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How Thryve's scientific design is reimagining agroforestry

2026

Where crops meet canopies

Across landscapes in India and Indonesia, years of monoculture farming and excessive chemical use have left the soil degraded and exhausted. Yet, this desolation holds untapped potential for restoration, both for the land and the livelihoods dependent on it.

This situation poses a powerful question:
What if restoring our planet didn't force us to choose between people and nature, but allowed us to restore both together?

"Agroforestry" provides the answer.

This regenerative approach blends agriculture and forestry to restore ecosystems while simultaneously sustaining livelihoods. This isn't just theory; it's a global practice: the FAO* reports that agroforestry is already used on over 43% of agricultural land worldwide, supporting 30% of the global rural population.

In comparison to monoculture systems, which exhaust soil fertility and make farmers vulnerable to crop failure, agroforestry provides a safety net with diversified outputs: short-term crops, medium-term returns from timber or fuelwood, and long-term yields from mature orchards or premium wood. This layered and sustainable approach is why agroforestry holds such promise for the future of farming.

* Link to the FAO report

Why agroforestry design matters

While agroforestry sounds simple in execution, its success heavily depends on well-crafted designs that balance ecological integrity with economic viability and social fit. The challenges are multifaceted:

Environmental challenges

- A poorly planned system may lead to resource competition (e.g., for water or shade) between trees and crops.
- Unsuitable species selection can result in reduced crop yields or plantation failure.
- Some species may dominate or attract pests, potentially damaging nearby crops.

Economic challenges

- Trees take years to mature, causing a delay in income for smallholders.
- Labor needs can be high, potentially diverting effort from other earning activities.
- Without diversified outputs, farmers are vulnerable to market or weather-related shocks.

Social and implementation challenges

- Agroforestry demands time, labor, and a long-term commitment from farmers.
- This commitment is difficult where land is scarce and families need food crops for daily sustenance.
- The design process must balance ecological and economic needs with social considerations.

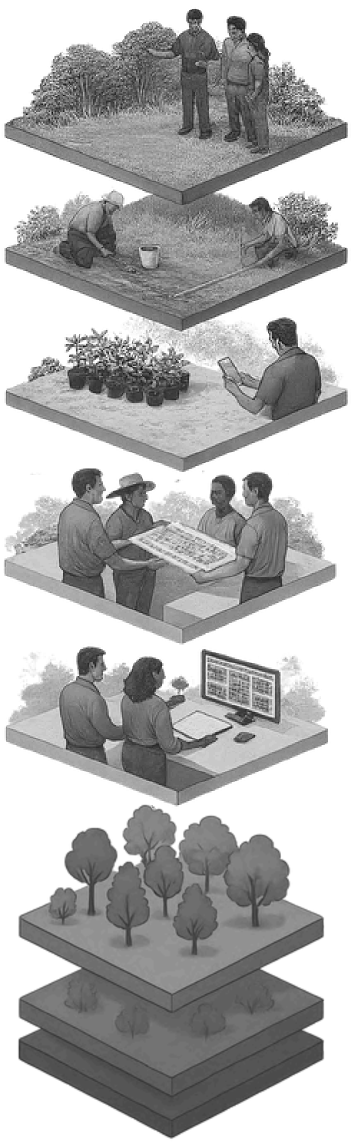
System planning challenges

- The design must balance the ecological, economic and social considerations.
- Design requires factoring in the market potential of species for profitability.
- Lack of design can result in a system that is not resilient or is vulnerable to climate conditions.

Thryve's approach to develop agroforestry model

Science-backed, community-centered model

At Thryve, we move beyond generic models ("one size fits all") to craft systems that reflect local ecologies, community needs, and long-term stewardship. We tailor each model to the land, the people who tend it, and the markets that sustain it. Our approach combines scientific rigor with farmer insights.



Baseline survey

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Environmental factors and soil testing

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Species selection

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Farmer consultation and model co-creation

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Science-backed model designing

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Phased implementation of finalized model

Step 1

Baseline survey

The first step is to begin with a landscape-level baseline survey to understand farmers' needs, existing cropping patterns, and local ecological conditions. This helps us to identify commonly grown and well-adapted species, as well as market-linked opportunities. By documenting these patterns, we could design systems that built on existing practices while addressing key challenges.

Project-level context

In our India project, the baseline survey revealed that farmers were already cultivating coconuts and mangoes as cash crops, but faced declining soil fertility and irregular income streams. Along with the survey, we conducted stakeholder consultations, which helped deepen our understanding of farmers' priorities, challenges, and on-ground realities. By documenting these patterns, we were able to design systems that build on existing practices while directly addressing the key constraints they face.

A baseline survey was conducted in the Trichy project area, Tamil Nadu.

Engaged with farmers during a stakeholder consultation meeting.

Step 2

Environmental factors and soil testing

We apply our biophysical feature analysis framework, which includes comprehensive soil testing across a representative sample of the region, covering macro- and micro-nutrients (including NPK), organic carbon, soil pH, and soil composition. This integrated assessment helps us evaluate soil capacity, identify required inputs, and understand site suitability. Combined with landscape-level factors such as topography, soil moisture and drainage, water availability, temperature tolerance, and drought frequency, the framework guides agroforestry species selection and supports the long-term resilience of plantations.

Project-level context

At our India project site in Tamil Nadu, soil test results showed consistently low soil organic carbon (SOC) levels, ranging from 0.15% to 0.45%, along with low available phosphorus and nitrogen. These conditions led us to prioritise nitrogen-fixing and high-biomass species such as Gliricidia sepium, Pterocarpus marsupium, and Pongamia pinnata - within the agroforestry design to address site-specific nutrient limitations through biological nitrogen fixation and increased biomass inputs.

Soil samples were collected for testing in Trichy, Tamil Nadu.

Step 3

Species selection

We prepare a shortlist of indigenous species suited to the region, that balances ecological sustainability with farmer interests. Selection criteria include ecological compatibility, economic value, and farmers' preferences. We also refer to established models developed by the World Agroforestry Centre (ICRAF), and NABARD's Wadi model and published research papers. Our in-house experts, who bring over three decades of field experience, provide final guidance. Selection is done strategically to provide:

- Immediate returns through intercrops (annual vegetables or pulses),
- Short-term yields (fruit trees), and
- Long-term returns (timber, premium orchards)

Project-level context

In our project in North Sulawesi, we observed that traditional species like nutmeg and sugar palm hold strong cultural significance and have established markets. We integrated these species with fast-growing timber such as Sengon and Jabon, alongside nitrogen-fixing plants and fruit trees. This diverse mix supports multiple income streams while gradually enhancing soil health.

A few snapshots from the project nursery showcasing the maintenance of traditional species, including Arenga, prior to field distribution.

Step 4

Farmer consultation and model co-creation

After Draft agroforestry models are taken back to the community and jointly discussed with farmers through meetings and small group interactions. Farmers share their preferences for species, planting layouts, labour availability, and market realities, as well as their traditional knowledge of what grows well together. Their feedback is used to refine species combinations, spacing, and management practices so the design fits local needs without losing its ecological intent. This turns the model from an external prescription into a co-created system that farmers understand and feel ownership over.

Project-level context

In the Tamil Nadu project, we initially included Sitaphal/Custard apple (Annona squamosa) in our agroforestry model, based on secondary research and its widespread presence in the region. However, on-ground consultations revealed that the local sitaphal market is largely saturated, with declining demand.

Many farmers instead expressed a strong preference for a locally grown, GI-tagged citrus variety with higher market value. In response, we developed an alternative model incorporating lemon alongside mango, coconut, and other complementary species, balancing market relevance with ecological compatibility.

Successfully conducted a stakeholder consultation meeting in Trichy, Tamil Nadu, India.

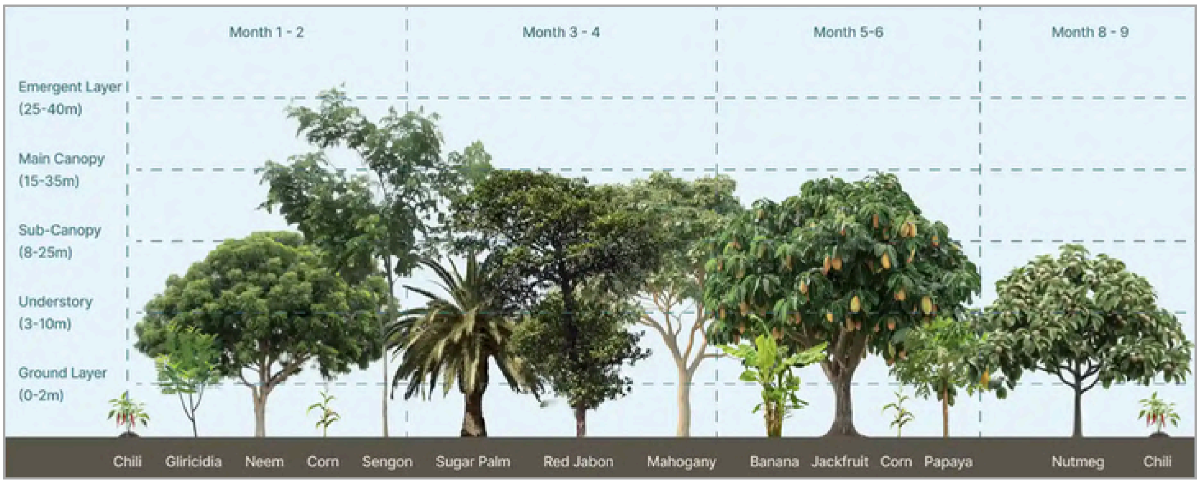
Step 5

Science-backed model designing

We apply successional planting and canopy stratification to optimise the use of light, water, and nutrients. Fast-growing species provide early cover, while slower, high-value species are introduced over time. The model's vertical canopy structure organises species by height and growth rate to reduce competition and maximise productivity. This approach enables efficient resource use, resilient yields across layers, and stronger ecosystems through improved carbon capture, biodiversity support, and soil protection.

Project-level context

Our North Sulawesi project model features a diverse mix of 10 species planted, structured across five canopy layers - from ground cover to emergent trees reaching up to 40 meters. Over 25 years, the system is expected to sequester 200–400 tCO_2/ha. This design delivers benefits: short-term returns from annual crops, medium-term income from fruit-bearing species and early timber harvests, and high-value long-term returns from mature timber and enhanced ecosystem services as the system matures.



A snapshot showcasing the science-backed agroforestry model from our Indonesia project.

Step 6

Phased implementation of finalized model

Once models are finalized, plantations are established in collaboration with farmers following ecological successional principles. By staggering planting phases, the system mimics natural forest regeneration, ensuring seasonal adaptability and long-term yields. This approach supports soil health, creates stable income streams, and enhances carbon sequestration.

The Phased Strategy:

Both agroforestry models apply successional principles through a carefully timed implementation schedule:

1. Months 1-2 (Foundation): Fast-growing pioneer species and nitrogen-fixing trees are planted to rapidly establish a canopy framework. This improves soil fertility and creates the necessary microclimate for subsequent species.
2. Months 3-4 (Transition I): Slow-growth timber and productive species are introduced once the pioneers have begun modifying the site conditions.
3. Months 5-6 (Transition II): Medium-growth timber and productive species are introduced once the pioneers have begun modifying the site conditions.
4. Months 8-9 (Maturation): High-value, shade-tolerant species are integrated after the canopy structure has sufficiently developed to protect them.

This sequential approach minimizes inter-species competition during critical establishment periods, maximizes survival rates by matching species introduction to evolving site conditions, and ensures farmers receive continuous economic returns from immediate annual crop harvests through medium-term fruit and timber production to long-term premium timber and perennial crop income.

Step 6

Phased implementation of finalized model

Project-level context

In our North Sulawesi project, we begin by planting pioneer and nitrogen-fixing species, alongside annual crops which stabilize soils, enrich nutrients, and create the first layer of canopy. As the system strengthens, timber and structural species are introduced to form the long-term backbone of the landscape. Fruit trees are then integrated, taking advantage of the improving microclimate as the canopy develops. Finally, specialty crops such as nutmeg are planted once the canopy is well developed, ensuring optimal growing conditions.This phased approach reduces competition, improves survival rates, and ensures continuous livelihoods.

A glimpse of phases 1 and 2 of the planting activities conducted at our project site in North Sulawesi, Indonesia.

The path forward: Scaling agroforestry impact

At Thryve, agroforestry is a design philosophy shaped by science, driven by technology, and co-created with communities. By applying ecological principles to agricultural landscapes, we build systems that bridge the needs of nature and humanity, forging a path toward long-term resilience.

The impact of this approach extends far beyond the individual farm. When implemented at scale, these systems transform landscapes into vibrant ecosystems where:

- Biodiversity flourishes alongside productive agriculture.
- Carbon is actively sequestered in both soil and biomass.
- Water systems are naturally protected and enhanced.
- Communities achieve lasting food security and economic stability.

As the climate shifts and biodiversity loss accelerates, agroforestry stands as a proven, multi-dimensional solution. Our work in regions as diverse as Tamil Nadu and North Sulawesi demonstrates that thoughtful design and genuine community engagement can turn degraded lands into productive sanctuaries.

Each project brings us closer to our ultimate vision:
Building a future where people and nature can thryve together.

> Agroforestry is not simply about planting trees on farms; it's about reimagining the relationship between agriculture and natural ecosystems.
>
> P.K. Nair, Father of modern agroforestry science

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Thryve develops high-quality Nature-based Solutions (NbS) carbon projects that regenerate ecology.

By combining a locally grounded and tech-enabled approach with rigorous project management and strong governance, we create resilient returns and lasting value for capital partners, landowners, and communities.

Interested in learning more?

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