FORREST
Restoration &
Agroforestry

Dalilah Schmid und Maurus Schifferli, Bern, Schweiz
Itisha Ismail und Simon Werren, Lahad Datu, Borneo

Project East Borneo

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Background

Introduction and geographical classification

Introduction

A large part of Borneo is covered with palm oil plantations.
Palm oil is an important product and is the main source of income for many local people. However, the cultivation of palm oil is connected with many difficulties and negative externalities. In addition, the loss of rainforest due to deforestation, forest fires and the establishment of plantations, as well as the general loss of biodiversity, poses a major problem.

Together with the general pollution, the loss of biodiversity and the practices geared towards short-term profit, this leads to a vulnerable system characterised by a lack of resilience, which is urgently needed in the face of climate change. The Project East Borneo aims to provide a holistic solution with a long-term planning horizon and a future-oriented, sustainable principle that takes into account the most important aspects as comprehensively as possible.

Geographical classification

The project focuses on the Malay state of Sabah on the Island of Borneo. Our local project manager, a Swiss national, lives in the region Sabah, East Borneo and will be in charge of the project in the long term.

Idea

The aim is a long-term investment in the sustainable development of agriculture in Borneo and a long-term and future-oriented renaturation of the valuable rainforests of Borneo.

Objectives:

- Renaturation and reforestation of the rainforest
- Sustainable agricultural production by means of an agroforestry system
- Education and research centre for training and further education in sustainable agriculture and reforestation of the rainforest

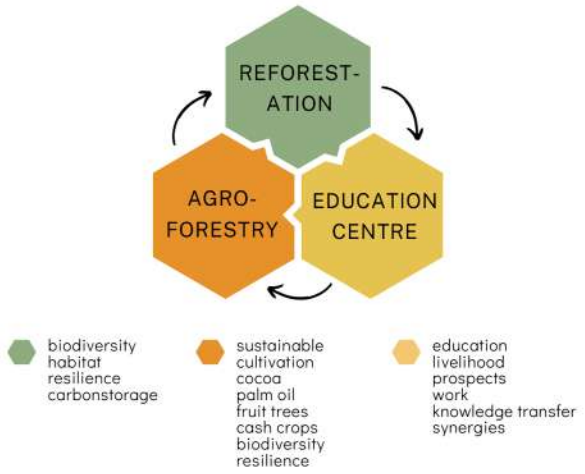


Figure 1: Rough division into the three core areas of reforestation, agroforestry and education centre.

Palm oil

Cultivation of the African oil palm

After the deforestation of the rainforests and the mining of lignite, palm oil plantations were established in many places. The African oil palm is an important and efficient crop. No oil plant is even remotely as efficient as the oil palm, so less land is needed than for other oil plants such as soy or rapeseed. Thus, the oil palm covers only about 5-5.5% of the global oil crop area, but accounts for 40% of the oil consumed.[1] The palm oil extracted from the fruit of the African oil palm is also characterised by its wide range of uses, as it is heat resistant, has a long shelf life and a neutral taste. However, the cultivation of the oil palm is directed towards short-term profit, with environmentally damaging practices.

The forested regions of Borneo, Sumatra and the Malay Peninsula produce over 90% of the world's palm oil.
Accordingly, oil palm is a correspondingly important crop in Borneo.[2]
The cultivation of oil palms practised in Borneo, whether by smallholders or large companies and corporations, is problematic from an ecological point of view. It is practised mainly for economic interest. There are requirements for riparian, water and soil protection, but these are implemented poorly or not at all.
The deforestation of rainforest areas to gain additional cultivable land [3] and the burning of disused palm oil plantations, which leads to air pollution [4], are among the practices applied.
Figure 2 shows the different stages of deforestation in Borneo.

[1] (Meijaard et al., 2020)
[2] (Meijaard et al., 2020)
[3] (Abood et al., 2015; Busch et al., 2015; Carlson et al., 2013)
[4] (Carlson et al., 2013)

FFigure 2: Borneo is home to a variety of rare and endangered vertebrates, including Bornean orangutans, which only occur on Borneo.

The high use of herbicides leads to open soil areas that are at the mercy of the weather, resulting in erosion and soil erosion. This also supports the high nitrogen leaching and groundwater pollution.
The wastewater from palm oil mills is often discharged unfiltered and causes considerable ecosystem and environmental damage.

The palm oil industry is therefore one of the main environmental polluters [1].

There are also repeated cases of poisoning of wild animals that have invaded the plantations. This includes rare, endangered and protected vertebrates, but the exact extent of this is not known.

[1] (Ahmad et al., 2022; Cheah et al., 2018)

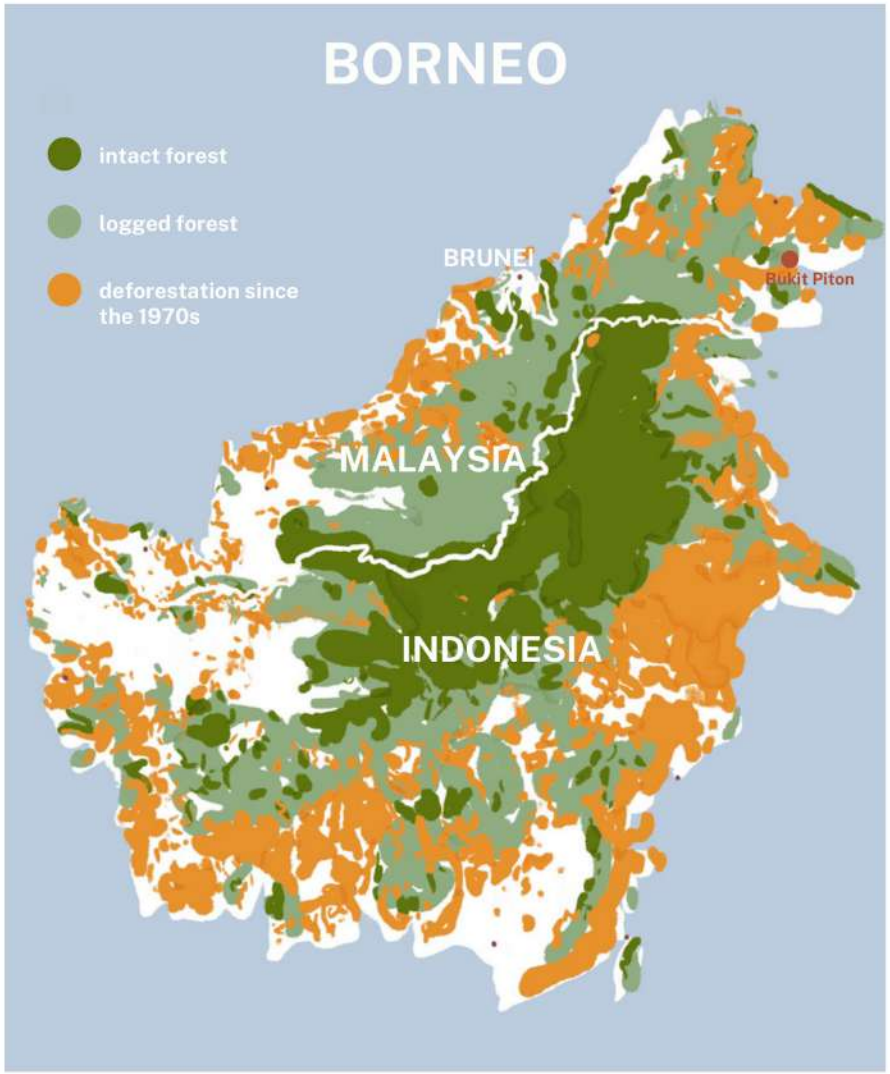


Figure 3: Illustration of the forested area of Borneo in 2021.

[1] (Ahmad et al., 2022; Cheah et al., 2018)

The impacts of the overall loss of biodiversity due to widespread oil palm monocultures are difficult to quantify but extremely diverse. Especially considering that tropical areas around the equator have the highest species density compared to areas in the northern and southern hemispheres, closer to the poles. Unfortunately, it is precisely these areas that are threatened by deforestation and conversion, including palm oil plantations.

In general, the loss of biodiversity and the accruing negative externalities from the cultivation of African oil palms and comparable monocultures create an extremely vulnerable system.
In the face of a longer time horizon and the coming weather extremes as consequences of climate change, this system will sooner or later reach its limits.
In the short term, the practices applied are feasible and profitable. In the long term, however, such a system cannot be sustained.

It is impossible to imagine many products without palm oil, and industry worldwide is dependent on this versatile oil. Due to the high yield and disease resistance of the oil palm, the cultivation of the oil palm can be considered and classified as reasonable. However, this requires revised ecological cultivation practices, as the cultivation of the oil palm could also look different. More sustainable ways already exist, for example the cultivation of oil palm in an agroforestry system.

Agroforstestry

An alternative

Definition

There are a variety of definitions for agroforestry systems.
Agroforestry can basically be defined as any land use system, practice or technology that combines woody perennial plants and/or animals with agricultural crops in the same land management system. In addition, they are characterised by an ecologically and dynamically based use of natural resources.

Agroforestry systems and forest management are, according to Lundgren and Raintree (1983), one of the viable alternatives to unsustainable natural resource management in tropical ecosystems.
Leakey (1996) defines agroforestry systems as a dynamic, ecologically based, natural resource management system that diversifies and sustains production through the integration of trees into agricultural land for increased social, economic and environmental benefits. There are many different classifications of agroforestry systems, as there is a wide range of possible implementations.
An important prerequisite for the successful implementation of agroforestry systems is the maintenance of inherent "ecosystem integrity".

This means ensuring sustainability in the face of changing environmental conditions as well as internal and external stressors, by developing a system in which habitat structure, natural functions and species composition act together to ensure sustainability (Wyant, 1996).
Agroforestry systems have many advantages; environmental, economic and social.

Oilpalms in an agroforestry system

One of the most promising alternatives to oil palm monocultures is the cultivation of palms in an agroforestry system, i.e. combined with other annual and perennial plants to form a separate ecosystem of crops. Examples of plants in this ecosystem would be pepper, cacao, coffee, moringa, cinnamon (C. burmanii or C. verum), tamarind, nutmeg, cardamom (semi-shaded mountain forests), vanilla, mango, mangosteen, durian, jackfruit, soursop, bamboo, coconut palm, rattan, ginger, pandan leaf and various vegetable crops.

Native rainforest plants could also be included, such as carbon trees.
High-quality timber species planted in the agroforestry system could provide an additional source of income that can only be earned after 20 years at the earliest, but would also contribute to the ecosystem character of the agroforestry system.

«For example, there are indications in the literature that practices that are common in smallholder landscapes, such as polyculture, are better for local biodiversity and food security.» (Ogahara et al., 2022)

Syntropy

Syntropy is a possible form for the implementation of an agroforestry system, which was developed by the Swiss agronomist Ernst Götsch.
Syntropy as a term in scientific discussions was introduced in the middle of the 20th century and refers to the ability of living systems to orient themselves towards a state of better organisation in the future. In ecology, syntropy refers to the socialised way of life of different organisms, each of which produces certain metabolic products for the other partner and thus depend on each other.

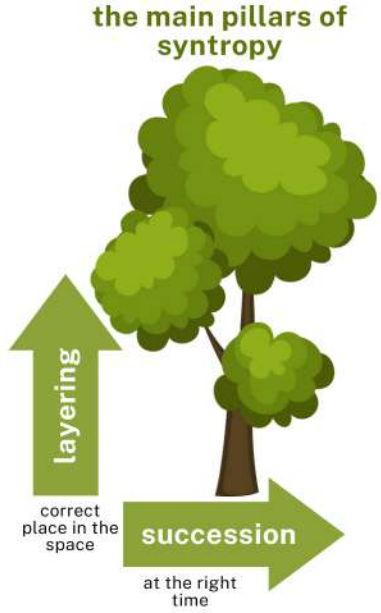


Figure 4: The basis of syntropy is to give each plant a right place in space (layering) at the right time (succession).

Syntropic agriculture has elements that are found in most forms of agroecology, such as the absence of chemical use, environmentally friendly or low impact technologies, and a concept reminiscent of the ecological timing of plants. They differ, however, in that syntropy is the main basis, both for the interpretation of life mechanisms and for the decision-making process regarding management in the field.

In this context, layering and succession are important concepts of syntropy inspired by nature, as each cultivated plant is given the correct place in space (layering) at the right time (succession) (Fig. 4).
These concepts are intended as a substitute for fertilisers and pesticides and also lead to an accumulation of organic matter. In this system, each plant has a task during a phase to further the overall system.

[1] (Andrade et al., 2020)

The entire system is thus intended to act as an ecosystem and, in addition to ecosystem integrity, enables permanent ground cover, stratified vegetation and optimisation of photosynthesis and carbon sequestration.
The dynamics associated with the ecosystem are integrated into the processes by the farmers [1].
The activity of each generation of plants, animals and microorganisms provides a more complex environment for the next generation, with hierarchically broader levels of organisation supporting and accelerating regeneration processes in changing and adapting to the ever-changing environment, among other things.

Despite the extra effort and additional knowledge as well as required labour input, syntropy is economical and produces high-quality products.

The agroforestry system in our project is established on the basis of syntropy and also incorporate the latest research findings.
In particular, the restructuring of the palm oil plantations will be based on syntropy and its important processes of succession and stratification.

[1] (Andrade et al., 2020)

Forest exploitation in Sabah

Sabah has a century-long history of large-scale forest exploitation through selective logging [1], which in the recent past has been increasingly replaced by clear-cutting for timber and later for palm oil plantations [2](Fig.4). Forests cover about 59% of Sabah's 7.25 million hectares, and most are heavily but diversely cleared (Fig. 5). [3]

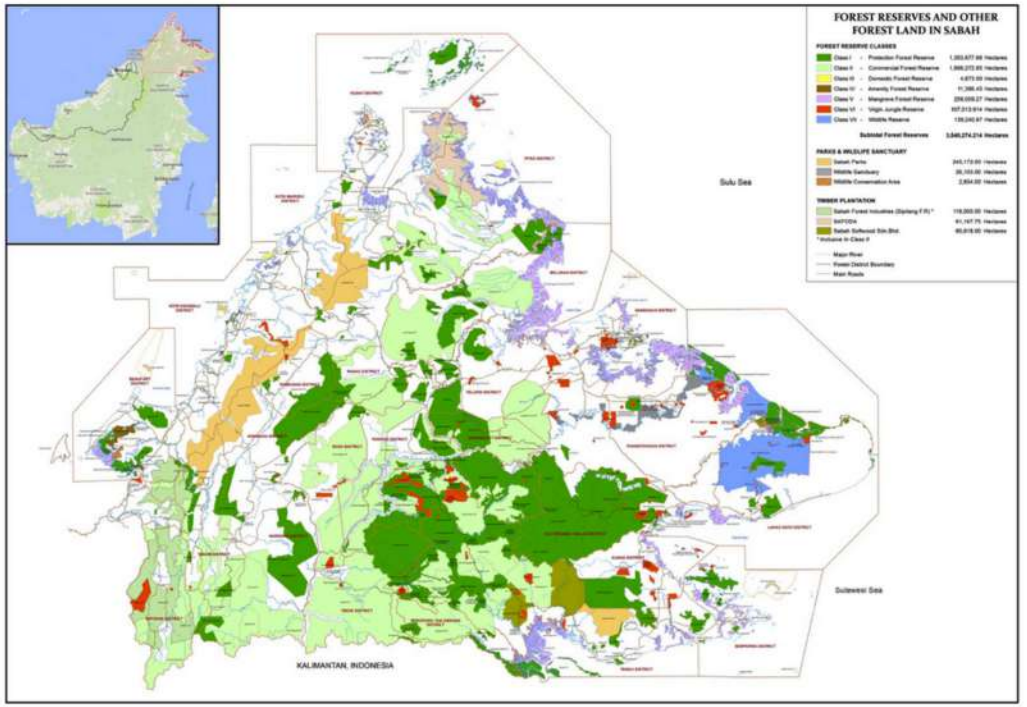


Figure 5: Map from Anser et al. (2018) of the nationwide distribution of official forest reserves and other forest areas in Sabah, Malaysia. Map of the Sabah Forestry Department.

[1] (Jomo et al., 2004)(Pinard et al., 1996)
[2] (Bryan et al., 2013)
[3] (Asner et al., 2018)
[4] (Asner et al., 2018)
[5] (Gaveau et al., 2016)

The remaining natural forests, excluding mangroves, cover an area of 3.7 million hectares. These belong to one of seven protected areas. Almost all of these forests have been selectively logged in the past [4]. One of the current estimates puts the area deforested from 1973 to 2015 at over 1.86 million hectares in Sabah alone [5].

Figure 6: History of forest exploitation in Sabah.

The picture shows an aerial view of a brown coal prospect in Kalimantan.

Carbon storage and biodiversity

Asner et al. (2018) found the highest carbon density in the "Forest Class" declared highest by Sabah's government with the greatest biodiversity. This was almost twice as high as in the next lowest forest class. The highest forest class does not mean virgin rainforest, but includes primary as well as secondary forests with high biodiversity.
Accordingly, the forests with the greatest biodiversity in Sabah are also the forests with the greatest carbon storage (Fig. 7).

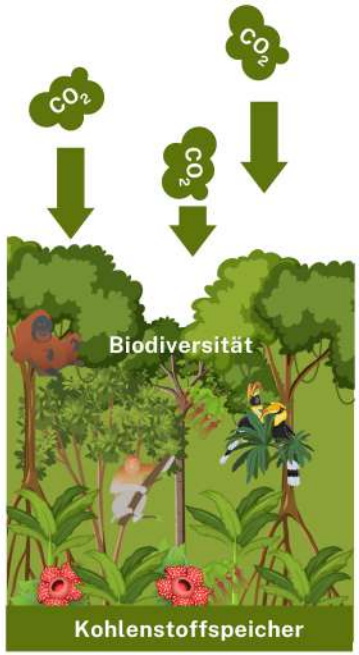


Figure 7: Illustration of the relationship between high biodiversity or the highest and thus, according to the Sabah government, most valuable "forest class" and the existing carbon density or size of the above-ground carbon reservoir. Simplified: high biodiversity and large carbon storage are related.

According to Asner et al. (2018), enormous amounts of carbon are present in both the logged and unlogged forests of Sabah, as the aboveground carbon density they measured in the unlogged forests exceeds the carbon stocks of most tropical forests, including large parts of the Amazon and Congo basins. Even the deforested forests of Sabah currently harbour as much carbon per hectare as old-growth forests of the western Amazon basin and other tropical forests worldwide.
Asner et al. (2018) also conclude that Sabah could theoretically double its aboveground carbon storage by fully regenerating the areas that are now deforested.
Accordingly, there is a very large potential in reforesting the rainforests on Sabah, both from a carbon storage and biodiversity perspective.

[1] (Jomo et al., 2004)(Pinard et al., 1996)
[2] (Bryan et al., 2013)
[3] (Asner et al., 2018)
[4] (Asner et al., 2018)
[5] (Gaveau et al., 2016)

Landscape management

Habitat connectivity and resilience

Reforestation and the agroforestry system must be placed in the overall landscape. Small afforestation areas alone are of less ecological value than connected reforestation areas. Area isolation, reduction and
-fragmentation of habitats leads to isolated populations of species. This is the case, for example, when a small reforestation area is located in the middle of monocultures. The longer an isolated area is unconnected, the more species it loses over time. The smaller it is, the fewer species it can accommodate.

This is due to three important ecological concepts:

Extinction flow:
Small population sizes and small gene pools lead to extinction through inbreeding.

Exceeding carrying capacity:
A certain area can only support a certain number of individuals due to limited food and habitat resources.

Edge effects:
Small areas are more vulnerable to external influences, including the maintenance of the microclimate.

Reforestation areas are the basis, however, as an important next step, they need to be connected.
Wildlife corridors are essential for animals to migrate and for gene exchange to take place between different populations. Animals as well as plants benefit from habitat connectivity.

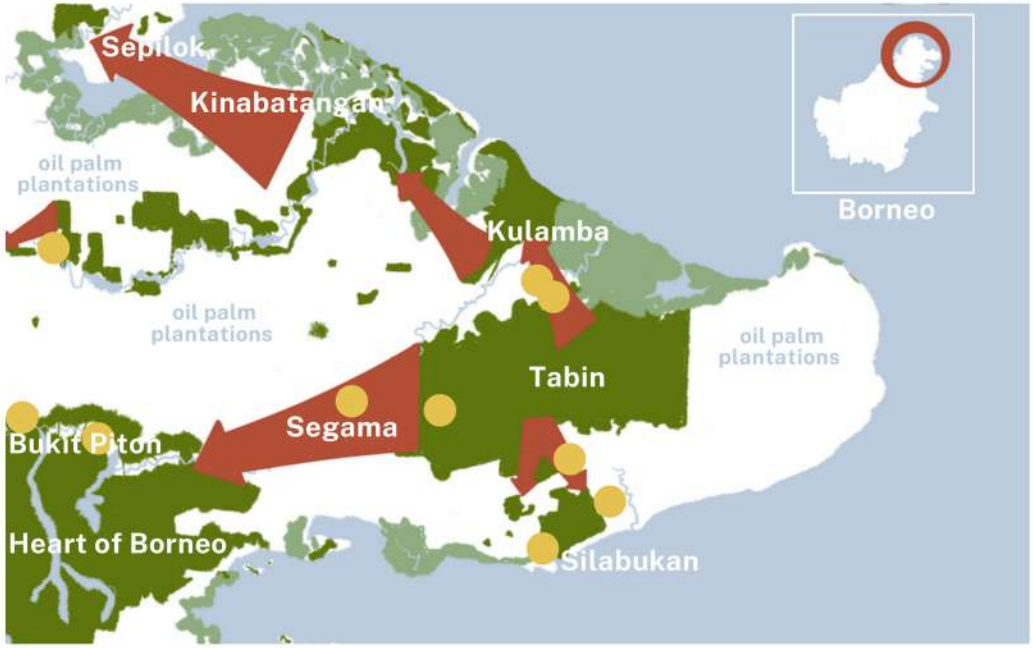


Figure 8: The planned wildlife corridors (red) connecting the forest areas, mangrove forests (light green) and wildlife resorts (dark green). The areas of the Rhino and Forest Fund e.V. are marked in yellow. Between the forest areas are large areas of oil palms.

The reforestation areas as well as the agroforestry systems can be used to connect habitats and create wildlife corridors on Borneo. They are an important piece of the puzzle in the creation of the wildlife corridors planned by the Forestry Department of Sabah and the Rhino and Forest Fund e.V., whose aim is to create a habitat network of sufficient size and quality to conserve as much of Borneo's threatened flora and fauna as possible.
One focus of the effort is the Tabin landscape, with its enormous diversity of endangered and threatened species (Fig. 8).

Structure

Structure of the Bukit Piton project

General structure

The project consists of different thematic areas, which can be extracted into nine individual sub-areas with certain overlaps. These eight sub-areas are shown in Figure 9.

The education centre is the centre of the sub-areas. All sub-areas are arranged around the education centre.

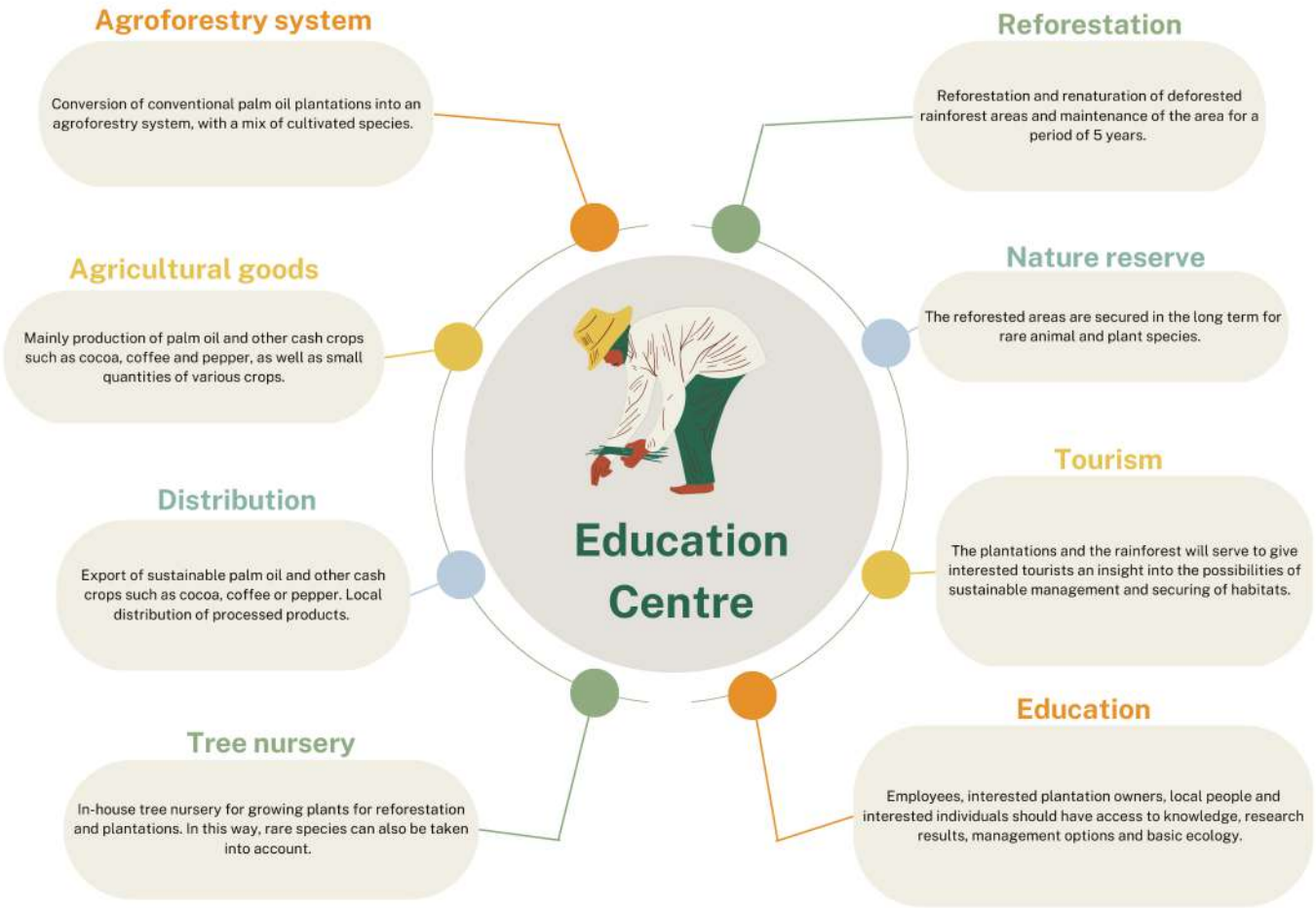


Figure 9: Structure and division into 9 sub-areas with the education centre as the core of the project.

Financial structure

The cash flow of the investment or donation, via the investment in palm oil plantations into reforestation can be seen in Figure 10.

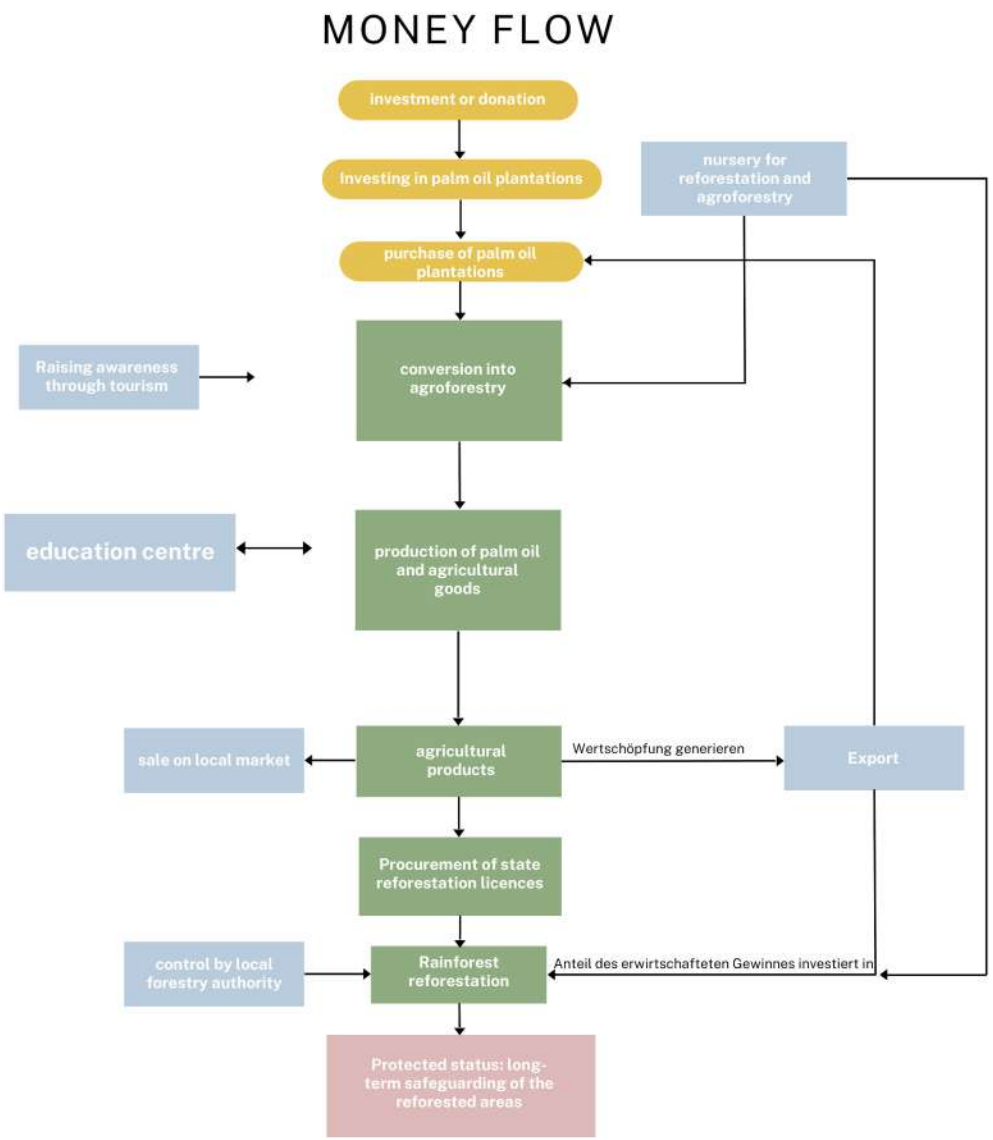


Abbildung 10: Geldfluss des Projektes und die Einordnung der einzelnen Teilgebiete sowie deren Verbindungen untereinander.

Calculation

Proposed calculation

A rough calculation based on an investment of CHF 100,000 leads to a possible agroforestry area of 5 hectares and a forest reforestation area of 10 hectares (Fig. 11).
The calculation is a snapshot from 2022 and can change at any time; market prices are very volatile.

Exchange rate CHF/MYR		4.5	
Acre per hectare		2.471	
PALM OIL PLANTATION			
	MYR	CHF	
Investition	450'000.00	100'000.00	
Price per acre	35'000.00	7'778.00	
Price per hectare	86'485.00	19'219.00	
Possible number of hectares agroforestry			5.2
TURNOVER OF THE AGROFORESTRY AREA			
Yield per hectare and year in t			18
Price per t	1'100.00	244.00	
Total turnover per ha	19'800.00	4'400.00	
Total turnover of invested hectares	102'960.00	22'880.00	
Maintenance costs of the plantation per year	25'000.00	5'556.00	
Profit from the plantation	77'960.00	17'324.00	
FOREST REFORESTATION			
Costs for one care round per ha	1'650.00	367.00	
Rounds per year			4
Total costs per ha/year	6'600.00	1'467.00	
Number of years			5
Total care and maintenance costs for the number of years per ha	33'000.00	7'333.00	
Costs of opening the site per ha	3'200.00	711.00	
Average costs for the number of years per ha	36'200.00	8'044.00	
Total reforestation costs per ha/year	7'240.00	1'609.00	
Number of hectares for reforestation			11

Figure 11: Calculation based on an investment of CHF 100,000.

Establishment

of reforestation and the agroforestry system

Cycle

The project roughly consists of three parts, which are linked to each other. The aim is to achieve a long-term implementation that does not rely on a constant periodic cash flow from investments.

Rainforest reforestation

Rainforest reforestation
One of the purposes of reforestation is to regenerate degraded soils and provide a habitat for rare and endangered animal and plant species, including the diversity of bird species and rare vertebrate species found on Borneo such as orang utans, pigmy elephants, proboscis monkeys, sun bears and banteng.
Rainforest is not only an important habitat, but also provides many other important benefits, including the absorption of carbon dioxide in the form of organic carbon. The agroforestry system also provides many of these benefits, although to a lesser extent than the rainforest ecosystem. However, agricultural production through an agroforestry system provides sustainable livelihoods for the farmers and includes, fulfils and promotes important social aspects.
Even partially cleared areas still provide important social and ecosystem services. According to the study by Boul Lefeuvre et al. (2022), all long-term undertakings for the protection and reforestation of the forest in Borneo should be considered.

Palm oil plantations

Oil palm plantations are often created by clear-cutting the forests or on coalfield sites. This reduces the 25m high tree canopy to bare ground with a harsh microclimate. Older plantations with closed canopies and a height of 13m have a better buffered microclimate than younger plantations with a height of 4m and open canopies. Overall, palm oil plantations are hotter and drier [1].

The habitat characteristics of palm oil plantations change during the plantation life cycle, such as canopy continuity and forage availability. Thus, as oil palms grow and gain structural complexity, native species are more likely to use these resources or spread into the plantations.[2]

[1] (Luskin and Potts, 2011)
[2] (Brockerhoff et al., 2008)

Social aspects

The social aspect of this project is an important, underestimated part. In conventional palm oil plantations there are roughly two jobs: harvesting oil palm fruits and driving them to the mill. This is done daily and predominantly by one demographic: young and male. The workers and their families live together on the plantation, for the women and elderly, there is usually no work in the plantation. This is where the agroforestry system would also intervene and provide work for all ages and genders, as the work involved is very diverse.

Tree nursery

The tree nursery would be both a foundation and an extension. The establishment of a seed bank is an important task of the tree nursery and forms the basis for the implementation of reforestation and agroforestry. As a mother quarter, the nursery is used for seed collection as well as for the production of seedlings.

Producing seedlings and obtaining seeds on site guarantees the desired quality and already site-adapted trees and variety types, whose planting shock, takes on smaller extents, as they have already been grown in closer surroundings. In addition, the quality of the seed itself can be checked and the desired quality can be selected. Furthermore, the species composition of the initial forest can be determined much more freely by having one's own tree nursery. Thus, rare and endangered species should be propagated. "Carbon fixating trees" could contribute to a good mix of tree species. The mix of trees and their objectives should be well chosen and cover as many benefits as possible.
If interested growers have their own tree nursery, the trees could be sold at the same time, so that a holistic package could be offered, which would massively lower the entry hurdle.

Ecophysiology

the basis of the ecology of the agroforestry system

Basis

The ecophysiology of plants deals with environmental factors and their influence on plant physiology.
An ecophysiological approach is of great importance for the planning and implementation of the Bukit Biton project. Its principles are the basis of cultivation planning, vegetation stages and succession planning.

Environmental factors

Environmental factors of varying intensity have a wide range of influences on plants. The most important environmental factors (Fig. 12) of tropical forests are:

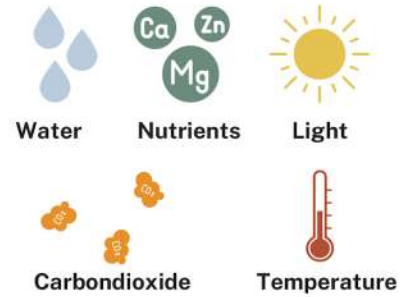


Figure 12: Important environmental factors

The dynamics of these environmental factors lead to an interaction between the species.
Environmental factors are thus of important significance for the expression of the enormous diversity in tropical rainforests. [1] The basis for this diversity is only present in a very narrow range of medium stress conditions. Both high and low stress do not favour traits that allow for the unfolding of variability and diversity.[2]

[1],[2] (Lüttge, 2007)

Dynamic structure and succession

Rainforests are subject to a dynamic structure and a continuous cycle of different stages of succession.
The forest goes through a cycle of these succession stages. Thus, the falling of a tree, leads to an opening of the tree canopy and a disturbance of the vegetation at the base of the impact. This disturbance leads to a renewal of the forest (Fig. 13).
Clearings and gaps are overgrown by vegetation and the forest is restored through the various succession stages.

The stratification of the forest is directly related to the local impact of certain environmental factors such as light, temperature, humidity, CO2 and minerals.

Simplified, this leads to five main layers:

- a layer of emergent giant trees up to 60-80m high
- an upper layer below the giant trees
- a middle main canopy layer with a height of up to 24-26m
- a lower canopy layer
- a herbaceous or woody layer

The rich flora of these layers in turn determines the gradient of important environmental factors.

Figure 13: Continuous succession stages showing the restoration of the forest after a disturbance, a falling tree marked by the lightning bolt. The arrow indicates the direction over time.

Nutrients

The rate of mineralisation of organic matter is very high in tropical soils and the cycling of nutrient minerals is very rapid, especially compared to temperate conditions.
Thus, a very important but usually limiting element, phosphorus in humid tropical forests correlates with litterfall [1] and Förna.
The extremely rapid recirculation of nutrients also prevents their leaching.

[1] (Lüttge, 2007)

The importance of light

The most important role in determining the ecophysiological behaviour of forest plants is light. Light conditions in the forest are highly variable.
The leaf canopy absorbs light. This not only decreases the irradiance from the canopy to the ground, but also changes the light quality and light composition (Fig. 14).
Light can become a stress factor through both an abundance and a lack of light.[2]
Simplified, there are shade plants and light plants. Shade plants and thus plants of lower layers have various adaptations that allow them to do so. Sun plants, and thus pioneer plants, on the other hand, need more light.

However, this classification is not entirely correct, as many plants can adapt to the given conditions.
However, there is often competition for light.

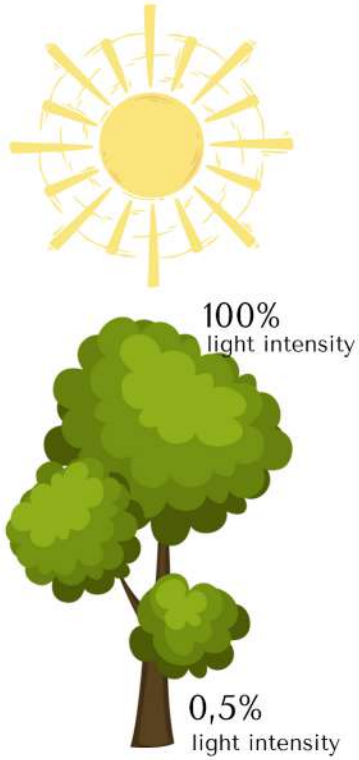


Figure 14: Relative light intensity in the canopy and on the ground. Here 1'000µmol/(m^2s^-1) photons are one hundred percent. However, this value can be up to 2.5 times as large. (1)

[1], [2] (Lüttge, 2007)

Planting

The structure of the system in layers

Structure

The same basic structure underlies both the agroforestry system and afforestation.
The basic structure is based on the natural principles of succession and stratification found in rainforests.
Four of the five main layers can be seen in Figure 15, although the herbaceous and woody layer near the ground is not shown.
In the following, the four layers are designated E = superstructure, C = superstructure, M = midstructure and U = substructure.

In principle, all tree species can be classified into one of the four height levels. However, certain species can also become very large in increasing age after several hundred years and thereby change to a higher layer.

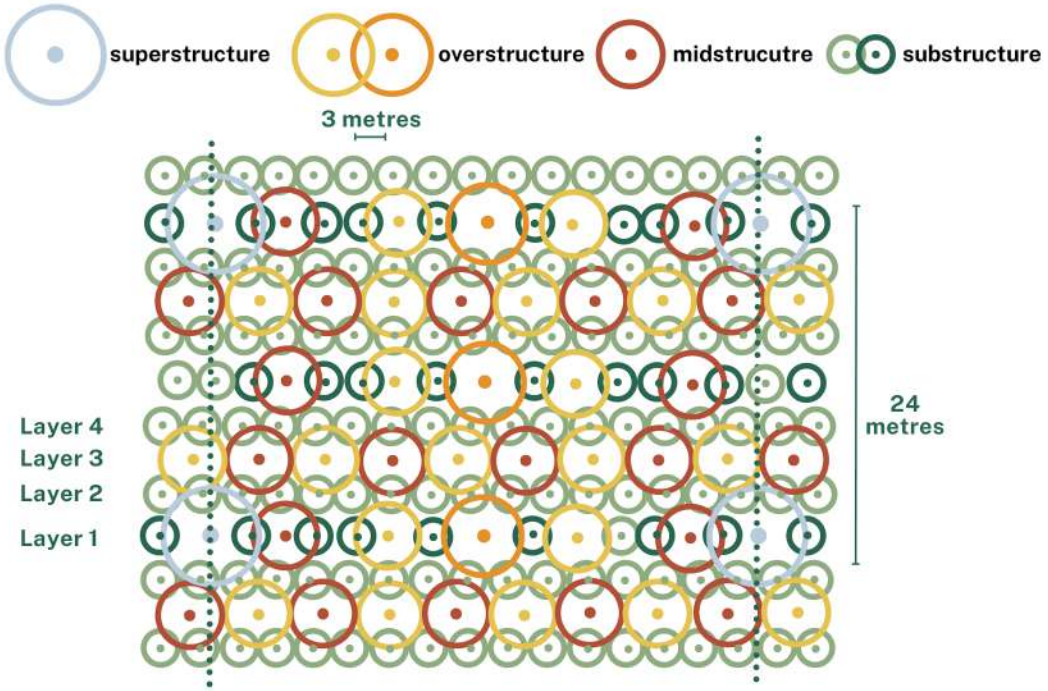


Figure 15: Plan of the principle planting structure of agroforestry and afforestation with the individual height levels of superstructure, superstructure, midstructure and substructure. A circle indicates one tree each. The interval marked with the dashed line can be seen in more detail on the next page (Fig. 16).

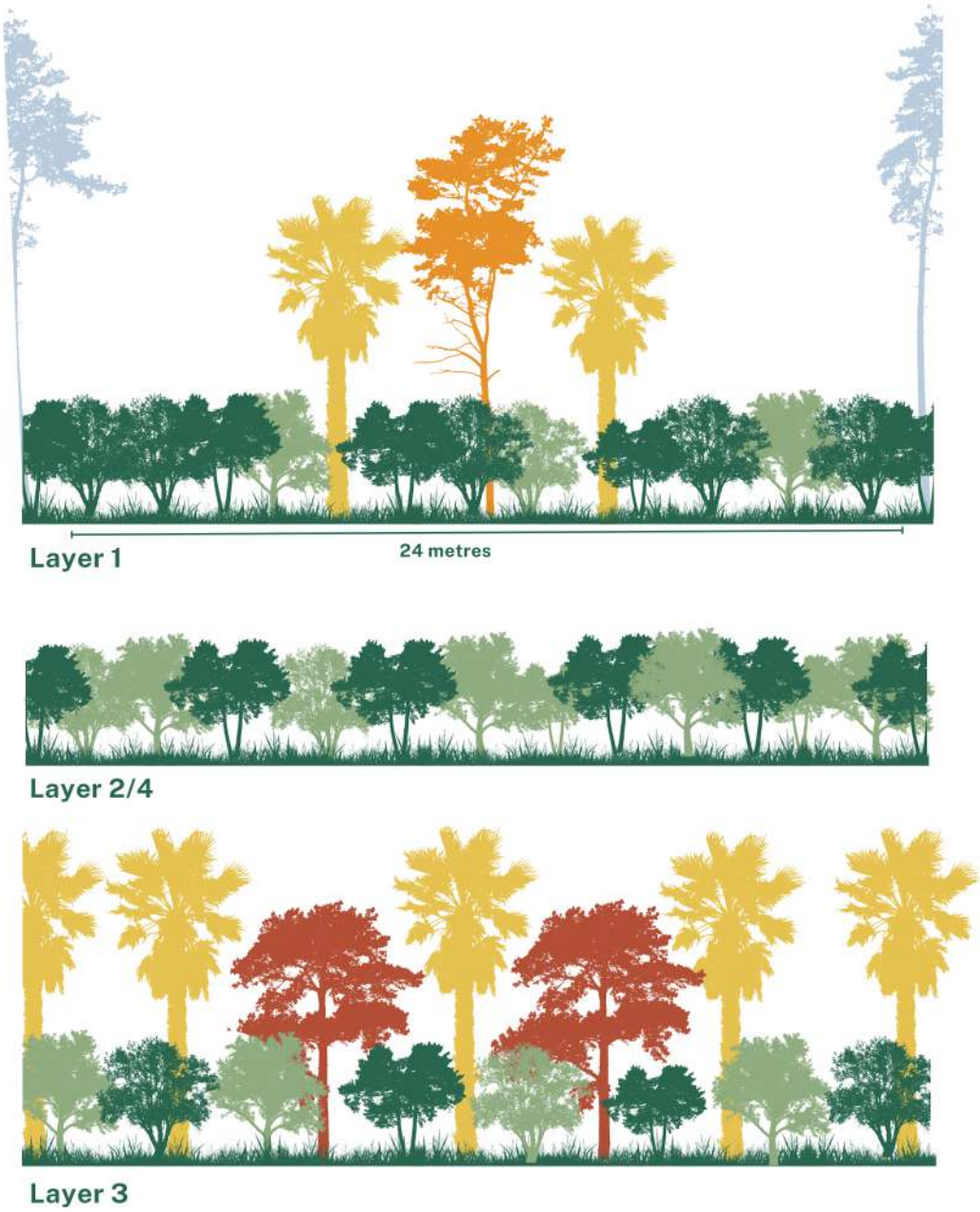


Figure 16: Side view of the individual layers from the planting plan in Fig. 11 with green = substructure, red and yellow = midstructure, orange = overstructure and blue = superstructure. The dashed line indicates an interval which is repeated on both sides until the entire surface is covered.

Plantig layout of the agroforestry system

The structure of the agroforestry system in layers

Structure

The planting proceeds in layers, analogous to the planting scheme. However, the stratification consists of homogeneous rows so that the plant can be driven over by machines. Otherwise it is difficult to transport the crop and makes maintenance easier. It also reduces competition for light among the plants, which is a potential problem in agroforestry systems.
Shade-preferring plants such as cocoa and coffee are located in the understorey. These have a higher susceptibility to disease when exposed to direct sunlight. Cultivation in the shade of larger trees is therefore ideal.

The middle layer, or middle cultivation, consists mostly of jackfruit, mango, teak and oil palms, but may also contain other fruit trees.
The upper layer, or superstructure, consists of the two fruit trees rambutan and mangosteen. The top layer, or superstructure, consists mostly of mahogany (Fig. 18).

Figure 17: Possible harvested products of the agroforestry system: jackfruit, cocoa, mango and durian (from left).

The crops mentioned can also be varied and supplemented, because depending on the site-specific conditions, a different crop or crop mixture makes sense.
However, the three important crops, also known as cash crops, are oil palm, coffee and cocoa. These provide the necessary profitability.
The different crops give the agroforestry system an ecosystem character and offer many benefits to animals, nature and humans. Animals can also feed on the fruit trees, and depending on the location, a row adjacent to the forest can be specially planned for this purpose, to expand the wildlife corridor.

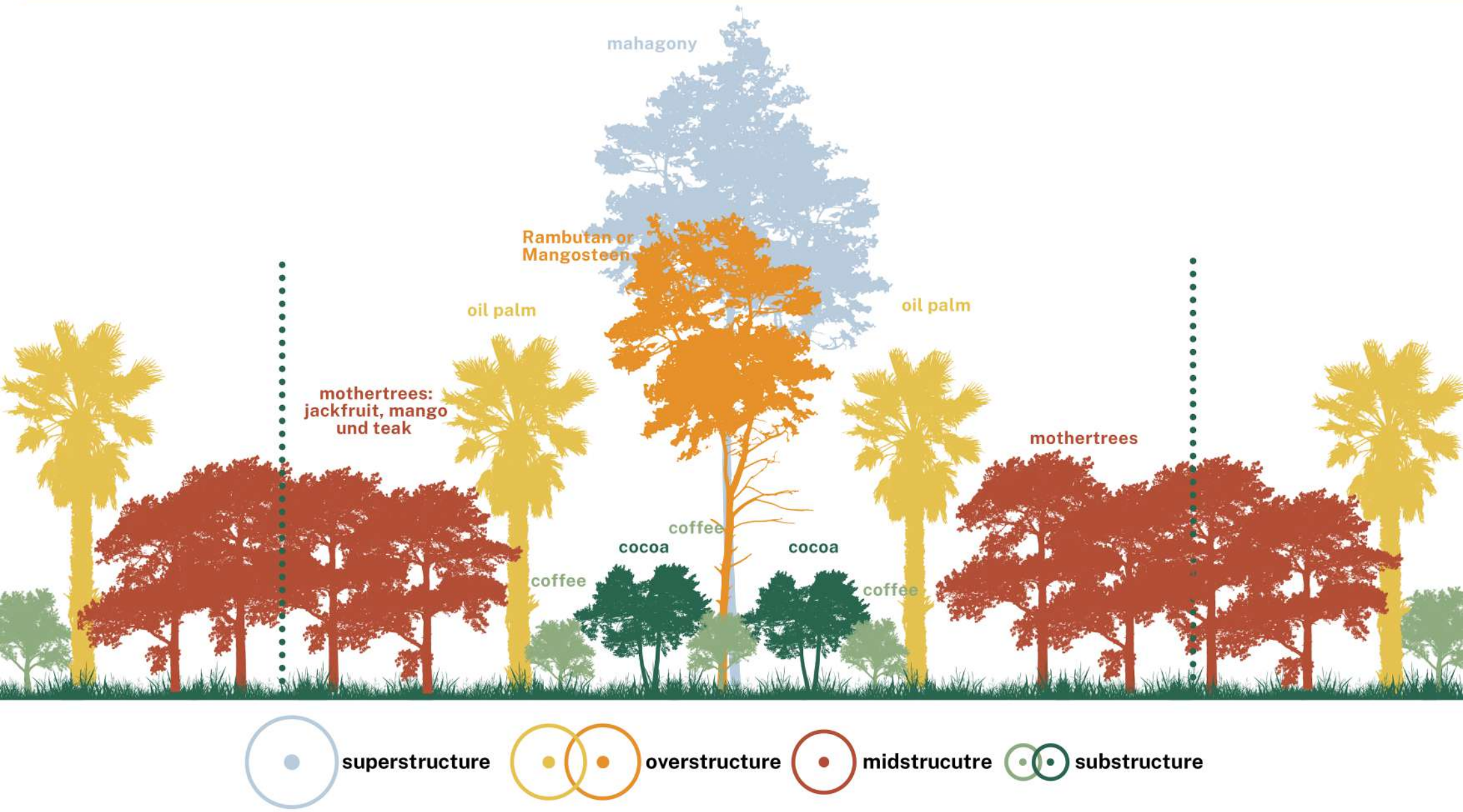


Figure 18: Side view of the agroforestry system and illustration of its stratification. Mahogany is grown on top, rambutan or mangosteen on top, jackfruit, mango, teak and oil palm in the middle and cocoa and coffee on the bottom. The dashed line indicates an interval that is repeated over the length of the area and thus extends over the entire area.

Organisation

Organisational structure

An association forms the basis for this project by establishing an education centre and cultivating and restructuring agricultural land into agroforestry systems. The association also organises the investment and donation funds and invests them in agricultural production.
The cultivation of the plantations and the production of the agricultural goods is done by an association with families who are employed for the cultivation. As soon as an agroforestry area is available, a family is found that is employed by the association to cultivate the area (Fig. 19). The profit generated flows into the reforestation of the rainforest areas, which is implemented by the association. Some of the families are employed for this work.

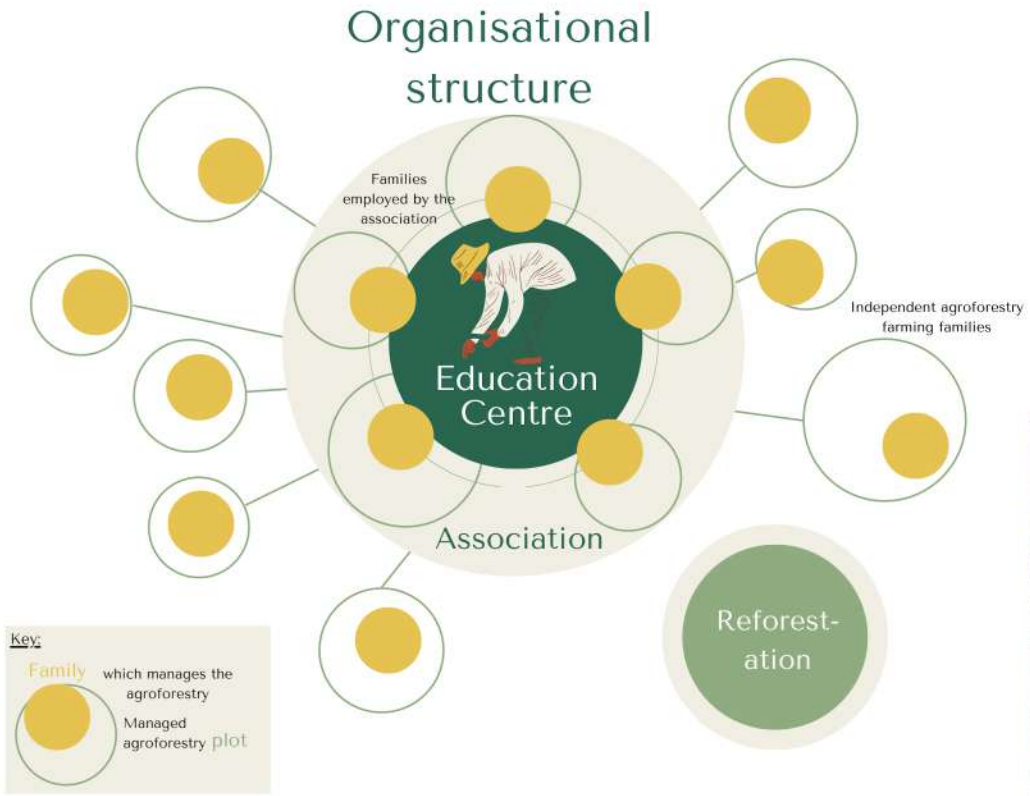


Figure 19: Organisational structure of agroforestry systems with independent family businesses, outside the association and families employed by the association

In addition, families with their own agricultural land can take benefit of training at the education centre and manage their land according to the principles of agroforestry. Export and distribution can also be organised through the association. These families act as independent enterprises, which are, however, in an exchange relationship with the association. If, after the initial phase of conversion to agroforestry with the association, they open their own distribution branches, they can distance themselves from the association and go their own way. If employed families wish to become independent entrepreneurs by acquiring agricultural land, this is possible without further ado. In the long run, a mosaic of agroforestry land is to be created, independent enterprises and employed families, thus changing the image of agriculture in Borneo in the long term.

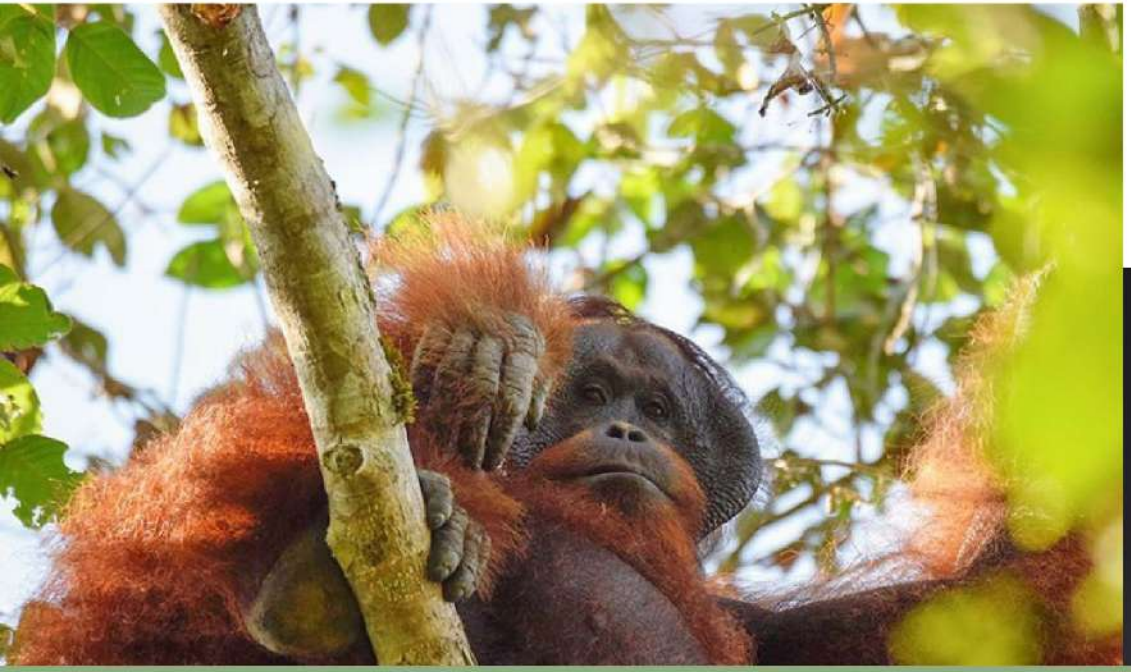
Smallholders in Borneo are involved through their training in the education centre and the distribution organised by the association, which then exports and markets the products through the company. Synergies are used in this way and a larger customer is supplied. However, their purchase is first ensured through a long-term purchase contract.

Cooperation with other organisations

Cooperation with other organisations
Cooperation with non-profit organisations on Borneo supports our efforts in reforestation as well as the establishment and management of agroforestry. A Memorandum of Understanding (MOU) has been signed with the Borneo Rhino Alliance (BORA). The intention of this MOU is to cooperate with the aim of restoring habitats and enriching them with food plants for orangutans. In the process, BORA provides reforestation plants for our reforestation. Cooperation is also maintained with the Rhino and Forest Fund e. V. to establish and expand wildlife corridors (see chapter on landscape management).

Buying land: conditions and geographical location

In the state of Sabah in Borneo, there are basically four different types of land. Town Lease is mostly urban land with a term of 99, 60 or 30 years. Native Title Land is only available for purchase by the indigenous population of Sabah. Their value for purchase is lower than the other leases, as they can only be traded between indigenous people. Field Registrar are land titles which are classified under Native Land. Country Lease is land outside towns, the lease of which has either an indefinite term or a term of 999, 99 or 60 years. Most of the land is of the country lease type with a term of 99 years.
The project will primarily acquire land from the country lease category.



Distribution

Local demand is currently limited to the fruit of the oil palm. However, there is a certain local market for processed products such as cocoa. For the project to be successful and for other growers to convert to a syntropic agroforestry system, the international market would have to be addressed. Exporting would be an option and would generate the additional value that is needed. It would make sense that only refined products are exported. Without exports, the vision of widespread agroforestry cultivation in Sabah would not be achievable at the present time.
Cooperation in Asian cities, Europe and Switzerland would also increase awareness and accessibility.

Human Capital

Employees are an important but demanding part of the project. The goal would be to employ a motivated family to cultivate the land of the association, whereby the education of the children must become. However, this should be easier to implement as the number of families increases and a village school is established. Women will make up a large part of the workforce.
It is expected that staff from different educational levels will also work for the project.

Infrastructure

The education centre and the agroforestry area requires infrastructure. For example, staff accommodation, consisting of longhouses, a reception centre for information, for meeting and for education is necessary. Accommodation for guests, wether interested plantation owners, investors or tourists, as well as various rooms and buildings for processing, storing and drying the agricultural products must be planned. However, these can vary according to preference and need.
A restaurant to serve local and home-grown products to guests and staff is an important element, also for the local marketing of processed products.

Vision

Sustainable production of agricultural goods with reforestation

Our Vision is the reforestation of rainforests of Borneo with a simultaneous sustainable change in palm oil production and restructuring of oil palm plantations. This will involve growing an important and highly efficient crop; the oil palm in agroforestry culture, with other species to create a system with ecosystem integrity. The project aims to demonstrate through periodic reforestation and a mosaic of agroforestry land, the possibilities of sustainable palm oil production and, in the long term, changing the face of rainforests and agriculture in Borneo .

Training, information and teaching centre

Education is indispensable for such a project to be of long-term benefit and to be successful in the long run.

Training, information and teaching centre

Education: long-term success and sustainability

In order for the project not only to operate its own plantations, but also for smallholders [1] to benefit from the advantages of agroforestry systems and to be aware of the risks, several tools would have to be offered. Among other things, a network of buyers would have to be available so that there is an incentive to convert in the first place. A package should be available that lowers the hurdle of conversion as much as possible. For example, after contacting the smallholder and explaining the idea of transplanting, an purchase contract should be drawn up that guarantees the smallholder the purchase of his products, including a factsheet and the organisation of the export. In order to be able to guarantee and control quality, however, guidelines must be drawn up to which the growers are bound. Internal control is important.

The association thus lowers the hurdle and is supposed to create incentives for sustainable production. If other distribution channels open up for the smallholders, they can continue on their own.

The project has the potential to create jobs, to establish good working conditions, to make education available and to secure more sustainable management in the long term through knowledge and training, and ultimately to make a contribution to the future of our planet that should not be underestimated.

Reforestation areas

The reforestation areas are maintained four times a year for 5 years and then handed over to nature in Borneo.
The reforestation is usually implemented with the Forestry Department in protected areas, which provide permanent protection against deforestation and thus provide a protected habitat for plants and animals.
Endangered species should thereby be given a basis for establishment and conservation.

Our goal

The aim would be to make a long-term contribution to the enhancement of rainforests in Borneo as well as the agricultural area, and to be a pioneer in the sustainable management of agroforestry systems.

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Contact us for further inquiries

FORREST, Restoration & Agroforestry:

Contact Europe:
Maurus Schifferli, Bern, Schweiz
www.msbern.ch
ms@msbern.ch

Contact Malaysia:
BUKIT PITON ORANG-UTAN PROJECT
Itisha Ismail and Simon Werren, Lahad Datu, Borneo
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