TREE PLANTATION PLAN FOR CARBON SEQUESTRATION

IN HOA BINH PROVINCE, VIETNAM

For season 2021

Submitted by:

DDS Vietnam

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And

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And

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To: Danish Forestry Extension/ Grow For It

Why plant trees in Hoa Binh, Vietnam

Hoa Binh is a mountainous province located in the north-west of Vietnam, which is 70 km away from Hanoi city. It is a buffer zone lying between the Northen Delta and mountains of the Northwest.

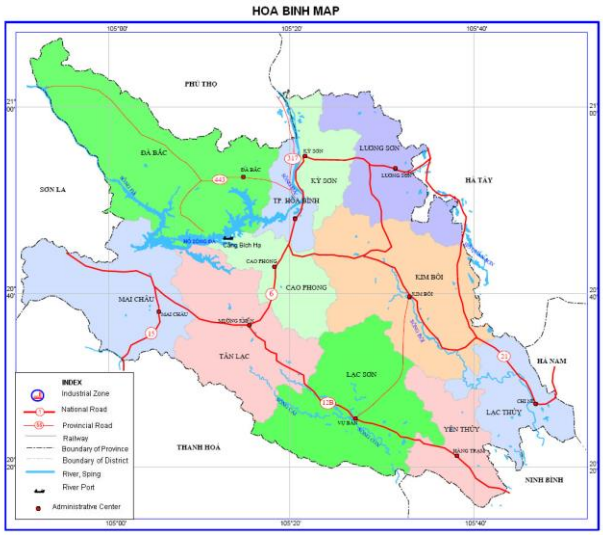
Mountainous area of Hoa Binh province accounts for 90% of the natural area. The terrain is complicatedly divided and steep in the Northwest – Southeast direction. The area is generally divided into two parts: the mountainous part in the Northwest with average height of 600-700m; and the hilly part in the Southeast with average height of 100-200m. Rivers are uniformly located; namely as Da river, Buoi river, Lang river, Bui river...

Hoa Binh belongs to the subtropical zone; the weather is dry, cold, less rainy in winters and wet, hot, rainy in summers. Annual average temperature is over 23^{o}C. The highest temperature is 27 to 29^{o}C in July and the lowest is 15.5 to 16.5^{o}C in January.

A large proportion of the area is managed by smallholder households who are allocated land to establish forest plantations. These households provide the needed workforce for plantation activities and forest managemet. Farmers' income comes mainly from two sources, which are agricultural production and forest plantations, with forest plantations being the main source of income.

However, forestry production activities are still being carried out with traditional methods (high degree of manual work little investment, bad impact on the environment, etc.), the efficiency of these main livelihoods sources is not really high. Part of the reason comes from the fact that farmers do not have many opportunities to access resources for development, especially investment capital and technical know-how to improve planted forests. Therefore, the support of investment capital and training in improved plantation techniques for farmers in these areas should be prioritized. This will contribute

directly to improved social and eco-system resiliencde, improving peoples livelihoods and contribute to environmental protection.



Pic 1: Hoa Binh on Vietnam map Pic 2: Planting areas on the map of Hoa Binh

It is expected that the impact from the effective implementation of the forest plantation model presented in the proposal with the investment in techniques and finance will also encourages people to invest boldly in the next plantation rotation and apply this model to neighboring plantation areasin other localities.

The Farmer Union of Hoa Binh currently has a total of 133.600 members at the province, district, commune and village levels. Farmers Union at all levels who represent the local farmers are the instrument to mobilize farmers and support cooperatives in the local area. They have extensive experience in providing forestry extension services as well as raising awareness among farmers regarding the importance of diversifying forest plantations so that they can have a lower negative impact on biodiversity and the environment.

Pic 3: Forest Landscape of Hoa Binh province

The Xuan Phong cooperative in Hoa Binh province was established in 2015. So far, the cooperative currently has 78 official members and hundreds of informal members. The cooperative provides seedlings, harvesting services, materials, silvicultural services etc. to its members.

Pic 4: Forest Lanscape of Thach Yen commune

Danish Forestry Extension (DFE) - DDS Vietnam has been present in Vietnam for almost a decade and worked with

local Farmer Unions to train farmers to plant and maintain their acacia trees. DFE has also established the three local forestry cooperatives mentioned above to ensure that local farmers can access services of technical advice, seedlings, plantation, and harvesting services. In addition, the cooperatives buy members' final crop through a more transparent and fair price setting mechanism compared to the common system with middle men. The cooperatives also advocate with the local authorities to help their members getting benefits from supportive local government development initiatives, for example: The local authorities built a road to the forest to help the cooperative's members and local farmers be to get easier access for the planting, tending and harvesting activites in their forest plantation plots.

Pic 5: Cooperative's operation of supplying forestry seedlings

Households usually plant 0.5-3 hectares of acacia on their small land plots where they are living, cultivating rice and crops. Trees are planted on degraded farmland and designated forestry land that has been planned by the local government and assigned to households for management and use.. There is a current practice to harvest trees 4-6 years after planting. Such short rotation is not optimal from a economic point of view. However, the rotation age is often dictated by the need to quickly pay back the high interests rates on loans borrowed for the purpose of establishing the acacia plantation.

Pic 6: A farmer planting trees on marginal slopes

Households commonly apply a clear cut practice hilly terrain. This causes strong erosion in the rainy season, breaking soil texture, sweeping humus and reducing forest biodiversity. Investning in low impact plantations allowing for the introcduction of new techniques (replacing traditional clear cutting practices with a more contious tree cover system with longer felling cycles) will not only reduce erosion, increase soil fertility and sequester CO2, but also help farmers profit more from the forest as well as maintain a temperate climate for the surrounding environment. Trees help to diversify the family's income, optimize the land management and particularly prevent erosion of mountain slopes. Income from trees is important for farmers as they can afford children school fees, new agricultural tools or some of the long rotation timber species become pension savings.

Objectives of low impact plantations

The main purpose of low impact plantations is to contribute to increasing biodiversity, reducing erosion, increasing the protectional ability for the forest, increasing carbon(CO_2) sequestration and improving livelihoods for forest-based farmers. By combining indigenous trees with a long harvesting rotation (at least 20 years) and acacia (8 - 10 years) in Cao Phong district (Hoa Binh province) the results achieved will include:

- Increasing the efficiency and effectiveness of plantations, contributing to improving livelihoods, society and the environment for growers and local people;
- Contribute to increasing biodiversity and atmospheric carbon sequestration through plantation / reforestation in the area; Generate more revenue from NTFPs (medicinal plants, mushroom.etc.) growing under the forest
- To reclaim degraded land through reforestation in upper river basin in the area.

Implementation mechanism

The process of plantation establishment in this proposal is implemented according to the following mechanism:

Hoa Binh Farmer Union is the management and coordination unit; The Xuan Phong forestry cooperative provide inputs, techniques and monitor the implementation; The target group is farmers who have available legal lands for establishment of plantations but cannot afford to invest in planting. DDS Vietnam acts as a coordinator to connect and report the activities of the Hoa Binh Farmer Union, Xuan Phong forestry cooperative and the target group to DFE. DFE is providing backstopping, Q&A and overall coordination in general and special coordination with the donor in particular.

Implementation Procedure

DDS Vietnam cooperates with the Hoa Binh Farmer Union and Xuan Phong forestry cooperative (these units are referred to as Vietnamese parties) to select plantation areas, develop planting plans, which they will submit to DFE and donorfor approval.

The DFE / Donor reviews and approves the planting plan. After the plan is agreed upon between the parties, the DFE and the Vietnamese parties will sign a cooperation agreement to implement the plantation plan.

The Vietnamese parties complete a detailed record of the plantation plan of each household, including: plantation area, forest plot topography, physical properties of land, humidity, GPS coordinates and map of the planting plots, then submit to DFE / Donor for approval and the first installment will be released.

The Vietnamese parties organize and guide farmers to plant according to the approved plan and send a report on the results that is updated right after planting, including photos of plants with GPS coordinates to DFE / Donor for approval and the second installment will released.

The Vietnamese party regularly provides technical support and monitoring of the farmers' plantations to ensure that the trees are growing and developing well. One year after planting, the Vietnamese party will present a report on the plantation development for each household involved. The report will include information on survival rates (a minimum of 80%), photo documentation, GPS coordinates etc. Upon approval by DFE / Donor the final installment will be released.

Tree planting models and species

The demand for acacia is increasing and today Vietnam is one of the largest wood exporters in the world. Several large furniture manufacturers establish plantations in Vietnam and sell furniture to the whole world. Commercial cultivation of acacia trees therefore represents a significant income opportunity for small forest holders. However, most of the farmers lack access to financing, technical advice, supporting organizations and market knowledge to optimize the yield and outcome for their plantations.

Also, there is a frequent tendency among farmers to sell trees after only 4-6 years to quickly get the invested money back to pay for household expenses. Plantation which combine native tree species and acacia trees in a long rotation will help local farmers increase income from the immediate and long-term plantation, while also increase biodiversity of forests which allows farmers to adapt to climate change.

Pic 7: a product of Acacia for export

Below presented are three different plantation models addressing on site characteristics, species' characteristics, CO_2 sequestration potential and farmer's livelihood interest.

One area for plantation: Hoa Binh province (where the Xuan Phong cooperative is operating) proposed planting area of 25 ha. For the required number of seedlings for each model, see Appendix 4: Seedling inventory sheet

Model. Purpose: Carbon sequestration and upper- basin river management

Location: Cao Phong district, Hoa Binh province - the operational place of Xuan Phong Cooperative which is able to provide seedlings, fertilizers, technical guidance and supervision for households during the planting process.

No	Indicators	Description (Unit: ha)	Remark
1	Rotation (year)	8 -10	
2	Spacing (m)	2.0*2.5	
3	Number of seedlings	2,000	
`-	*Acacia Mangium*	*1,800*	
`-	*Chukrasia tabularis*	*200*	Keep longer to the rotation 20 years
4	CO_2 sequestration	To be confirmed later on	
5	Purpose of plantation establishment	Timber harvestation, forest enrichment and increased income for plantation households	

Note: A total of 25 ha will be planted with this model

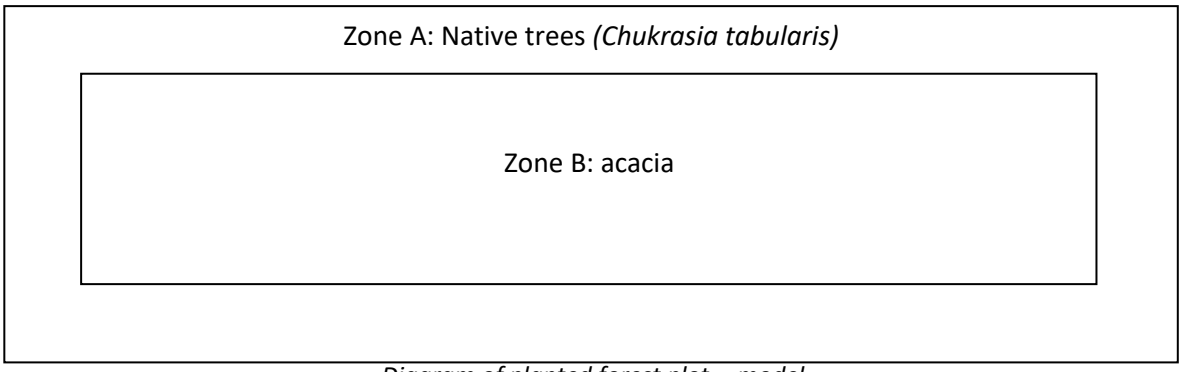


Diagram of planted forest plot_ - model

Approx. 2,000 trees including indigenous and acacia are planted per hectare in the first year. The trees will as per silvicultural presriptions and need be regularly pruned and thinned to ensure that only the best trees left and they have sufficient space and light to grow big (using thinning technical during plantation perious). After 8-10 years, about 800-1.200 acacia trees per hectare will be harvested. Of which, about 50-70% of the wood is sold as a timber e.g. for furniture production. The rest of the trees are used for other purposes as the dimensions are insufficient for timber.

According to the experience and recommendations of plantation households in the selected area, the combination of planting native trees and acacia trees will meet the immediate and long-term economic goals of the forest growers. In particular, acacia will create immediate income for households to maintain their daily life, native trees *(Chukrasia tabularis)* will generate long-term income (according to local people's estimates, each native tree will bring economic value from 350-400 USD which will give them an accumulated savings in old age). Native trees with a long harvesting rotation (at least 20 years) are intended to be planted around plots as a permanent boundary between households. The native trees are planted in two rows (4 meters distance between trees and 3 meters between rows). This method of plantation contributes to increase biodiversity, limit erosion, and protect acacia forests against wind.

This proposal is built based on the opinions and suggestions of the forest growers, Xuan Phong Cooperative and Hoa Binh Farmers Union after DDS Vietnam consulted them on new initiatives for forest plantation. In fact, the model of planting indigenous tree around acacia has already been implemented by some households in the area (ex, Mr. Quyen, Thach Yen commune, Cao Phong district, Hoa Binh province planted trees like this model in 2018). The results showed that both indigenous trees and acacia grow and develop well. On the other hand, the plantation of indigenous trees combined with acacia plantations in the future will partly satisfy the needs of people in using high quality, high value timber from indigenous species , as well as help to reduce activity of harvesting timber illegally in natural and protected forest. Thereby contributing to protecting biodiversity and minimizing adverse impacts on protected forests.

Calendar of operation (Detail work plan for 2021)

A. Pre- plantation work plan

No	**Activities**	**2021 (month)**												Note
		1	2	3	4	5	6	7	8	9	10	11	12	
1.	Hoa Binh and Ha Tinh FUs, 3 Cooperatives planning with farmers: farmer list, site selection etc.							X	X					
2.	Seedlings preparation							X	X					

3.	Complete documentation and reports before planting								x	x				
4.	Agreement with selected farmers								X					
5.	Land clearance, site preparation completed								X	X				
6.	Field survey and mapping completed							X	X					
7.	Lining in the land and marking									X				
8.	Planting trees									X	X			

B. Post plantation work plan

No	**Activities**	**2021 (month)**												**Note**
		1	2	3	4	5	6	7	8	9	10	11	12	
1.	Maintenance / weeding and replanting										X	X	X	Ongoing
2.	Supervising, monitoring, survival counts and update information										X	X	X	Ongoing

Tree planting sites

Tree planting sites were selected in Thach Yen commune, Cao Phong district, Hoa Binh province. According to the GPS survey mapping of the allocated land, total of 25 ha of land is selected for tree plantation in the year 2021. Tree planting sites and farmers with their commitments were selected as following: For details please see annex: 2, 3 and 5 for list of the selected farmers with their commitments and site conditions, GPS coordinates and survey maps respectively.

Criteria for selecting households participating forest plantation program

The plantations are planted in order to improve the livelihoods of smallholder households, and to minimize the impacts of biodiversity loss and environmental degradation, and not for sale as carbon credits.

Interested members with available legal land for tree planting activities are selected to plant trees according to the following criteria and mutual understanding:

- **Land available**, farmers with more than 0.5 ha of land who are interested in establishing tree plantations on their land.
- **Willing to contribute financially where and when needed.**
- **Committed people**, farmers who are committed to managed the planted trees during the rotation period and agree not to cut the planted trees until the rotation period ends, except general thinning and pruning activities to improve the stand growth to harvest the trees for commercial timber purposes or other socio-economic benefits. Forestry Cooperatives will provide pre- and post-advisory services to farmers during and even after the planting period- until the final harvesting (based on the rotation period).
- **Willing to prolong the rotation**, farmers who agree to provide their land and tree planting, maintenance till the rotation period complete.

- **Commitment to replanting** armers and cooperatives intend to replant the concerned areas after harvesting at the end of the rotation period.

Monitoring and Follow up

Vietnamese parties are responsible for developing a basic structure of monitoring and following up on the tree plantation and tree growing activities; providing technical assistance to the tree planting/ tree growing farmers; reporting to DFE and donors for planting areas, seedlings and maps with availably determined GPS coordinates of each household before planting trees; reporting updated results as soon as farmers plant trees along with pictures of planted trees with GPS coordinates; reporting the trees' growth status updated on a yearly basis after planting with photos including GPS coordinates.

In order to do this, Vietnam parties will immediately form a three member monitoring, supervising and folow-up committee including one member from the cooperative, one member from the provincial Farmer Union and one selected from a participating household. The supervision and follow-up will focus on seedling procurement and management; pitting and plantation management; plant protection and maintaining plantation database which include: GPS survey for planting area, GPS data records for tree location in excel sheets, name of land holders, planting area, planting layout, name of the tree species, planting year, planting model, photo documentation, seedlings survival/ mortality percentage etc. Besides that, they will conduct periodical follow up visits and instruct to restock in case of a mortality rate of 20% or above due to observed extreme weather.

Budget and payment

1. Estimated costs

   Total estimated cost for 1 hectare planting area is EURO 1,250. Farmers agree to bear for 20% of labor and material costs. The remaining 80%, amounting to EUR 1,000 per ha, will provided by DFE / Grow For It. Funds will not be transferred directly to the farmers. Instead, fund will be transferred to the Hoa Binh Farmer Union, which will then be responsible for paying the remaining costs amounting EUR 1,000 per ha. At the time of harvesting, the funds provided by the cooperatives will be deducted from the sales revenues. In this way, the donations functions as interest free loans. Please see annex. 7 for details of the costs estimation.

2. Payment schedule

   DFE/Grow For It will provide 1,000 EURO per hectare to Xuan Phong cooperative through DDS Vietnam and Hoa Binh FU as per following schedule:

   - First payment: 50% of the budget will be paid after the official documentation of the planting plan is available, including: List of participating households, coordinates and map of plantation forest.
   - Second payment: Another 40% will be done after planting taken place and documented.
   - Last payment: The remaining 10 % will be transferred after 1 year/growing season when 90% planted seedlings survive.

3. Mode of repayment

As a condition for the “interest free loan”, farmers sign an agreement with the cooperative and Hoa Binh Farmer Union to keep the trees on the soil for at least 8 years and allow the cooperative to harvest and sell them when trees are ready for harvesting. As the cooperative is owned by members and works for members’ interests, the sale of trees will always be based on consideration of farmer’s interests. When the wood is sold, the amount originally contributed by the Farmer Union is deducted from the generated revenue and channeled back to a micro-credit. The farmers get the rest of the profits from the wood sale. Among others this means that:

- There is no direct money “transferred and repaid” between the farmers and the Hoa Binh Farmer Union as it is only the Hoa Binh to receive the donation fund and to pay for 80% of the plantation establishment cost. Thus, no money must be collected by the farmer after harvest as the Hoa Binh Farmer Union assign Xuan Phong cooperative to handle harvesting and selling wood then deducting the investment costs from the revenue.
- The farmers only bind few of their resources in the trees and thus can "better afford" to leave the trees longer than usual in the soil. Thereby both the CO_2 sequestration and the farmer's economic benefits increase.
- Acacia trees can be replanted in the same area after each harvest (if the farmers wish to) and thus the micro-credit can be "recycled and reused".
- The farmers have an incentive to look after the trees as they have invested their own resources and money in 20% of the establishment costs and repay 80% of the establishment costs to tree planting fund when plantation harvested.

Sustainability of the model

- **Silvicultural and technical sustainability**: These forest plantation models (planting native trees around acacia) have been developed based on the farmers' experience with successful pilot implementation. Silvicultural measures were applied which follow the forest plantation techniques instructed by the government and the More Trees project, which farmers have practiced proficiently through the previous planting rotation. Planting models designed to plant acacia combined with indigenous trees will enhance the protection of planted forests, protect soil and increase economic efficiency, contributing to preserving the local biodiversity values.

- **Financial sustainability for plantation housholds**: The main source of income that helps farmers with their daily lives is from forests and agriculture. So, planting acacia with a rotation of 8-10 years will help farmers have an income to cover their daily life, while native trees with a rotation of 20 years or more, will give the farmer accumulated savings in their old age. Farmers are the ones who propose the implementation of the model and are willing to return funds, commit to afforestation with a long rotation on their own land, which shows the goodwill and commitment of farmers when implementing requirements that the model sets out.

- **Environmental Sustainability**: Native trees are planted as fences around forest plots, with long rotation to increase carbon sequestration and biodiversity. The deep roots of the trees increase the ability of the soil to hold groundwater, limit leaching andsurface erosion.

- **Sustainability in terms of management and implementation**: The units that implement and monitor these forest plantations are located in the area where farmers plant forest, so the management, supervision and technical assistance for farmers will become efficient , timely and transparent. Farmer Union is the general management, monitoring and coordination agency for

forest plantation activities. Cooperatives are the units that provide seedlings, technical consultancy - supervision and buying the forest products from farmers when they reach harvesting age.

- **In line with the orientation of forest development in Vietnam**: Afforestation with long rotation timber species, aiming to increase carbon sequestration and improve people's income is in line with Vietnam Government's forest development plan and large timber plantation extension plans with a long rotation by the authorities of Ha Tinh and Hoa Binh provinces. The Government of Vietnam and the two provinces of Hoa Binh and Ha Tinh have issued specialized policies for long-term forest development.

Benefits from the model

- **Environment**: The health and living environment of people in the plantation area will be improved and become safer.
- **Economy:** The living conditions of forest-dependent people are improved with increased income. This source of income will help farmers pay for their daily lives such as paying school fees for their children, repairing the house, buying household items or making savings for old age.
- **Social**: Creating job oppotunities for people in forested areas, limiting the phenomenon of migration from rural to urban areas, helping farmers to stick with forests and manage forest development sustainably.

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