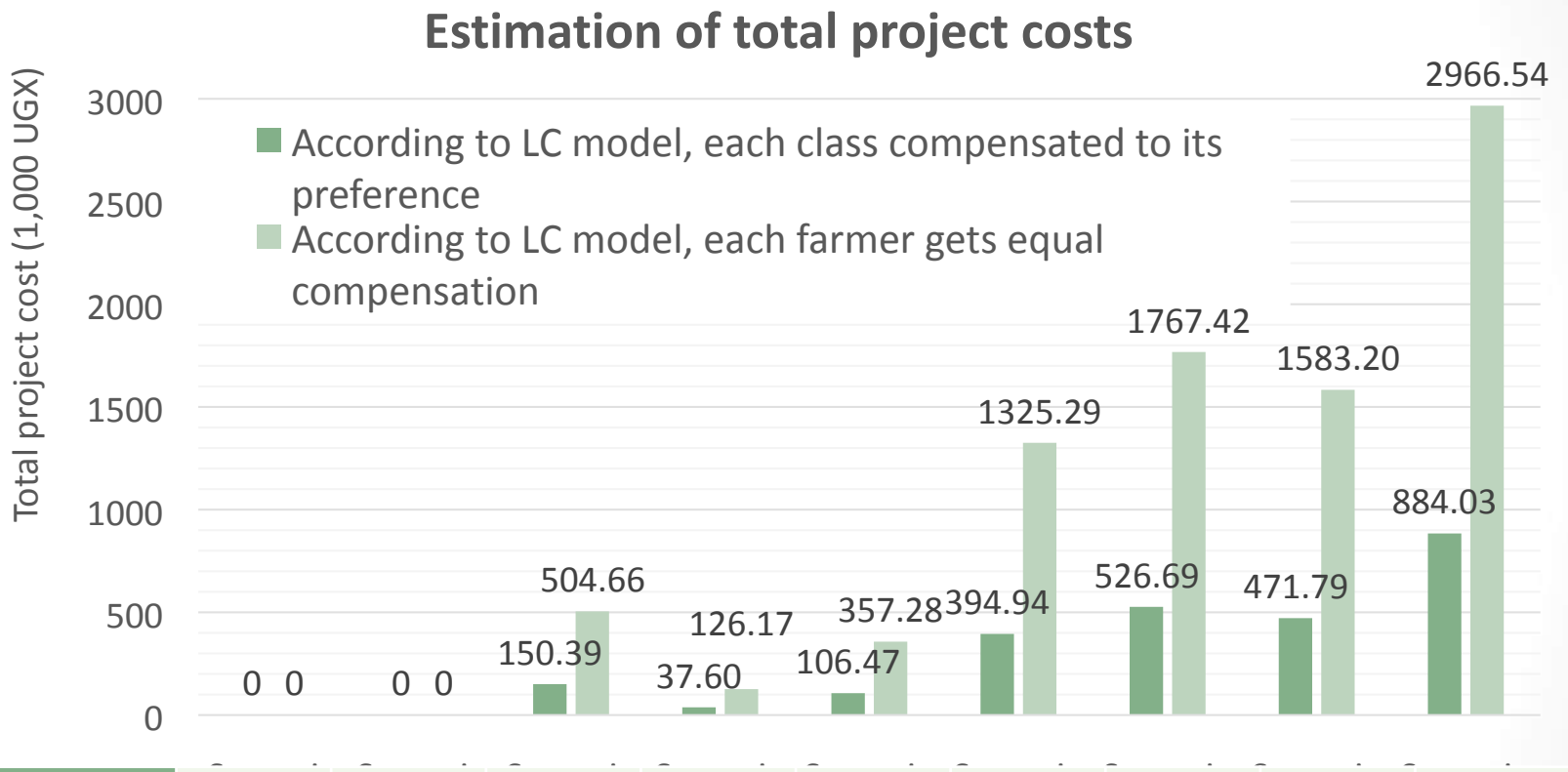
| CARD 1 | Contract A | Contract B | No Contract |
|---|---|---|---|
| 1. Distance to river banks to be protected |  0 M |  20 M | I choose not to enter any contract and to keep my current farming methods |
| 2. Contour trenches and grass bunds |  ALL FIELDS |  HALF OF FIELDS | |
| 3. Soil conserving agricultural practices (minimal tillage, mulching ...) |  HALF OF FIELDS |  ALL FIELDS | |
| 4. Yearly compensation |  360.000 UGX |  90.000 UGX | |
| 5. Mode of compensation |  COMMUNAL |  50/50 | |
| 6. Assistance in implementation |  LABOUR AND TOOLS |  TOOLS BUT NO LABOUR | |

# Location of sampling sites

- Farmers with land at the river
- Important water sources
- Degraded rivers

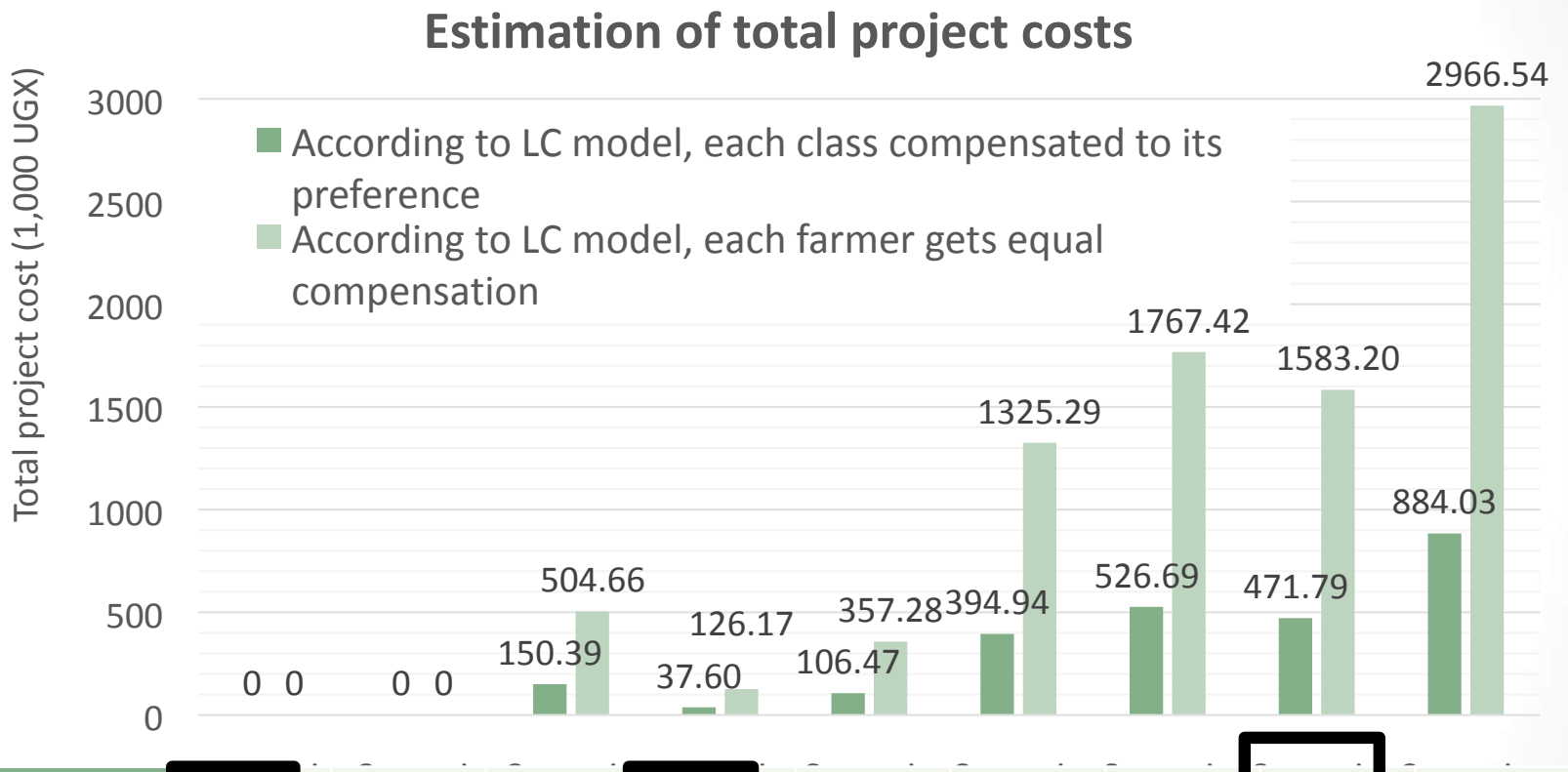


# Results: Project Costs




| Buffer width | 5 m | 5 m | 5 m | 10 m | 10 m | 10 m | 20 m | 20 m | 20 m |
|---|---|---|---|---|---|---|---|---|---|
| Trenches + SC | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Communal? | No | No | Yes | No | No | Yes | No | No | Yes |
| Labour | No | ~~20 days~~ | No | No | 20 days | No | No | 20 days | No |

# Results: Project Costs




| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Buffer width** | 5 m | 5 m | 5 m | 10 m | 10 m | 10 m | 20 m | 20 m | 20 m |
| **Trenches + SC** | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Communal?** | No | No | Yes | No | No | Yes | No | No | Yes |
| **Labour** | No | ~~20 days~~ | No | No | 20 days | No | No | 20 days | No |

# Policy Implications

- Awareness on benefits of SC is present -> focus on overcoming barriers
- Use individual payments
- Not all farmers require compensations: Efficiency vs. Equity
- Three solutions with increasing cost and increasing ecological benefit

1. Equity with 5 m buffers: **only transaction costs**
2. Equity with 10 m buffers and individual compensation: **UGX 126,170/ yr**
3. Spatial targetting with 20 m buffers, individual compensation + 20 labour days: **UGX 471,790/yr**

What is the affordability for the buyer (NWSC) ?

# Do Private Sustainability Standards walk the talk in improving economic and environmental sustainability?

**Koen Vanderhaegen**[1], Kevin Teopista Akoyi[2], Wouter Dekoninck[3], Bruno Verbist[1], Bart Muys[1] and Miet Maertens[2]

[1]*Division Forest, Nature and Landscape, Department of Earth & Environmental Sciences, KU Leuven*
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[3]*Entomology Department, Royal Belgian Institute of Natural Sciences*

EVAMAB

# Introduction

Why?

- Private Sustainability Standards (PSS)

➔ Information asymmetries

What?

- Focus on sustainability

➔Biodiversity conservation

➔Sustainable livelihoods

Who cares?

- Do PSS walk the talk?

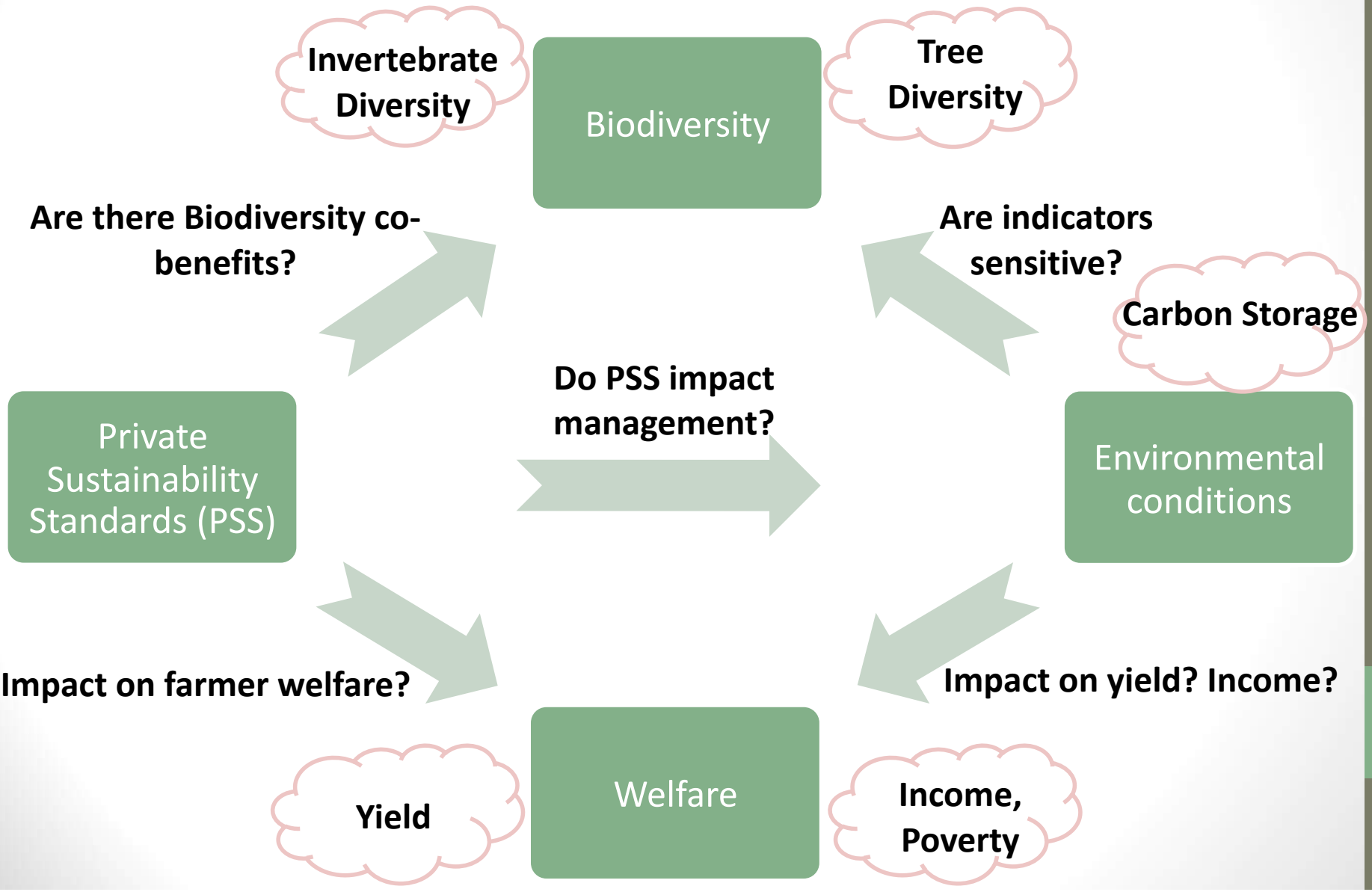
➔Developing countries

➔Consumers

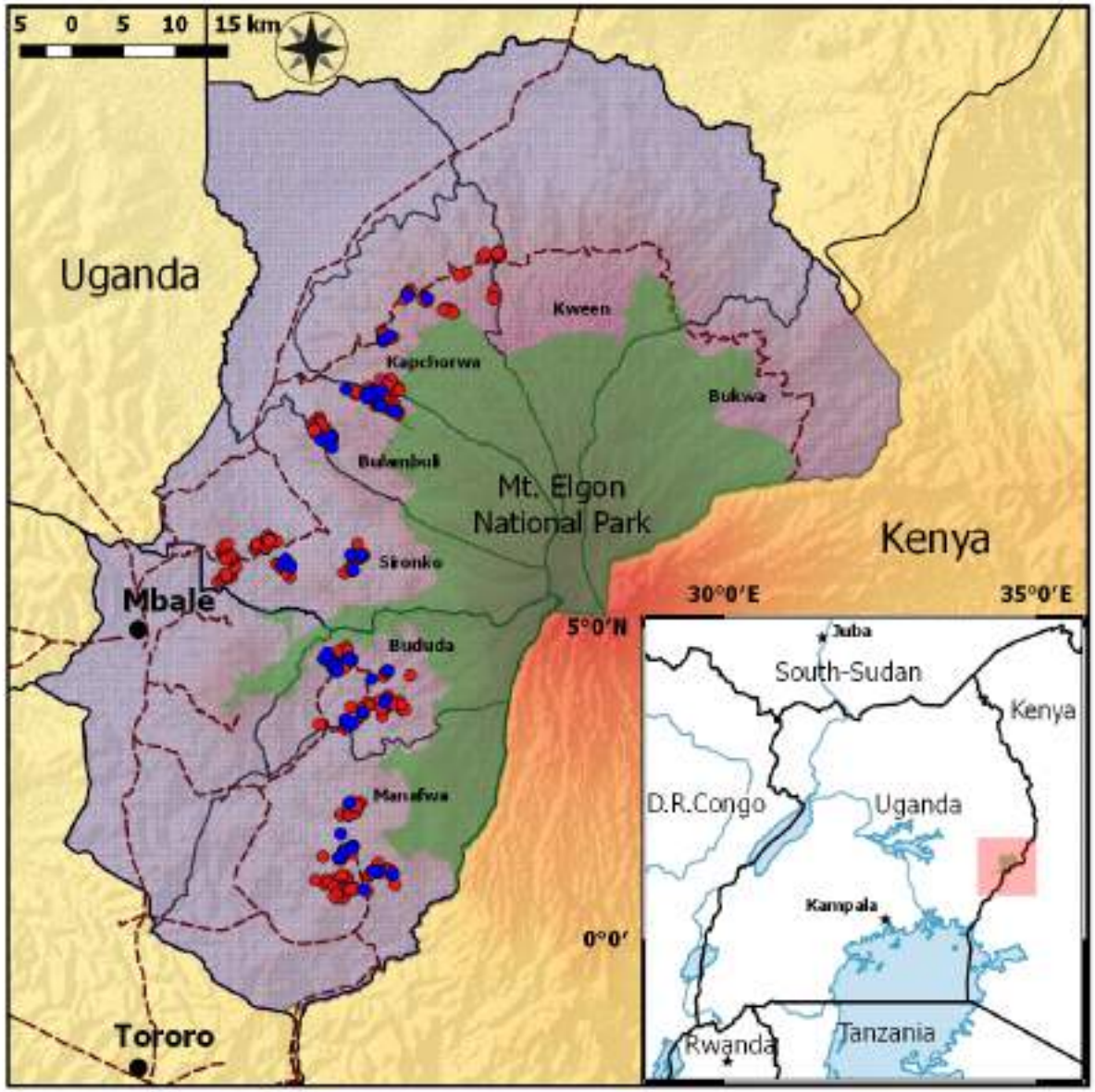
➔Companies, non-profit org.

➔Donors

# Analytical framework



# Study Area




*Local Land Use Mosaic*

*Coffee Garden*

# Sampling design

1. **Survey** among 600 farm-households (Feb-Mar 2014)

   - household- and field-level socio-economic data

FT-Organic

Utz-RA-4C

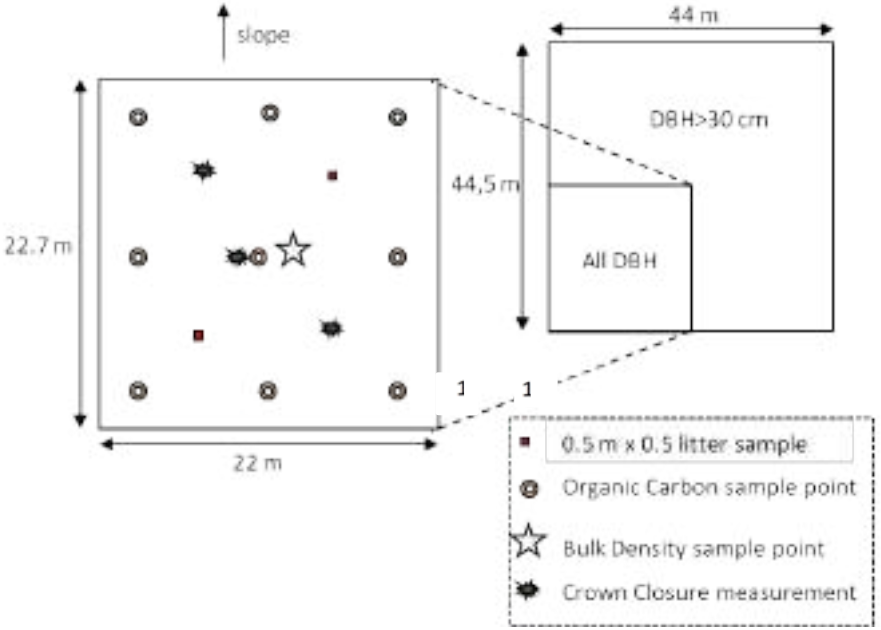
2. **Field-level inventory** in 74 coffee gardens (Jun-Aug 2014)

   Stratified random selection out of 1183 fields of surveyed HH + pair-wise matching of controls

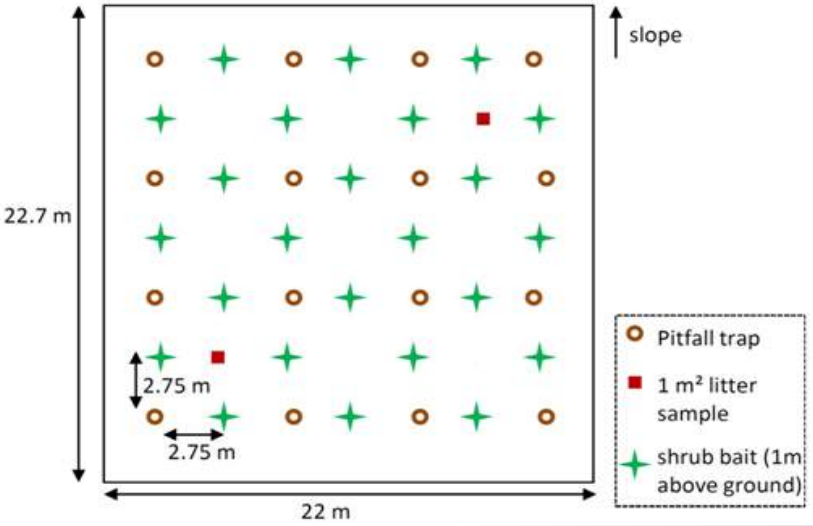
   - field-level data on tree- and invertebrate-biodiversity and C storage

# Field and lab work

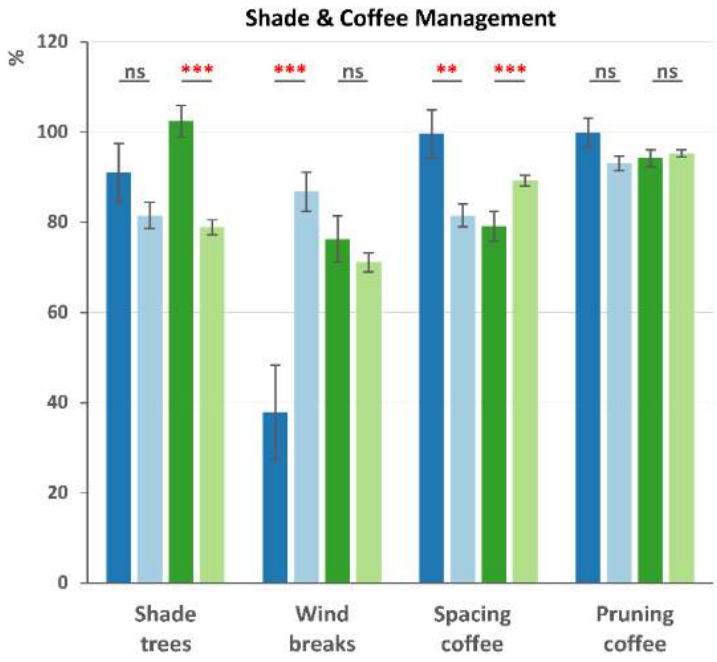
## Carbon Stocks + Tree Diversity

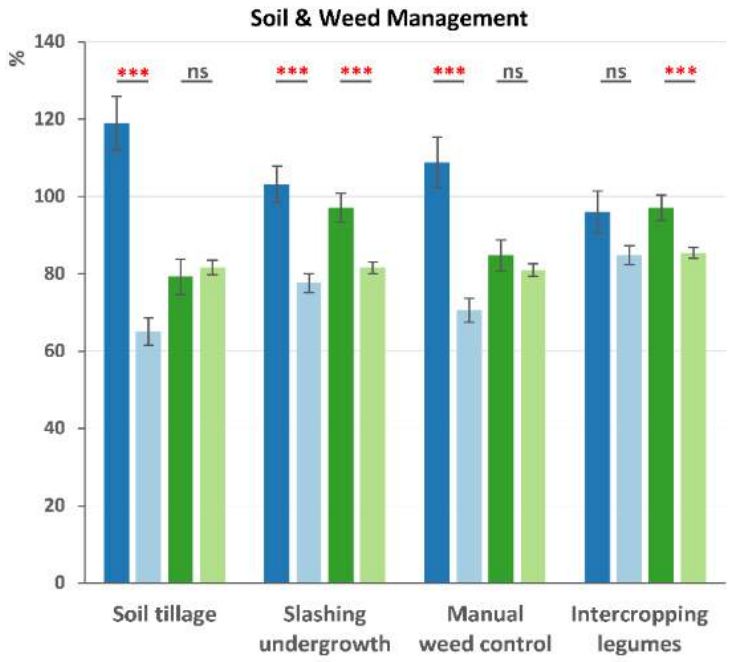


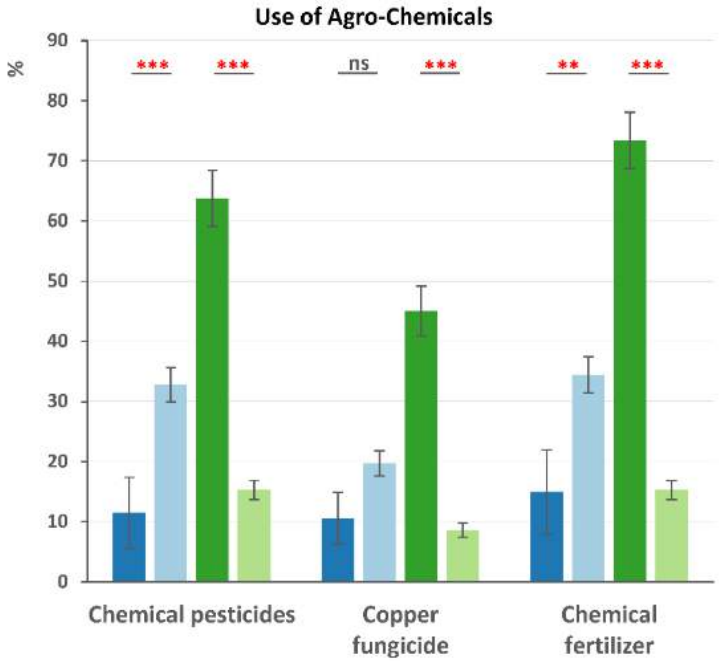

## Invertebrates Diversity

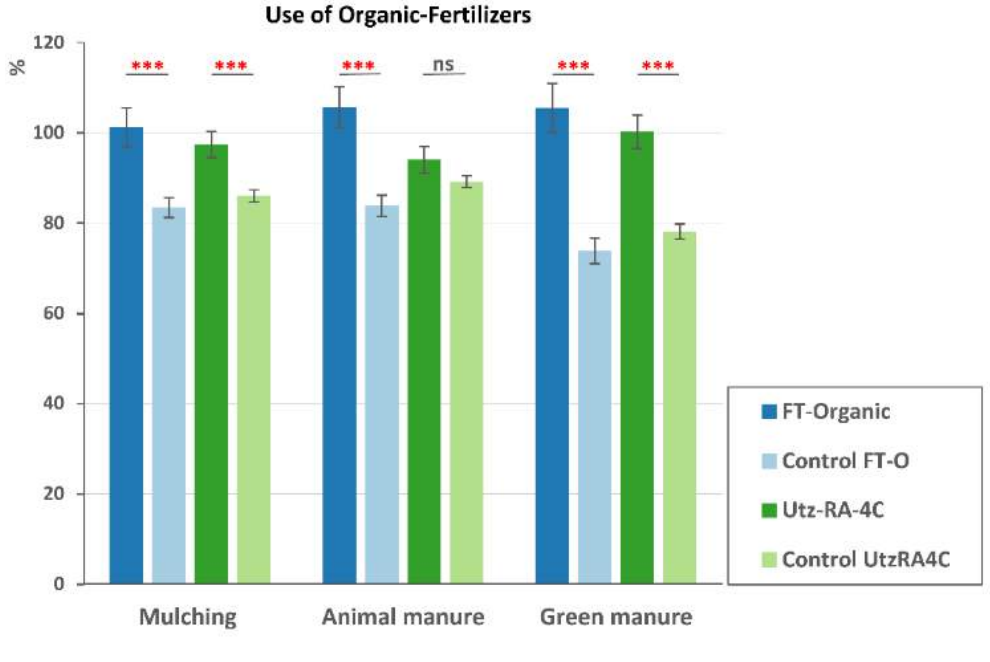


# Results PSS => Management

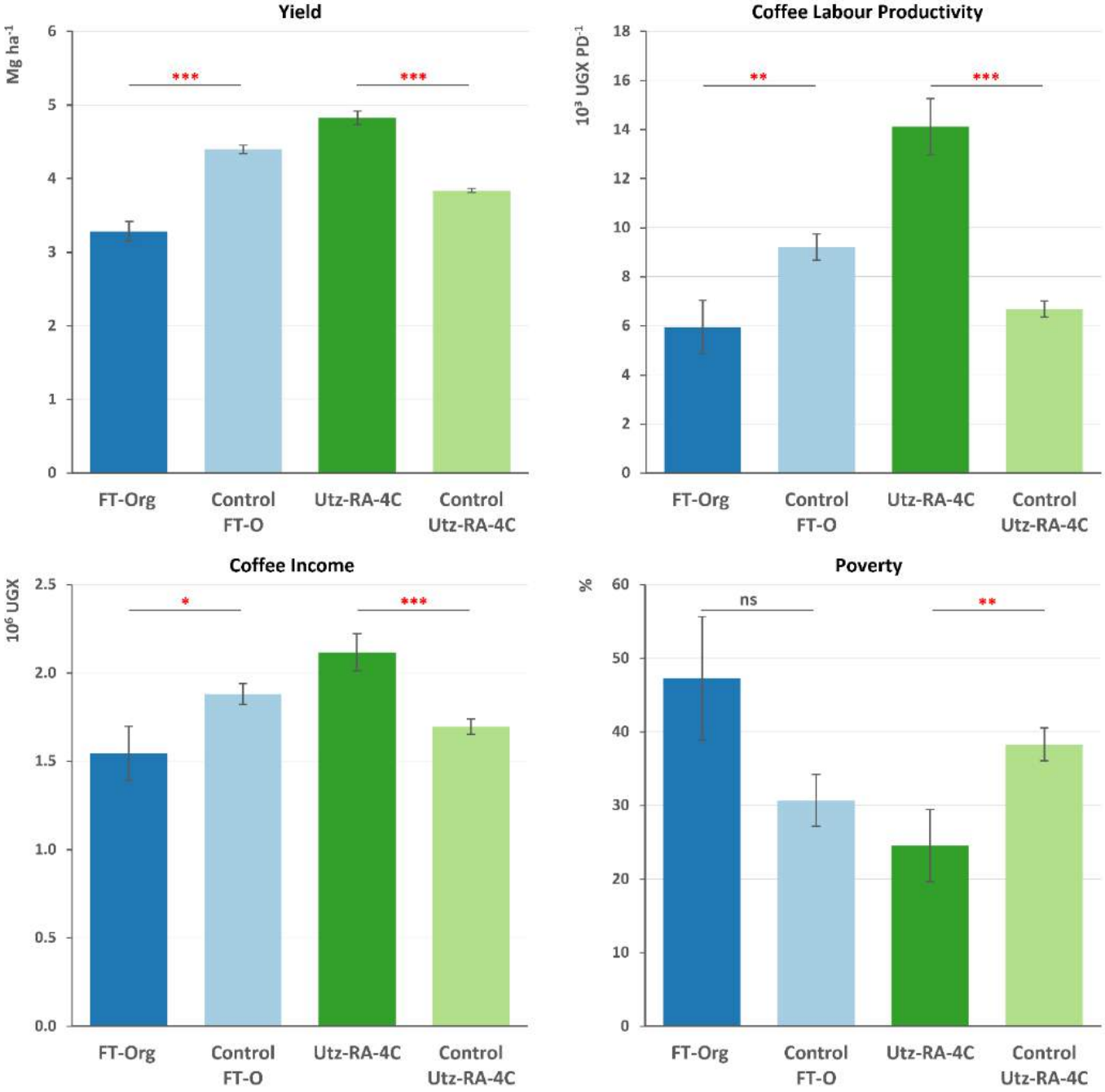


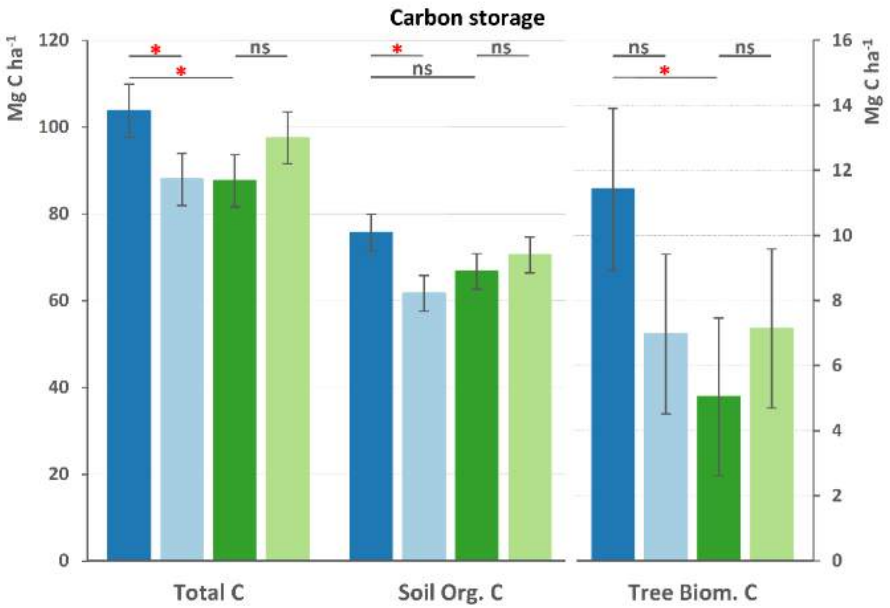



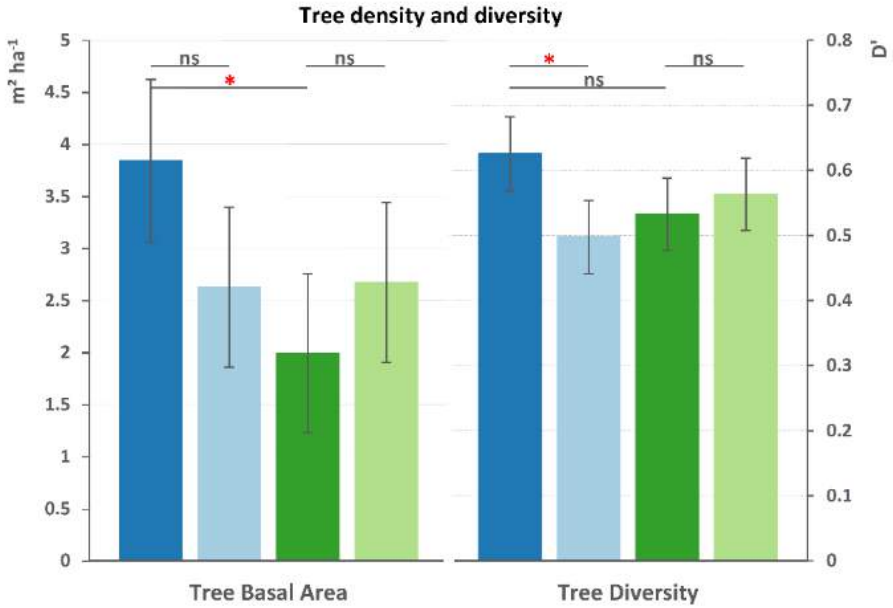



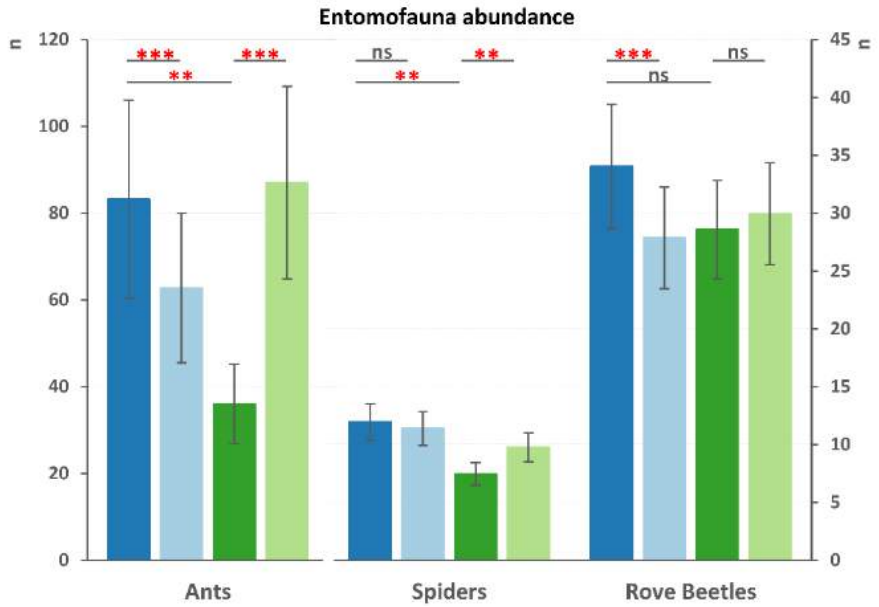
# Results PSS => Welfare

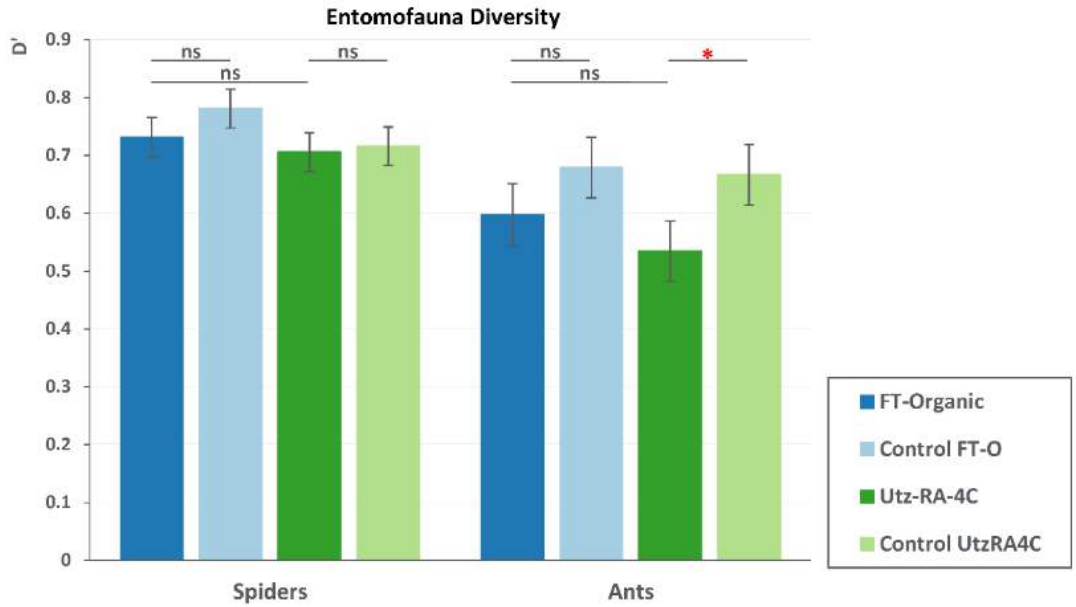


# Results PSS => Ecosystem Services



# Key Findings

**Utz-RA-4C**

performs better from a socio-economic perspective and worse from an ecosystem service perspective

**FT-Org**

results in a negative income effect

(10% price premium is annihilated by a yield loss of 25%),

but there are gains in carbon storage and biodiversity.

➔ Coffee standards do not always walk the talk!

Strong trade-offs between socio-economic and ecological benefits.

# Conclusions

1. **The claims standards make about their impact do not uphold.**


E.g. FT focuses most on improving smallholder wellbeing and reducing poverty but is found to actually reduce yields and smallholders' income

E.g. RA focuses on environment and nature conservation, but is found to create adverse ecological impacts, although yields and farmers' income did increase!

2. **Multiple certification does not necessarily increase the impact of PSS or eliminate trade-offs.**

3. **Positive is that PSS reduce trade-offs, but room for improvement.**

# Advice

PSS should be designed to compensate for existing trade-offs

⇒By **harmonization of PSS** instead of combining PPS with varying focus and different requirements

⇒By **differentiation of PSS** to local agro-ecological and economic conditions

Rather than their strategic use as a product differentiation tool.

+ Limited impact could be due to **lack of effectiveness** or **lack of compliance** or both…

# Thanks to

EVAMAB

Kevin Teopista Akoyi

Sofie Fabri

museum NATURALSCIENCES.BE

vliruos SHARING MINDS, CHANGING LIVES

DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES
KU Leuven - BELGIUM

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# Results were shared in stakeholder workshops in Mbale & Kampala October 2018

- Still lots of challenges
- Promising activities to rebuild trust between MENP & local population
- Need for upscaling of promising PES initiatives: local & international
- Knowledge & perceptions: still fragmented, but ES are well understood
- Stakeholder forum with UWA as catalyser: work in progress
- "Local Ownership of ES" radius of ca. 5 km: Need for '**honest brokers'** for larger distances
- Potential & challenges for "synergies" e.g. tree planting vs. relocation for land slide control

# Thanks for your attention!
# Questions?

The support of BELSPO, Belgian Development cooperation, VLIR-UOS and UNESCO-MAB was very much appreciated!!