Acorn

Agroforestry Carbon Removal Units (CRUs) for the Organic Restoration of Nature

Emma van de Ven, December 8th 2021

Rabobank

Growing a better world together.

Problems to tackle

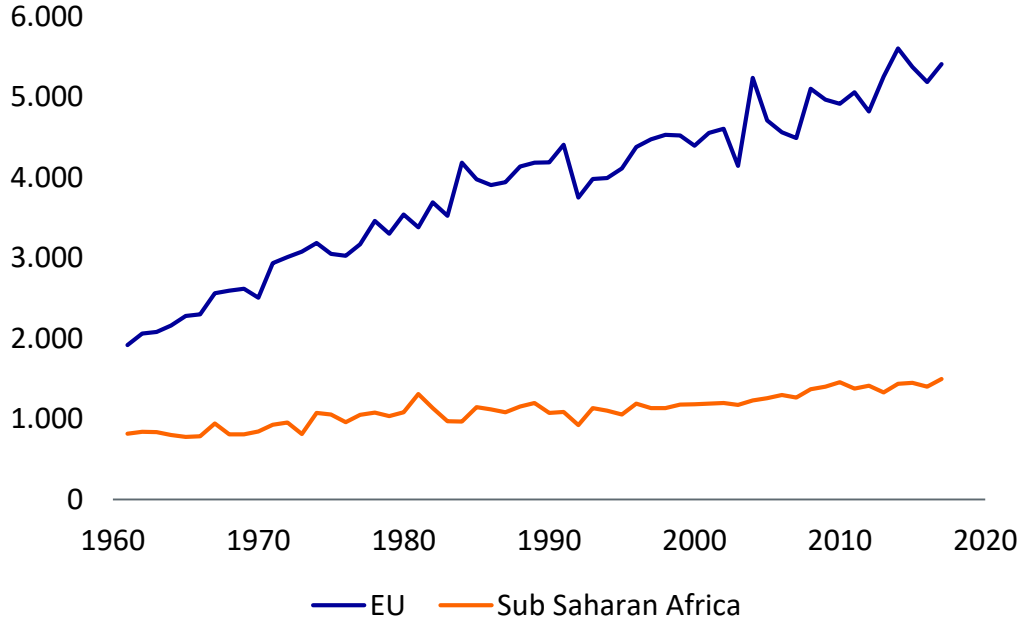
Growing a better world together

Rabobank

Growing a better world together.

Smallholder farmers' productivity has stagnated, yet pressure on them to provide food for growing populations continuously rises

Productivity gap [Cereal, kg/ha]

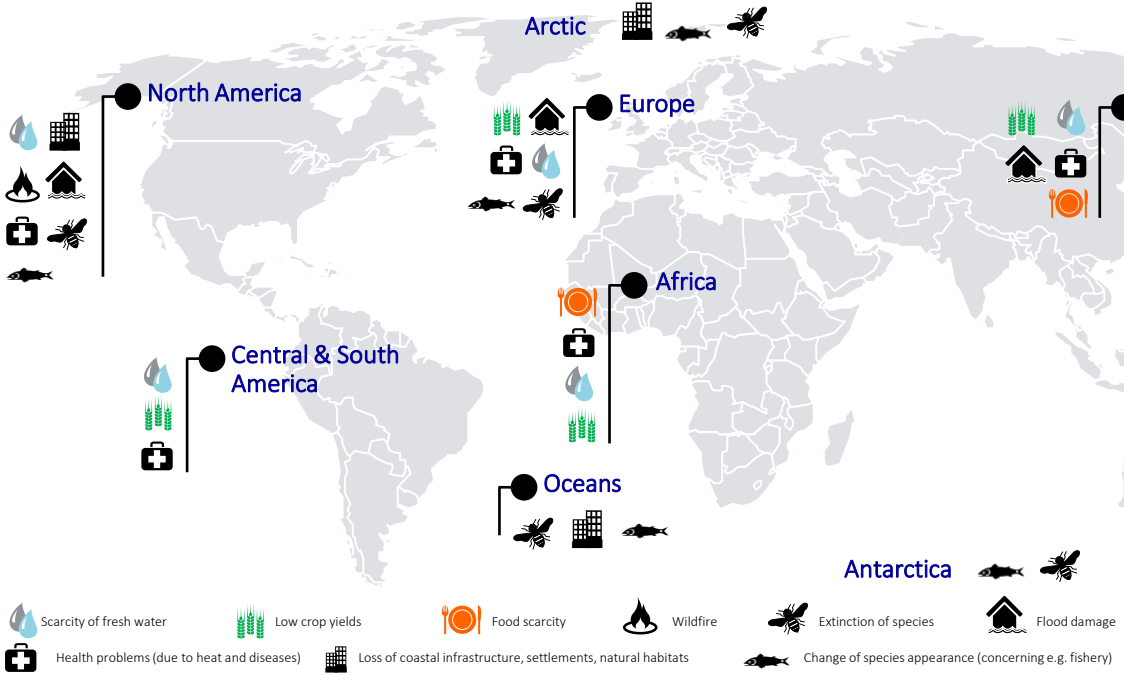


Smallholder farmer needs

Source: World bank Open Data

Smallholder farmers in developing countries are also disproportionately impacted by climate change

Regional impact



UNEP, Jan 14, 2021

Source: IPCC, AFP, BZ

The Acorn solution

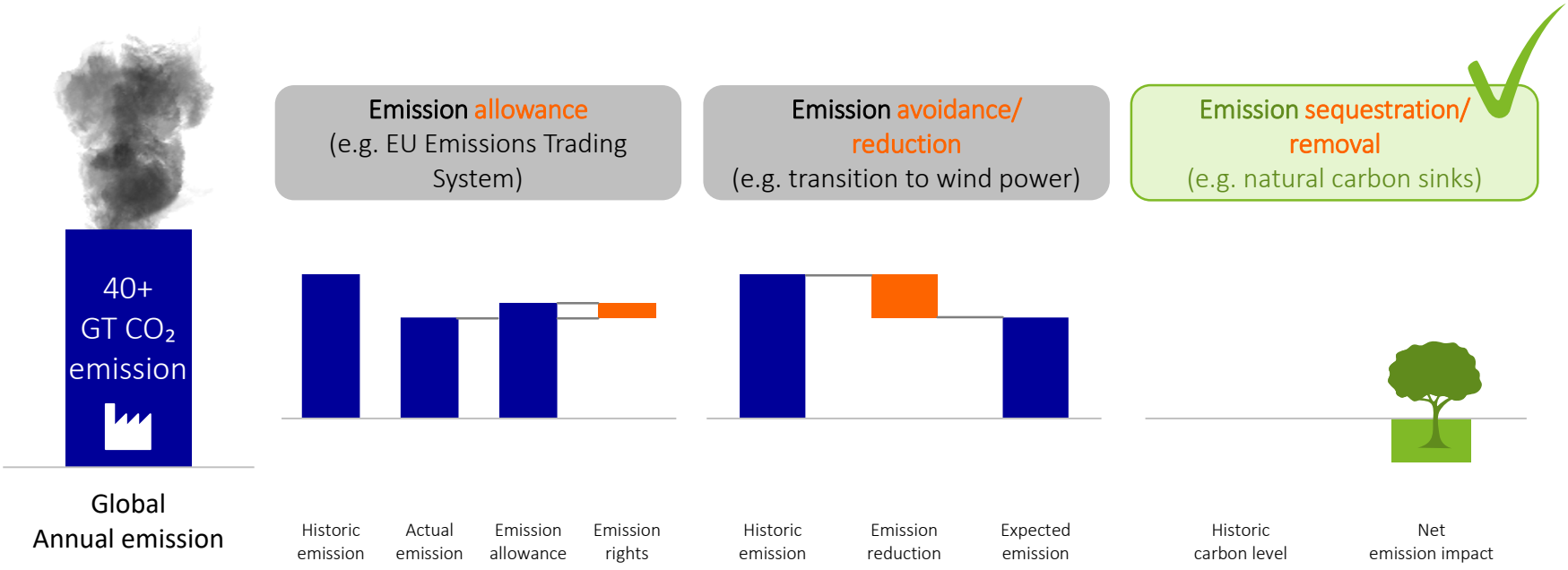
How Acorn helps solve these problems

Rabobank

Growing a better world together.

To compensate the anthropogenic 40+ $GtCO_2$/yr emission, Acorn uses the carbon market to grow carbon negative initiatives

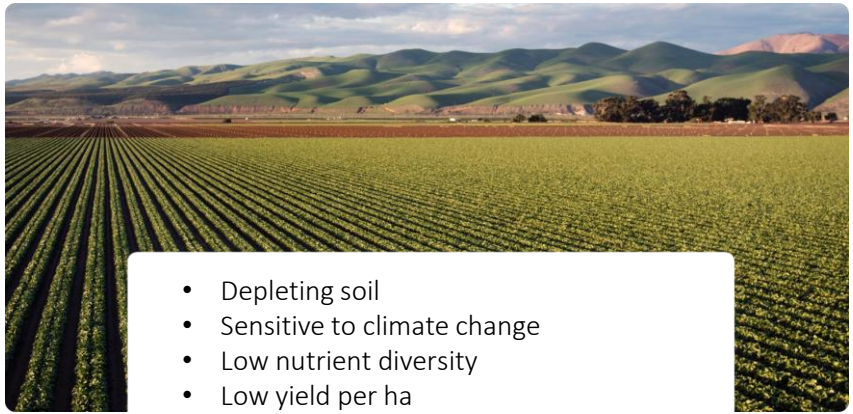
Global need versus carbon credits sold in the market



Source: IPCC

The agricultural intervention that can relieve hunger while simultaneously increase resilience to & mitigate climate change

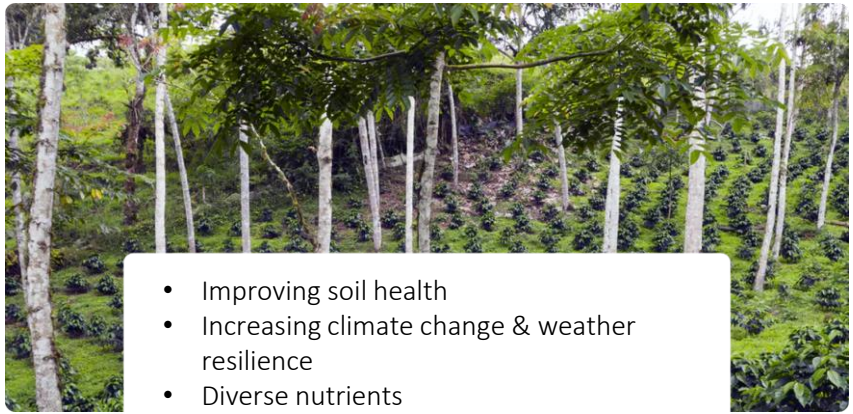
Monoculture agriculture



- Depleting soil
- Sensitive to climate change
- Low nutrient diversity
- Low yield per ha
- Income depends on single crop type
- Deforestation

Low investment costs

Agroforestry



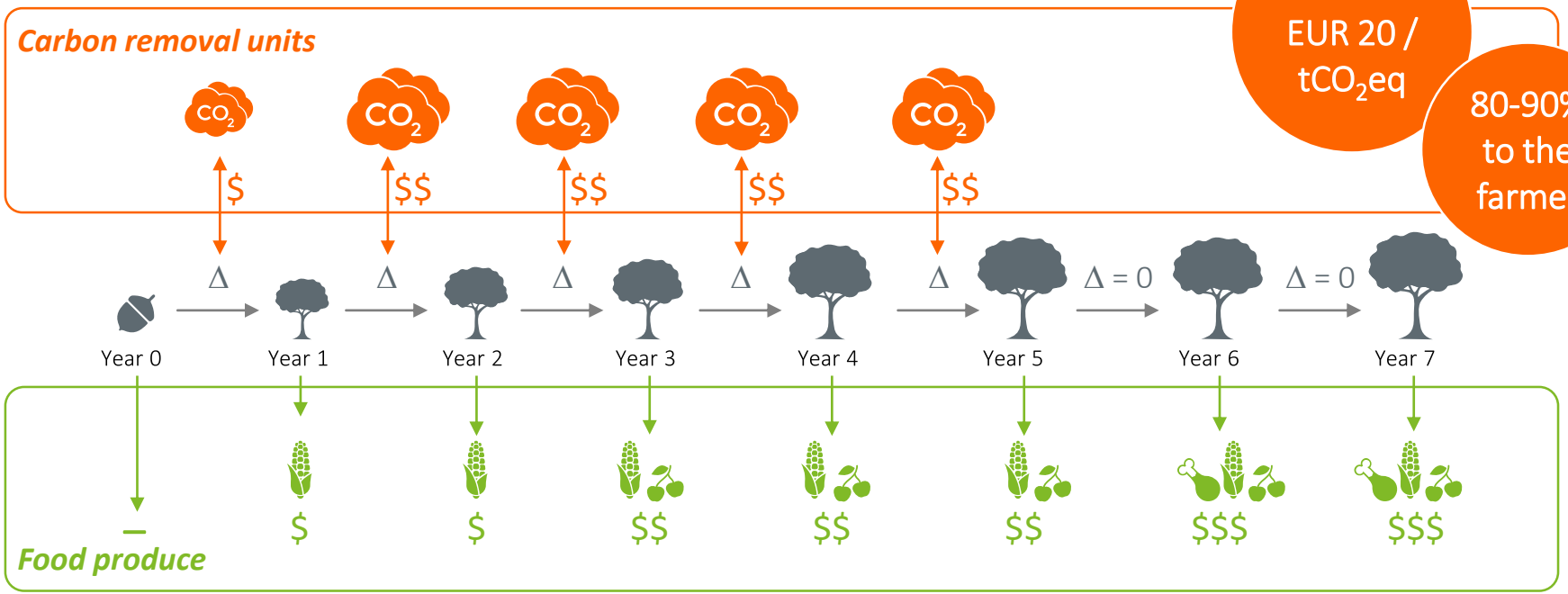
- Improving soil health
- Increasing climate change & weather resilience
- Diverse nutrients
- High quality nutrients
- Improved yield per ha
- Income depends on different harvest streams
- Afforestation

High investment costs

Acorn
Rabobank

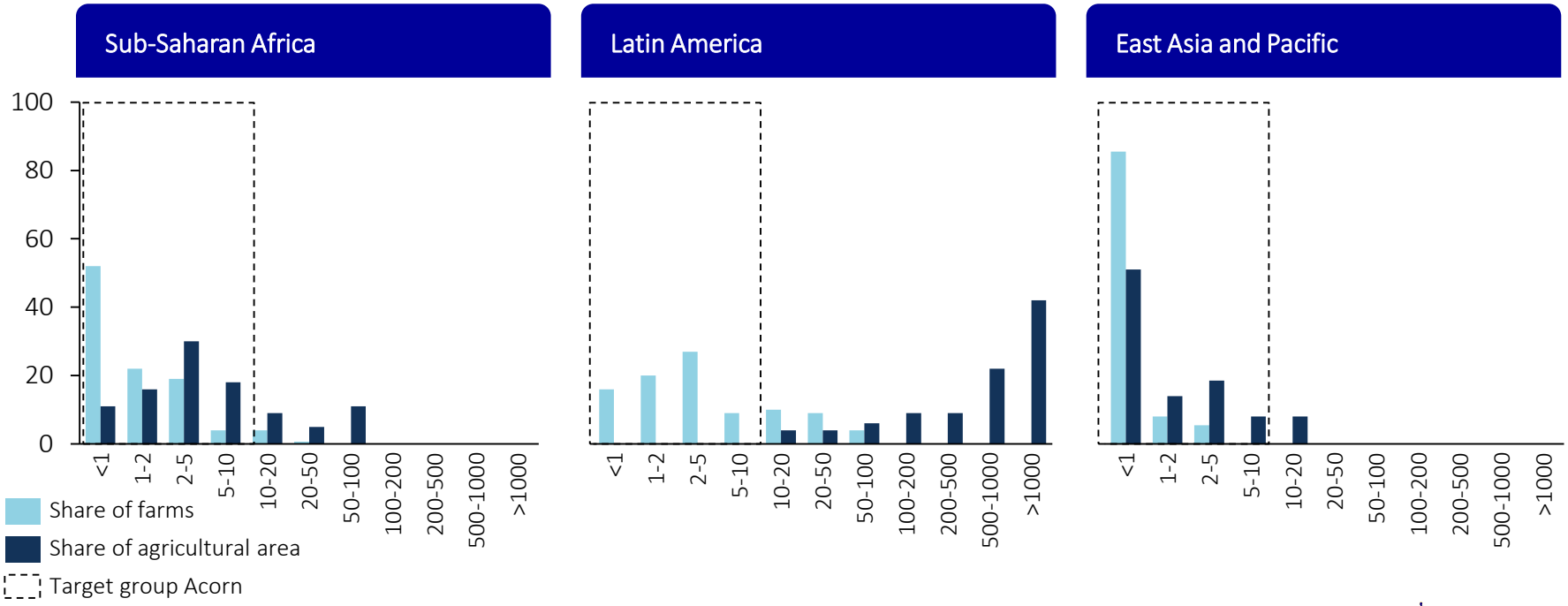
Annually generated, ex-post Payments for Ecosystem Services (PES) finance the transition from monoculture to agroforestry

Additional revenue stream from Carbon Removal Unit (CRU) sales



Acorn targets smallholder farmers with maximum 10 Ha of cultivated land

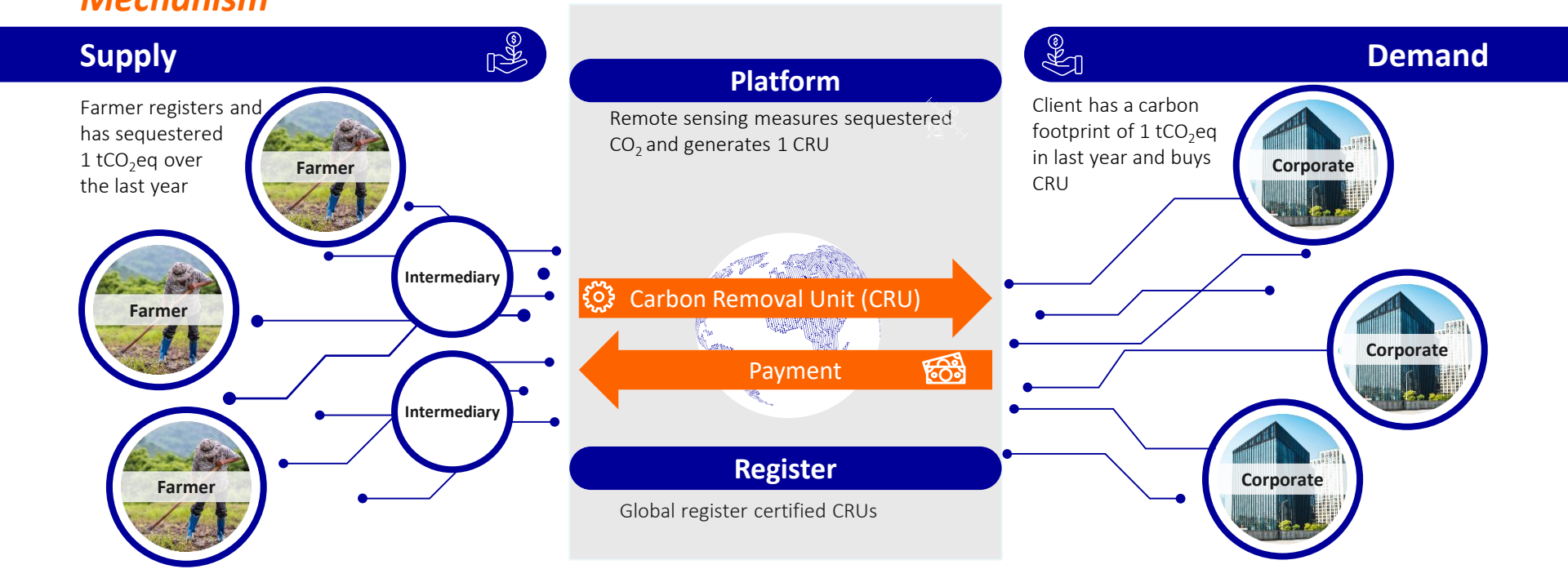
Average distribution of farms and farmland area by land size class



Source: FAO

Smallholder farmers sequestering carbon are monitored by satellites to sell their Carbon Removal Units (CRUs) to companies

Mechanism



Hurdles Acorn tackles

And the value of smallholder data

Rabobank

Growing a better world together.

High entry barriers made it difficult for smallholder farmers to benefit from PES through the carbon market

Former bottlenecks

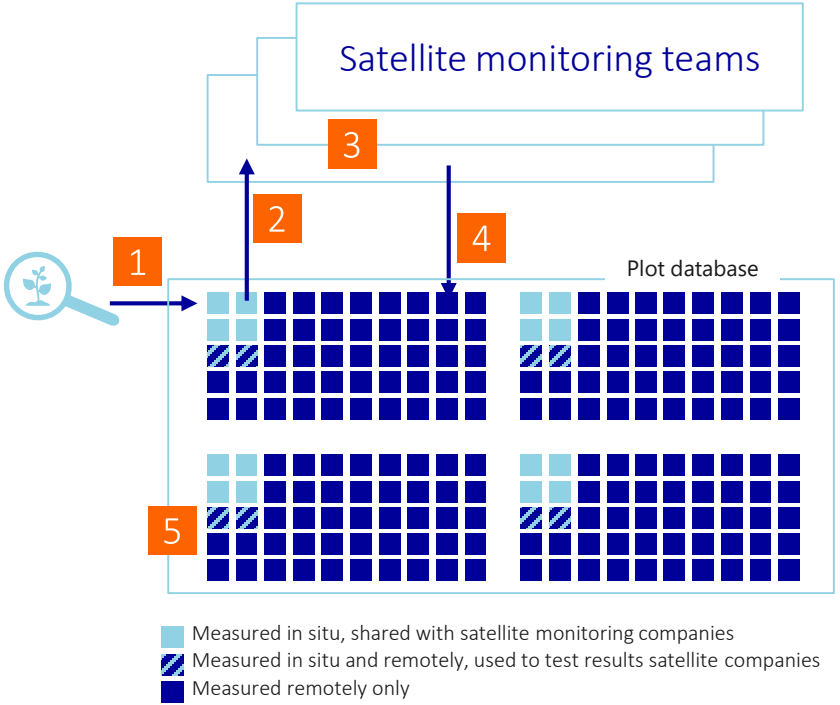
High monitoring costs throughout the project

High certification costs for each project

Satellite monitoring is applied to ensure cost-efficient measurement with ground truth data to ensure accuracy

Satellite monitoring high level process

1. Rabobank and partners collect the ground truth data to measure the total carbon storage ($AGB_{t=0}$) in situ for 100+ locations:
   - Hand measurements (counting / measuring trees)
   - Lidar technology (terrestrial/aerial)
   - Commercial satellite data
2. Rabobank shares the data with satellite monitoring teams
3. Satellite monitoring teams use the data to train their AI models
4. They calculate all remaining pilot plots using their AI models
5. Rabobank assesses the accuracy by assessing the [20] in situ measured plots that have not been shared



Acorn
Rabobank

Hand measurements contribute to ground truth data

Our partners on the ground collect tree data

Species identification

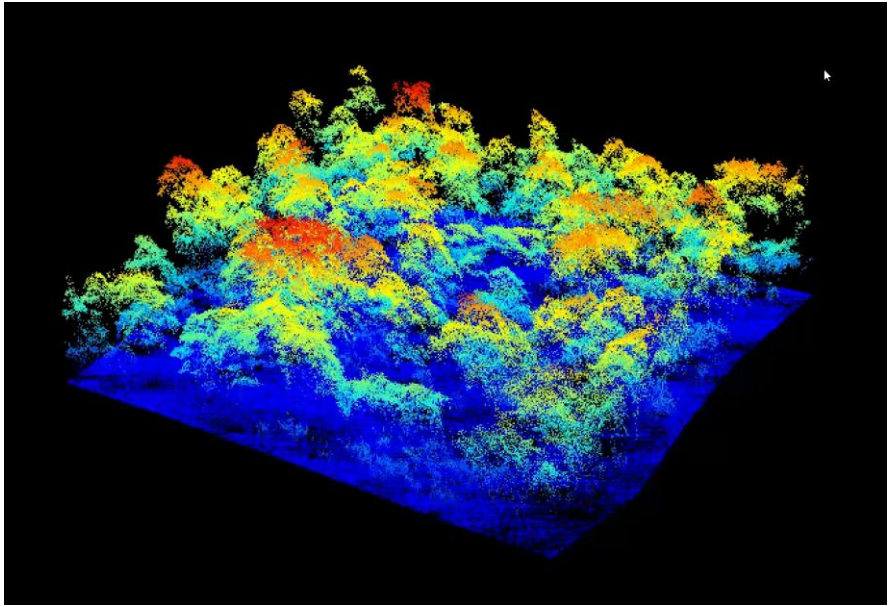
Height measurement

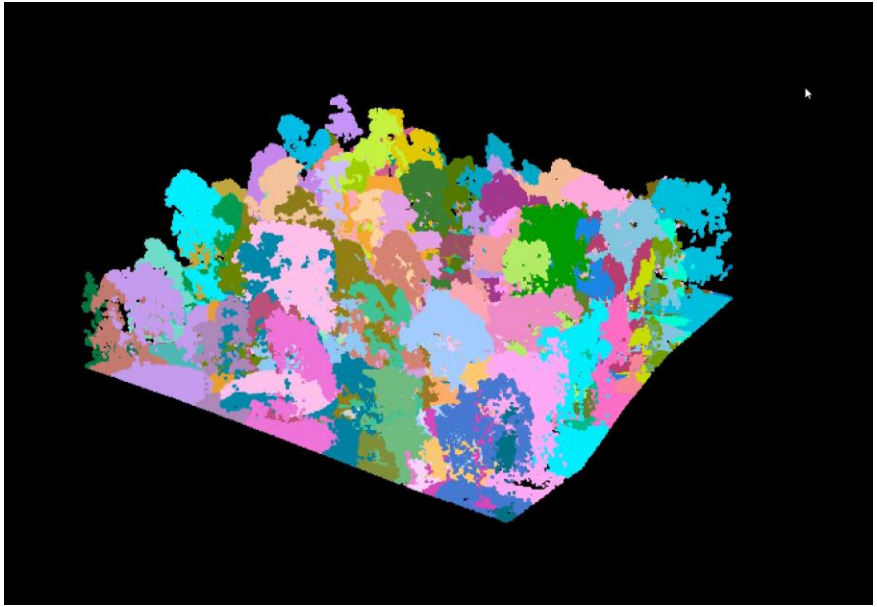
DBH measurement

Acorn
Rabobank

LiDAR data is used for ground truth measurements

Adapted by Acorn's data scientists to map out the full forest and individual trees





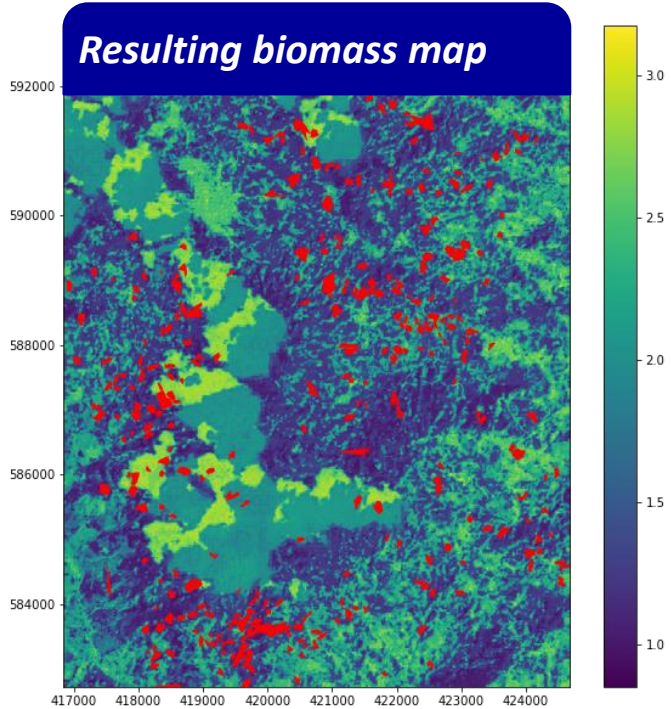
Rabobank

With these additional data layers, remote sensing is possible

Using ground truth data to train the models to recognize biomass

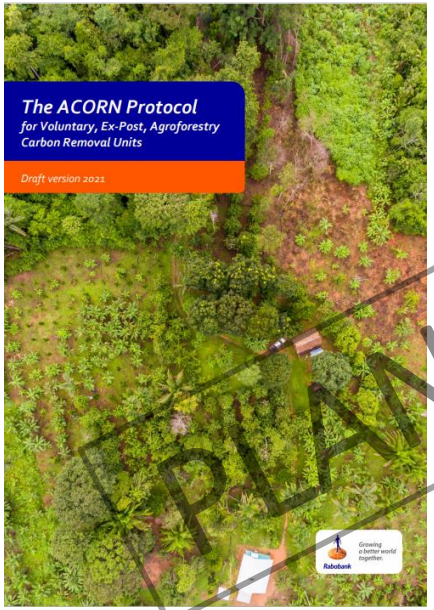
Sentinel satellite data

Resulting biomass map



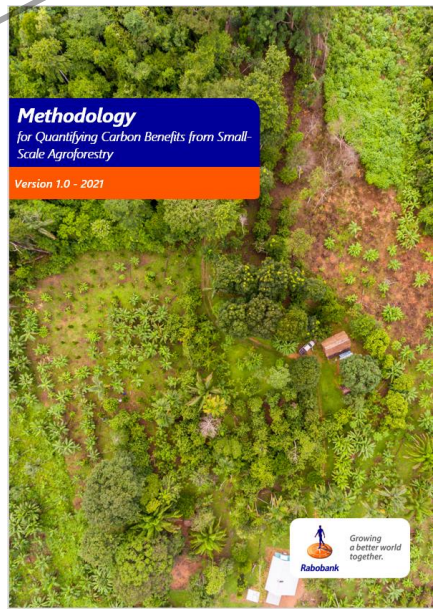
Acorn
Rabobank

We provide high-integrity CRUs conform our own framework and methodology, certified by Plan Vivo



Acorn's guiding principles

1. All Acorn projects meet the eligibility requirements and actively involve smallholder farmers in the transition to agroforestry to improve their livelihood and that of their community.
2. All Acorn project coordinators have clear responsibilities and are compliant with international and national legislation.
3. All Acorn CRUs are generated with integrity by additional and real project interventions.
4. All Acorn projects realize ex-post carbon sequestration, as well as demonstrable socioeconomic and environmental improvement compared to the baseline.
5. All Acorn CRUs are ex-post, science-based and data-driven in their quantification and measurement, and these are demonstrated to be accurate, validated and verifiable.
6. All Acorn projects will mitigate additional carbon emissions within and beyond the project boundaries.
7. All Acorn CRUs are traceable, uniquely registered and accounted for.
8. All Acorn projects deliver CRUs that are based on actual sequestration and come with an appropriate durability period.
9. All Acorn projects adopt robust solutions for reversal risk.
10. All data acquired by Acorn is handled with the highest level of integrity and with stakeholder consent.



Data shows that the Acorn project impacts not only the carbon market, but many other important SDGs for smallholders

How data-driven PES for agroforestry for smallholders contributes to SDG targets

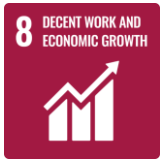
Agroforestry contributes to and increases farmer income.

Agroforestry makes farmers more resilient to market and environmental shocks.

Agroforestry enriches the diet of rural people in emerging markets

Agroforestry contributes to the increasing demand for food, by diversifying and increasing the yield per hectare in a sustainable manner. Agroforestry also contributes to long term soil health and prevents desertification and erosion.

Agroforestry contributes to the decreasing need for fertilizers and indirectly contributes to the ground water quality and infrastructure



Agroforestry contributes to farmers productivity, technology allows for a scalable approach

Agroforestry contributes to the resilience of climate change effects, like flooding.

Agroforestry continuously contributes to the afforestation rates and combats desertification.

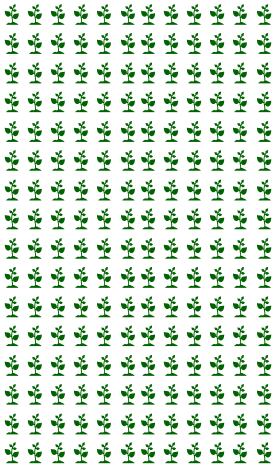
Agroforestry contributes to biodiversity.

Acorn
Rabobank

Ambition is to empower 15 million farmers with almost 4 billion trees compensating 150+ Mt CO_2eq

Ambition

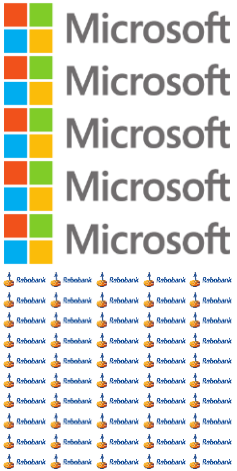
~15 million farmers with
~1 hectare
(~25% of Kenya)



~4 billion trees
(~250 per farmer)

=

150+ Mt CO_2eq
sequestration per annum



~5x Microsoft +
~500x Rabobank
annual emissions

Thank you!

Feel free to reach out to us with any questions, suggestions or advice

Rabobank

Growing a better world together.

The first results of Acorn's new agroforestry projects

Moringa & mango planted in Ghana

Seedlings

Loading up

Transport

Acorn
Rabobank

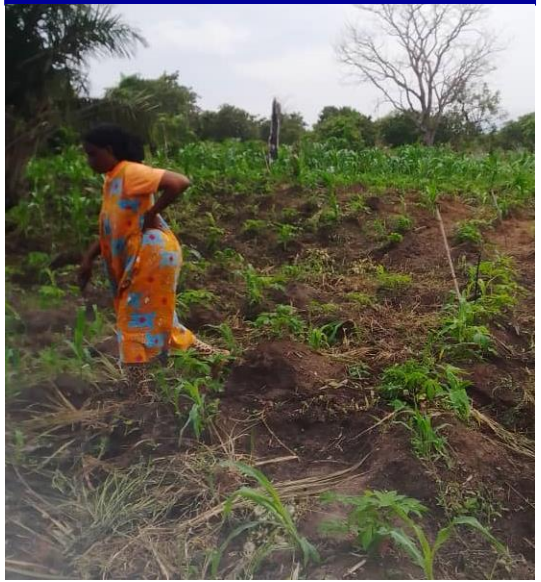
The first results of Acorn's new agroforestry projects

Cashew planted in Ghana

Cashew tree intercropped

The field

Farmer resting



Acorn
Rabobank

The first results of Acorn's new agroforestry projects

Banana planted in Burundi

Stubs arrive

Holes to plant in

Banana between crops

Acorn
Rabobank

The first results of Acorn's new agroforestry projects

Avocado planted in Burundi

Avocado between crops

Farmer training

The ecosystem

Acorn
Rabobank

The first results of Acorn's new agroforestry projects

Moringa planted in Kenya

Seedlings & schoolkids

Planting

The field

Acorn
Rabobank

The first results of Acorn's new agroforestry projects

Permaculture planted in Kenya

Planning

The team

Acorn
Rabobank