

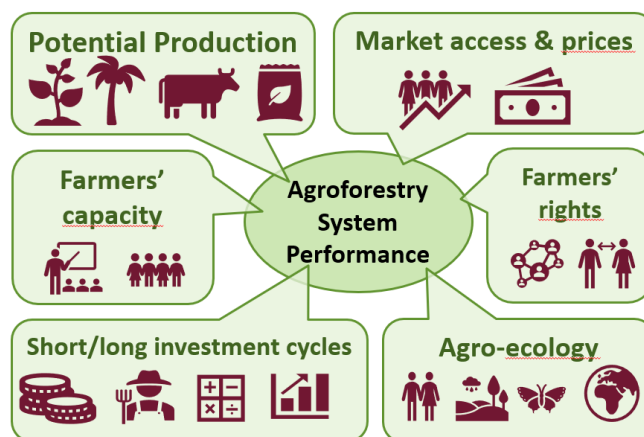
FarmTree® Model, Tool & Services

Calculating the costs and benefits of Agroforestry – the easy way

FarmTree® provides services to project and report on the impact of Landscape Restoration Initiatives, including Agroforestry. We briefly explain how we work and how we can support your project or initiative. Please contact frank.vanschoubroeck@farmtree.earth for more information.

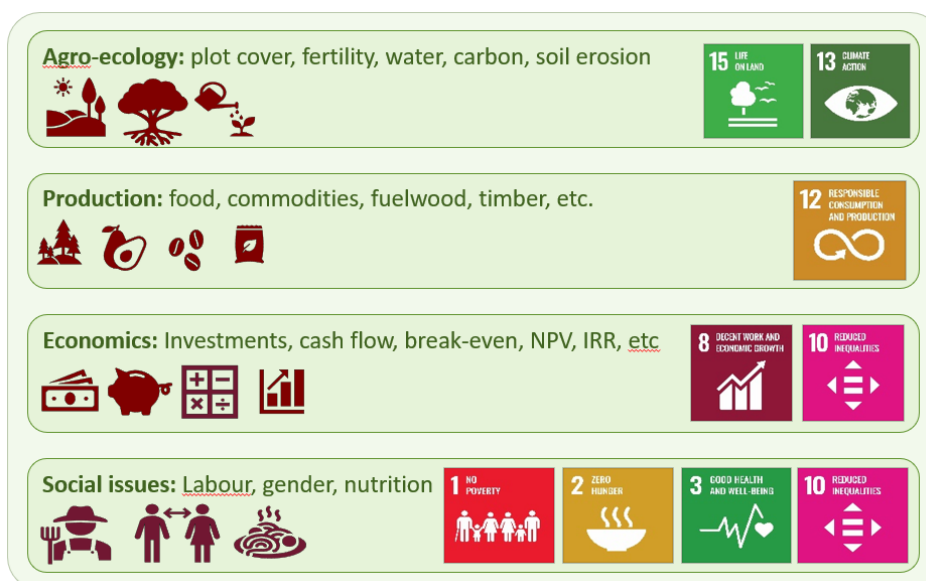
Capturing the complexity of Agroforestry

Agroforestry farming systems result in more productive, climate-resilient and biodiverse agricultural landscapes that also support (smallholder) farmers' livelihoods, particularly those of women. There are so many benefits because agroforestry systems are complex and multifunctional. While these diverse agro-ecological relations are agroforestry's biggest asset, they also make it a big challenge to quantify the performance of these farming systems and their impact on livelihoods. The FarmTree® Tool can help professionals to calculate quite a few development indicators of Agroforestry systems, and weigh them against investments.



What is the FarmTree®Tool?

The FarmTree®Tool is a modelling tool that quantifies the production (fruit, wood, etc.) and services (soil conservation, carbon, etc.) provided by agroforestry systems, at plot, farm or landscape level. It can gauge a wide range of effects of agroforestry at multiple levels, from farm level to landscape level to national level.



The FarmTree® Model generates different classes of development indicators – some of them linked to the Sustainable Development Goals - for up to 50 years

Field-level evidence is translated into cause-effect relations that capture trends and generate agronomic, financial, ecological and social indicators for forecasting future farming scenarios. These scenarios can be tailored and made more precise by adding local data to the global defaults, and thus Agroforestry systems' performance can be estimated.

Who is the FarmTree®Tool for?

Farm and landscape managers working at local, regional and national level can evaluate and compare different agroforestry options depending on the indicators they are interested in. These include production, labour and input costs, cash flow, wage per day, soil conservation, carbon storage. The FarmTree®Tool supports decision-makers, such as farmers, consultancy firms and NGOs, in their project planning and can provide information for investment and financial planning.

The FarmTree® Method

The FarmTree®Tool provides context-specific, tailor-made output, based on a clearly defined agroforestry system. For each assignment a broad array of input data is collected to quantify the defined system.

The whole process involves a semi-structured 4-step working method:



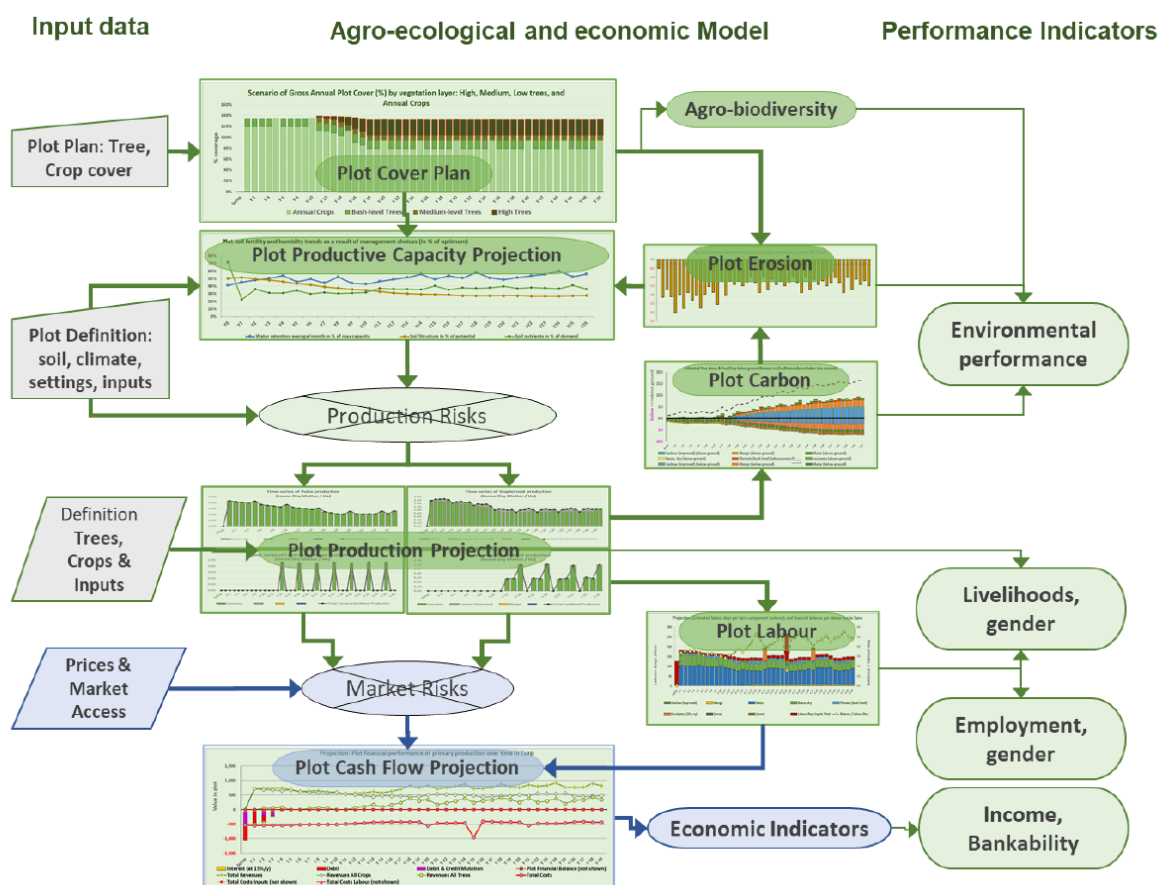
- **Project definition**
Clients define the farming scenarios to be analysed and compared (Business-as-Usual, Agroforestry option 1, Agroforestry option 2, etc.) and validate this with the FarmTree® team. For landscape-scale projects, land cover classes and appropriate landscape restoration options are defined.
- **Data collection**
Input data is derived from farmers' interviews and other field data, FarmTree®'s own database, external databases, and scientific and grey literature. Data is stored in several interrelated datasets so quantitative projections can be made.
- **Data processing & output generation**
The FarmTree® team runs the data through the model and generates agro-ecological and economic outputs and performance indicators. Model calibration is done if projections seem unrealistic.
- **Report writing**
The FarmTree® team interprets and analyses the output in accordance with the clients' requirements.
- **Tool publishing & user capacity development**
Next, the Tool with local species / climate setting is published on the web, so that farmers or local experts can use it. Experience shows that users need it for different indicators (production, or cash flow, or environmental services) and that adaptations to the tool output are sometimes necessary. Similarly, users may need training to use and interpret tool outcomes. FarmTree® provides all these services.

The Plot Planning Model

The model below can be dissected in three basic parts: the input data, the model and the output. Input data is partly provided by FarmTree® and partly by the client. FarmTree® provides default input data that clients can adjust if need be and the client provides data sets needed for the desired projection. Input data is organized in different data sets that feed into the model. The model itself also entails various interrelated datasets that collectively generate a wide array of performance indicators as output. Please find below a link to an introduction to the tool.



[Link to FarmTree Clip](#)



The FarmTree® Model consists of modules that cover agro-ecology, production and cash flow

Plot projections & Scenario Comparisons: Business as Usual vs. Agroforestry

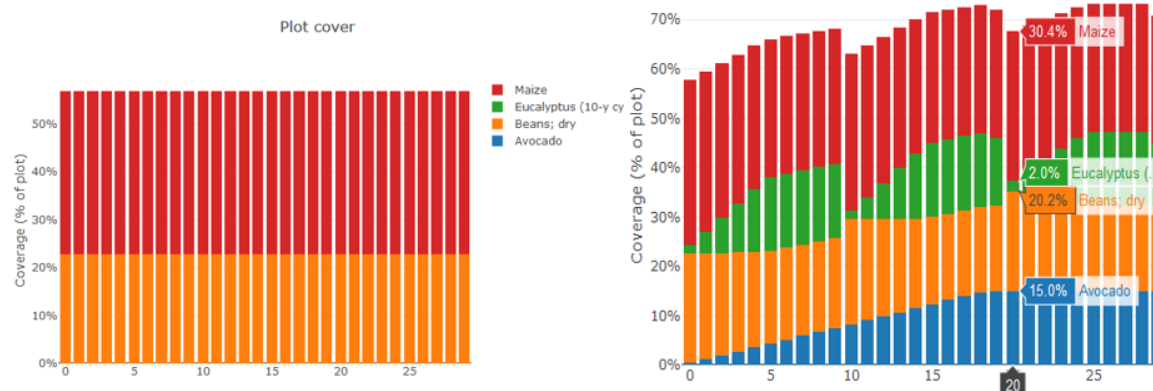
Farmers or project managers can compare different agroforestry options according to the required livelihoods, economic or environmental objectives. By extrapolating and combining projections, the user can evaluate the performance of a 'mix' of different land uses on different scales. On a farm scale, the comparison could for example entail different crop combinations whereas on a landscape scale different land uses are compared in a larger region.

Production in tonne (Dry Matter) per Ha per Year	StapleFood	Fruit	Pulse	Fodder	Fuel Wood	Construction wood	Carbon CO2e/Ha
Baseline	1.086	0	0.213	1.555	0	0	6.7
Intervention	1.015	0.168	0.187	2.067	0.413	0.851	22.6
Difference	-7%	-	-12%	+33%	-	-	16

* Intervention: about 1.18 tonne fresh fruit

per Ha per Year	Labour Days	Revenue / labour-day	Public Investment	Total Investment	Project Break-Even	NPV @25% DR	Internal Rate of Return
Baseline	145	0.387	-	-	-	-\$808	
Intervention	156	1.23	-\$700	-\$755	After Y-06	\$293	13%
Difference	+8%	+218%				+\$1101	

Example of comparing the average 25-year annual performance of a 1-Ha BASELINE (<10 trees /Ha & Maize - Bean - Cassava); with + INVESTMENTS Calliandra (5%) + light progressive terracing; Grevillea 6-year cycle; 60 trees/ha; and Avocado 20 trees/Ha in Gatsibo, Rwanda.



The figure on the left shows a 30-year projection of the annual average plot cover for a maize-bean intercrop. The figure on the right shows how tree and crop cover might expand and contract over the same period of time. In the FarmTree® model you can adjust variables such as plot cover, time of tree planting, and change life cycle settings, for example to vary tree harvest intervals.

The FarmTree-story so far

The FarmTree®Tool is still in development. So far DIBcoop and FarmTree® have used it primarily to help smallholder farmers and Agroforestry projects make cost-benefit analyses of their efforts. Partners provided the data, we did the analysis.

- **Farm Pond cost-benefit analysis**
World Vision, SNV & partners' DryDev programme promoted farm ponds for rainwater harvesting and off-season horticulture. FarmTree® developed a model to calculate additional vegetable production and value, with which farmers can prepare a business plan for external financing.
- **Comparison of agroforestry options for investment purposes**
These are often business-as-usual scenarios versus agroforestry intervention scenarios. Clients include the EU Delegation for the Rwanda Water and Forestry Authority; the Social Forestry Extension Division in Bhutan; Tropenbos International and Indonesia in South Kalimantan, for fostering the development of mosaic landscapes rather than oil palm monocropping.
- **Estimating the impact of Agroforestry options across a project or a country**
The World Agroforestry Centre (ICRAF) in Ethiopia carries out Tree genetic improvement programmes, as well as Agroforestry promotion programmes. DIBcoop helped calculate likely impact over five decades and make a cost-benefit analysis, for project justification and fund raising.
- **Estimating the value of smallholder farms**
The ICRAF & partners' Regreening Africa programme surveyed 10,000 farms in eight African countries. Using the FarmTree®Tool, DIBcoop estimated the baseline Net Present Value, to-be-compared with their post-project value. The issue here is that, at the end of the project the trees have not yet reached maturity, so their impact cannot be directly measured, but the FarmTree® Tool can make a projection of it.



Integrating naturally regenerated Acacia on grassland in Kenya helps farmers to bridge dry season fodder supply gaps, helping survival of animals. World Vision/ICRAF DryDev project.

The online FarmTree®Tool

A demo version of the online FarmTree® Tool is available. It expands the functionality and usability of the tool and will enable farmers and project staff to prepare locally tailored plot plans.

A demo of the tool is available at the following coordinates:

Go to <https://farmtree.earth/tool/>

Login with guest@farmtree.earth; password Guest123!

Go to Demo, wait for the programme to load, and start planning.

The aim is to have clients work with the tool semi-independently with FarmTree® providing technical support. Clients will be able to use the tool on a continuous basis by themselves instead of receiving a one-off analysis. The online FarmTree®Tool will be used in various new projects:

- **Plan the transition towards agroforestry**
For example in collaboration with a service provider in Europe, such as [Soulfood Forestfarms](#) and the syntropic farming movement
- **Prepare a production plan for outgrower schemes**
For example with a [tea processing firm](#) in Rwanda, a [cashew factory](#) in Ivory Coast and a PES scheme for a Malian water company
- **Estimate the carbon sequestration of agroforestry systems**
For example, the [Rabobank ACORN project](#) is investing in the tool to estimate the carbon sequestration potential of different agroforestry systems
- **Provide country staff with Agroforestry Planning Tools**
For example with different local chapters of [Tropenbos International](#)
- **Baseline and ex-ante project impact assessment**
For example for the [ICRAF PATSPO project](#)

FarmTree® Services

FarmTree.earth offers a range of services to support clients in their use of the FarmTree®Tool for Agroforestry Farm and Landscape Planning and Monitoring.

FarmTree.earth (in formation) is a Software as a Service (SAAS) company

- **Support and Training of field staff**
E.g. data collection and forms, use of the FarmTree® Model for Agroforestry project planning
- **Design of quantitative agro-ecological project monitoring protocols**
Landscape Restoration projects often have both an institutional and a tree promotion component. FarmTree® can provide support in the latter.

- **Projection of the costs and benefits of landscape restoration projects**
Typically implementers design project interventions, for which FarmTree® design a planning tool that allows them to make cost-benefit projections.
- **Managing the FarmTree® Model**
Hosting, maintaining and developing the FarmTree® Model
- **Interfaces and user management**
 - Designing interfaces for farmer, extensionist, project and national/international users
 - Managing user, tree/crop, soil, climate and other databases; including user feedback and calibration
 - Managing subscriptions, prices etc. updates, etc.

How it all started

The FarmTree®Tool has its origins in the Oxfam Projects in Support of Smallholder farmer Entrepreneurial Agroforestry which ran from 2013 to 2017 in Nigeria, Niger, Senegal and Mali. The then created Excel-based model appeared useful and has gradually been evolved to address the needs of a wider range of users with more complex inquiries and at larger scales.