Japan International Cooperation Agency (JICA)

Sustainable Natural Resource Management Project (SNRM)

FINAL REPORT

"MONITORING ACTIVITIES IN LAI CHAU PROVINCE"

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List of Abbreviations

C/P	Counterpart personnel
CPC	Commune people's committee
DARD	Department of Agriculture and Rural Development
DPC	District people's committee
HH(s)	Household
JICA	Japan International Cooperation Agency
LD	Livelihood development
MARD	Ministry of Agriculture and Rural Development
M&E	Monitoring and evaluation
NTFP(s)	Non-timber forest product(s)
PC	Provincial Co-ordinator
PDM	Project Design Matrix
PFES	Payment for Forest Environmental Services
PPC	Provincial people's committee
PRAP	Provincial REDD+ Action Plan
REDD+	Reducing Emissions from Deforestation and Forest Degradation, and foster conservation, sustainable management of forests, and enhancement of forest carbon stocks
SNRM	Sustainable Natural Resource Management Project
SUF	Special Use Forest
SUFMB	Special Use Forest Management Board
SUSFORM-NOW	Project for Sustainable Forest Management in the Northwest Watershed Area
VFPT(s)	Village forest patrolling team(s)
VND	Vietnamese dong

I. INTRODUCTION

1. OBJECTIVE

The Sustainable Natural Resources Management Project (SNRM), funded by Japan International Cooperation Agency (JICA), initiated in nine villages in Phuc khoa Commune, Tan Uyen District, Lai Chau Province in August 2016 and focused on two main parts, livelihood development, and forest management and development. Overall objective of the Project is to enhance the national capacity for sustainable natural resource management by focusing on forests, biodiversity and the people who depend on these natural resources for their livelihood.

The Project is generally divided into two phases, the first phase from 8/2016-7/2018 and second phase from 8/2018 to 7/2020. In the first half of project term, REDD+ pilot activities have been planned and implemented in Phuc Khoa Commune. In the second phase, the Project gave a priority on the monitoring and evaluation (M&E) of pilot activities.

Monitoring framework and evaluation of indicators for REDD+ pilot activities aim to standardize the criteria and indicators of M&E in the pilot commune of Phuc Khoa. M&E has been conducting every six months to collect qualitative and quantitative data from all implemented activities for the terminal project evaluation planned in June 2020.

II. METHODOLOGY

1. DATA COLLECTION AND SAMPLE SIZE

Monitoring and Evaluation (M&E) of the SNRM Project is carried out in the second phase of the Project and is included with 4 rounds with the interval of 6 months. The first M&E Round was started in October 2018, second Round in March 2019, third Round in September 2019, and fourth in April 2020.

M&E approaches mainly include (1) Ground discussion, (2) Individual interview, (3) Field visit, (4) Key person interview. One activity can have more than one method; for example, field visit and individual interview applied for afforestation activity.

Sample size in the four round interview is presented in Table 1 below. Number of households taken for data collection was advised by the SNRM Project, depending on number of households participated in the activity and also crop season. Households interviewed were randomly selected by the project staff.

Table 1: Sample size in M&E Rounds

No.	Activity	Round 1	Round 2	Round 3	Round 4
1	Forest protection	36	107	105	105
2	Scattered planting	38	121	121	121
3	Forest plantation	9	6	9	9
4	Boundary planting	26	49	50	50
5	Regeneration	29	46	45	45
6	Vegetable cultivation	0	111	0	111
7	Watermelon cultivation	0	44	0	44
8	Fruit tree cultivation	94	140	140	141
9	Model of fish raising	5	5	5	31
10	Fodder cultivation	32	45	45	45
11	Improved cook stove	43	32	33	33
12	Biogas plant installation	22	21	21	21
	Total	**334**	**727**	**574**	**756**

Data collection was carried out by project facilitators and project staff. The project facilitators were trained carefully on methods and questions before starting interview. M&E questionnaires were also pre-tested to adapt based on local situation and to prepare interview schedule. Each interview takes about 10 to 15 minutes.

III. ACHIEVEMENTS

1. FOREST PLANTATION

1.1. BRIEF DESCRIPTION

Af/reforestation directly contributes to increase of forest area and coverage, improve landscapes, and protect the environment. Furthermore, it can also give farmers an opportunity to receive income from Payment of Forest Environmental Services (PFES). This is absolutely in line with the Provincial Development Plan.

In early 2017, the SNRM Project received a registration list from 37 households who wished to plant trees on 11.7 ha belonging to the protection forest land. After checking, it turned out that quite a number of registered areas were too small (much smaller than 0,5ha per one plot) which did not fit the requirements. The total actual planting area of a group of 9 households was about 2.5 ha in the village of Na Khoang, Phuc Khoa Commune.

The Project provided seedlings, including two species, for planting with total of 5,152 trees (of which 2,576 *Michelia mediocris Dandy* and 2,576 *Schima wallichii Choisy*). Notably, *Michelia* species was first introduced by the Project to forest plantation due to expensive seedlings. Therefore, this species also worked as a trail for local authority and farmers. *Michelia* can also be a valuable tree (more information on this species in Section Boundary planting).

1.2. MAIN FINDINGS AND ISSUES

In general, the planted trees have been so far developing quite well as farmers reported to maintain regularly tended, though the tending schedule was not exactly conducted as trained. Some households (40%) tended 2 times per year while others (60%) did 1 time per year. Reasons for not tending regularly include labor shortage and hard work. In March 2020, planted trees were from 1.2 to 2.5m in height.

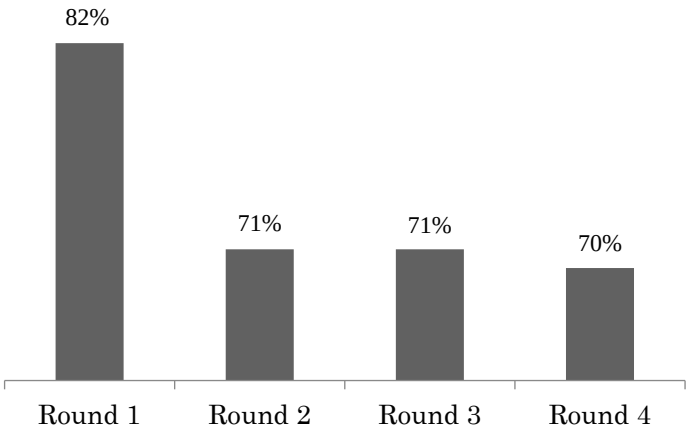


Figure 1: Survival rates at M&E Round Surveys

Photo 1: Forest plantation trees taken in March 2020

Schima Wallichii is a local forest planting species, including Phuc Khoa forest. Therefore, it should be no problem in testing. *Michelia* was considered to be a strong species and evaluated by local authority to be a very suitable species in Phuc Khoa Commune, even planting in high-altitude areas. Survival rate at the M&E surveys was rather high for plantation (See Figure 1). According to Lai

Chau Provincial Project Management Unit (PPMU) this survival rate can consider to be good for forest plantation.

Animal damage can cause the tree death and hinder the tree growing. Animal destroy problem was reported to be more serious at the first M&E Round and this problem was improved or got less and less serious at M&E Round 2 and 3 with only few trees. Interestingly, no farmer reported animal damage at M&E Round 4.

1.3. LESSONS LEARNED

- Strong agreement from farmer side played an important role in afforestation. Farmers would put much effort on protection and tending the trees. To get farmer agreement often take time through out a number of meetings and explanation.
- Animal destroy was such a problem not only for newly planted forest trees but also other crops. This requires a good collaboration between farmers themselves, different villages and commune leaders.

1.4. RECOMMENDATION

- Coordinate with local authorities to regularly supervise households in conducting af/reforestation.
- Check the results of land preparation by the households and provide support as equal to what they have done.
- Choose the right time, best in planting season, to provide farmers seedlings. Select strong seedlings and check them at the nursery, before delievering to farmers.
- Local authorities and other concerned stakeholders should raise awareness for the people, especially the ones who raise buffalo and cattle.
- Moreover, local authorities also keep monitoring and give farmer more advice regarding to harvest the trees. As *Michelia* can harvest fruit and wood, it is needed to have a good plan for which harvest. It is strongly recommended to harvest fruit and keep the trees as long as possible.

2. FOREST RPOTECTION AND MANAGEMENT

2.1. BRIEF DESCRIPTION

In Phuc Khoa Commune, nine Village-based forest patrolling teams (VFPTs) belonging to nine villages undertake forest patrol, protection and fire prevention and suppression activities in a total area of 4,230.51ha under three forest categories as of special-use forest, protection forest and production forest. VFPTs have been established and subcontracted with the forest owner, namely Tan Uyen District Protection Forest Management Board (PFMB) for protection of this forest area.

VFPTs, as contractors, are responsible to protect their contracted forest area in order to yearly receive Payment for Forest Environment Services (PFES). This payment is only made in case forest area is well protected and undamaged, suggesting the important role of patrolling activity in forest protection and management. However, since established, VFPTs were rather poorly organized and operated improperly, and actual patrolling routine was not completely carried out. Based on the situation of the existing VFPTs which necessarily needs to be supported, the SNRM Project assists VFPTs in consolidating and enhancing of their roles and function, expanding to forest patrolling and reporting as well as the role of awareness raising for communities.

2.2. MAIN FINDINGS AND ISSUES

Patrol plan: VFPTs prepare monthly plans for their patrolling and assign their members to follow the plan. Plan for patrolling is mainly based on regulations and each VFPT's budget availability. The SNRM Project planned a scenario for VFPTs in which all PFES deducted amount would be totally used for forest protection in term of patrolling; if so, how many time a year and a month that a VFPT can go on patrol. Assuming 1 time a month patrolling during rainy season based on the

VPFT regulations, it resulted in a big range, from 5 times to 28 times a month patrolling, depending on forest area of each village. This assumption is prepared for a group of 4 members and payment of VND 150,000 per time.

This scenario is very important and helpful for VFPTs in order to overview and therefore prepare patrolling plan. Moreover, VFPTs also understand this is maximum number of time patrolling and if village fund would allocate in other categories, the number of time patrolling a month would become less.

Patrol route: Provided by the Project, VFPTs use satellite forest patrol route maps for their forest patrolling routes. The map indicates the way to patrol, which is very useful for all members, particularly for the new ones or who are not familiar with forest path. This route map was well prepared from results of a Project survey on forest and then discussed and verified with groups of villagers who know the forest very well. Furthermore, the patrol route map also indicates forest area that each village in charge of protecting.

The forest patrol route map is supposed to be taken with a group of VFPT members when patrolling and stored and protected in a storage tube provided by the Project. The map not only indicates the patrol route but also helps VFPT members note location such as landmarks and other information such as plot number if there are any changes in forest.

Actual patrolling: As advice, patrolling should be implemented once a month during rainy season and regular during dry season. Remarkably, regular patrolling in villages was only conducted in recent years and after the SNRM Project implementation. This is absolutely a big change and good improvement. Before the Project time, VFPT members were totally not clear with general information of their forest protection area and even had no idea of forest location and satellite image map.

Photo 2: VFPTs practised patrolling

Photo 3: A group of VFPT members goes on patrol

Since VFPTs are consolidated and supported by the SNRP Project, patrolling has been started in villages. VFPTs often organized, only in first time, patrolling so that all members went on patrol; this is important to make sure everybody understands, gets to be familiar the way and helps each other. From second time on, it was recommended to patrol with a small group of four or five members depending on the distance to the protected area.

VFPT member's allowance for patrolling is paid equally from deducted PFES, depending on number of times he or she went on patrol. There was no official instruction from local authorities for this payment, but it could be different from VPFT to VFPT. However, how to pay or the payment amount was deeply discussed within VPFTs, that was, not to much and not too low, considering labor market situation and responsibility. Futrthermore, VPFTs got reference from other VFPTs. In 2017 and 2018, the paid were 150,000 and 200,000 VND, respectively, per person per time. According to VFPTs, this payment amount is rather reasonable. VFPT heads recorded the patrolling assignment and actuall work of each member during the year; at the end of the year when

PFES is paid and available, VFPT's members would receive their allowance based on actual work. As stated by VFPT members, the allowance is rather fair to everybody, both in terms of contribution, meaning no work no pay, and amount.

Actual patrolling was conducted out in all villages, average from one to two times a month. VFPT members had a chance to observe their protected areas. Despite patrolling as a regular task, many VFPT members reported they had seen their protection area for the first time. For this evidence, the SNRM Project has played an important supporter making the VFPTs work out.

Since VFPTs were started getting the Project's support in 2017 and there were so far four illegal cases found by VFPTs, including two cases related to forest fires and one related to the extension of tea gardens into forest land.

When patrolling, VFPTs are facing with some difficulties including a long distance and no existing paths. For some forest areas nearby Lao Cai Province, it often takes the whole day walking for one way; this means it often takes three days a time patrolling. Or one needs to start walking very early in the morning today so that be back home late tomorrow if planning for two days Staying overnight must be prepared. On the top of that, many parts, deep in the forest, have no path existing, but only bushes or rock; it also takes time to walk.

To stay overnight, each member needs to prepare personal stuff such as food and tools; all seems to be challenging VFPT members for patrolling.

2.3. LESSONS LEARNED

The SNRM Project wishes to focus on sustainable forest protection particularly in terms of keeping regular forest patrolling activity in villages. As such, the following key points were identified for further development.

- The fact shows that special use forest in Phuc Khoa Commune has extremely difficult geographical conditions; thus, it is big challenges for VFTPs in patrolling through the protected forest areas. There might have no existing path in forest and it often took several days to go on patrol a time, suggesting an important role of selection of active VFPT members
- Based on the instruction of Decision number 36/2014/QD-UBND, issued on Septmber 2014 of Lai Chau Provincial People Committee, PFES fund, namely village fund, was reinvested not only in direct forest protection but also spent in other categories relating to forest protection and development such as purchase of patrolling equipment/tools. However, it revealed that the village fund was sometimes mobilized for items which were unrelated to forest protection and management such as installing road light in the village. Thus, the number of patrolling route would be definitely reduced
- To go on patrol, division of a VFPT into small groups, consisting of 4-5 members, seems to be more effective in terms of collaboration and incentive saving. Moreover, in any group, there must be someone who can read and write in order to prepare a report and access to information on the map
- Incentive to VFPT members when patrolling was a controversial issue; this should be carefully discussed and agreed among all members. Little payment would not be able to encourage members to do the job while paying too much would negatively affect the PFES fund and might get criticism from other villagers. Consequently, actual compensation has been considered both basic labor market pay situations as well as members' community responsibility
- A patrolling work plan for a new month needs to be well prepared ahead, often by the end of the month; however, it should be a bit flexible or be able to change according to certain circumstances like unexpected events, sickness and so on. Thus, there is a replacement if someone is absent

- Tools and equipment play an important role in stimulating VFPT member spirits and be helpful while patrolling. This indicates all new members are well equipped and old members can also be supplemented tools and equipment if they are worn-out or broken
- In comparison to others, some VFPTs do not actively take responsibility of preparing patrolling plan as well as implementing patrolling activity according to forest regulations. Regular checking and monitoring by relevant agencies such as CPC, CFRs would greatly encourage and facilitate the work
- As the role of a VFPT leader is greatly important in managing and monitoring the whole team; therefore, on one hand, he/she has a good capacity of management, and on the other hand, he/she takes his/her responsibilities very seriously. Moreover, VFPT leader should have the power, suggesting he/she is also the village leader
- Before the SNRM Project implementation, VFPTs were not professionally organized and operated, and VFPT members were totally unfamiliar with basic information on forest and techniques when patrolling; consequently, patrolling task was not conducted properly

2.4. RECOMMENDATION

Based upon the VFPT performance, the following recommendations are made for VFPT improvement in Phuc Khoa.

- As patrolling is not likely to be conducted within one day but often about two or three days per time and requires an overnight stay in forest; thus, it needs to establish a tent on each VFPT's protection forest area. These temporary tents for patrolling groups are better not to be built solidly and costly but be established environmental friendly by available materials such as stone and wood from naturally spoiled or broken trees
- VFPT members are reviewed and reselected yearly and new persons may join in; therefore, it is necessary to build capacity for VFPTs; more specifically, to organize new technical training courses for new ones and refresh training for old members. Importantly, these two training courses, for new and old members, should not be separated but be combined in order the old members could share experiences and they can learn from each other
- Phuc Khoa CPC should advise villages to use village fund appropriately; this also implies that village fund which is mainly contributed by the deducted PFES fund should be prioritized to allocate to forest protection in terms of patrolling and purchase of tools and equipment and so on. Additionally, the amount of PFES fund deducted should also widely discussed with villages in order to make sure the fund can cover all expenses for forest protection
- CFRs regularly communicate with VFPTs to update forest status and provide advice or any support if necessary. As planned, CFRs and VFPTs should keep monthly meetings to review and prepare work plan and reporting
- VFPTs should spend more time and efforts patrolling and focusing on certain forest areas where often easy happening illegal forest encroachment and fire hotspots. Frequently, CFRs and VFPTs also need to identify those forest areas
- As mentioned previously, it is important to have active VFPT members, consolidate and motivate those; thus, it would be worth to offer reasonable incentives, rewards for good performance and recognition by CPC and CFRs for retention increases. Recognitions can come in many forms, for example, a small amount of money and other types of rewards, for instance, perfect-performance certificates, are given to VFPTs and some VFPT members
- Consistent tools and equipment should be provided periodically to stimulate VFPT members' spirits and work more effectively. In addition, satellite maps also need to be updated, if any, and delivered; this absolutely requires external support, for instance, District FRs, or District Protection Forest Management Board
- As CPC organizes monthly meeting where all VFPT leaders gathered, this is also the best time for reporting forest status as well as patrolling activity in the month.

3. SCATTERED PLANTING

3.1. BRIEF DESCRIPTION

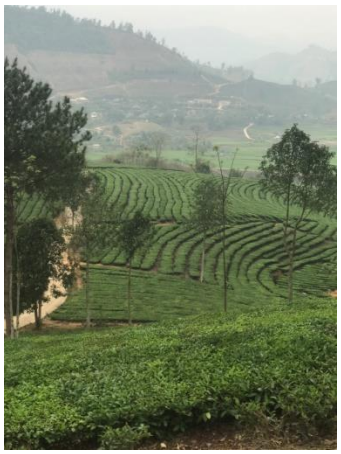
Scattered plantation is very practical and meaningful for protection of the environment and ecological landscape. Scattered tree planting can be applied to a very small land area where large forest tree planting is impossible such as in tea gardens or pond edges. Scattered tree planting is good for not only environment protection but also brings benefits or income to local people, for example, wood, fruits, seeds, etc. that indirectly reduce impacts on the forests.

The SNRM Project supported 278 households in 9 villages with 12,254 seedlings of *Michelia, Chukrasia tabularis, Canarium, Cinnamomum bejolghota Sweet* (Re). Of which, *Michelia* species were most preferred, accounting for about 66% of seedlings. Farmers planted around tea or home gardens, on pond edges, and village or commune roadsides and so on.

3.2. MAIN FINDINGS AND ISSUES

As mentioned, scattered trees are planted around the tea gardens or other crop gardens; they are also tent together with other trees or crops. Farmers reported that scattered trees could get some fertilizer directly or indirectly from tea or other crops. Furthermore, as planted in lower altitude and better water moisture compared to forest plantation; thus, scattered trees are developing very fast. Tree height can so far reach 2,5 m.

Survival rates are presented at Table 2. Problems causing the tree death such as natural death, natural disaster, or animal destroy were also reported by farmers during M&E rounds. Tree growth was slightly affected by animal destroy, though it is not so serious.



Photos 4 & 5: Scattered trees taken in March 2020

Table 2 Survival rates of scattered planting

No.	M&E Round	Survival rate (%)
1	Round 1	65
2	Round 2	73
3	Round 3	73
4	Round 4	70

3.3. LESSONS LEARNED

Farmers often needed to pay more attention with scattered trees from animal destroy. The protection measure introduced by the Project at early planting stage by using rice bags worked quite well from animal destroy.

Planting location should be carefully considered to reduce the risk of losses such as flooding or landslide.

Local authorities/agencies perform communication/dissemination work to raise awareness of the people.

3.4. RECOMMENDATION

Farmers continue tending, protecting the planted trees and providing fertilizer if possible. Protection of the trees would be even more when trees giving fruits or bigger. Though less risky for animal destroy but it will be more for stealing.

Regularly conduct communication and dissemination to raise awareness of the local people, especially to households whose children, cattle destroyed trees. In addition, implementation of village regulation on forest protection and development is important.

4. BOUNDARY PLANTING

4.1. BRIEF DESCRIPTION

The boundary planting system introduced by the SNRM Project is referred to as a living fence or barrier planting. It involves planting trees along the actual boundary of agricultural field and forest land. Generally, boundary trees planting are essentially established for land delimitation. In this particular case, the Project aims to introduce the boundary planting system as a hidden measure for delimitation between agricultural land and forest land. Thus, other objectives of the system would be widely mentioned in any discussion in the locality, especially in the discussions with farmers.

General and well known objectives of boundary system include its contribution to soil erosion control and keeping moisture for tea gardens. Farmers cultivate tea on slope gardens and the tree line in the boundary system would perfectly work as a contour to prevent landslides and keep moisture for the tea. With the distance of 5 meters each tree, based on the technical consultant, the system would not totally affect the tea development. Furthermore, the planned species would not be competitive with tea neither.

There are several common species in boundary planting system for land demarcation; however, it was highly recommended to use one species for the whole system. Many discussions regarding to selection of species were held; the chosen species needed to be widely accepted by farmers with some basic criteria, for example, soil suitability, easy to grow, high value, and sustainable development. Finally, the species of *Michelia Mediocris (Gioi xanh* in Vietnamese*)*, known as a multipurpose tree, has been the best chosen tree for boundary planting system in Phuc Khoa.

Boundary trees planting are essentially established for shading humans, particularly during harvesting tea. Besides, *Michelia* provides edible seeds after 5 years of planting and farmers can also sell them locally and earn an additional income. Moreover, *Michelia* has long-term benefits. After planting 15-20 years, *Michelia* will also produce highly valued timber, which can be sustainably harvested by the farmers and sold. The timber can be used for construction when trees are mature. Mature trees provide farmers with a valuable source of construction material and discourage them from cutting down other forests to meet their needs.

Total seedlings were 1,462 trees to 67 households in 2018.

4.2. MAIN FINDINGS AND ISSUES

Seedlings and fertilizers were freely provided to the households for planting in 2018 and supplimentary planting in 2019. For supplementary planting in 2019, relevant farmers were requested to carefully count at the field for number of all missing trees. About 320 seedlings have been delivered in 2019 to the households for all missing trees because of natural death, landslides, thieve and so on. The figure of seedlings providing in 2019 indicates the survival rate at 72% after one year planting. This has considered being somehow acceptable for forestry planting trees.

Survey of the M&E Round 4 in 2020 has shown a relatively high survival rate, at 81%.

Boundary planted trees are developing well in the edge of forestry land and agricultural land; their height can reach 2m.

Since boundary planting system was established, there is so far no land convervion into forestry land from tea garden or agriculral land. No evidence of land conversion can somehow be considered a result or good impact of the tree line, that is, the tree line, extrembly easy vision if tea garden extended into forestry.

Photos 6: Boundary planting trees taken in March 2020

4.3. LESSONS LEARNED

Boundary tree system should have been perfectly established based on any official map; in other words, the boundary trees should be planted on the margin of agricultural land and forestry land to be functioned as its real name. Unfortunately, there is no official map existing in the locality; therefore, the system has been established on actual edge. Nevertheless, it somehow plays an important role in reminding farmers for not keeping extending into forest.

It is very important to get fully agreement from tea owners who have the boundary trees on. Without their high level of interest and participation, it would be extremely difficult to establish the system and it would be not sustainable. To get the tea owner involved in participating into the system, it requires sound explanation and discussions for the tree line objectives. The fact has showed that this took time; for instance, some households in Ho Bon village first rejected to participate.

The hidden purpose, monitoring and limitation of continuous extension into forest, should not be widely discussed and mentioned with tea farmers during any discussion such as village meetings and technical training. The fact has showed that farmers seemed sensitive about the name of boundary; for example, in one village, during training, some farmers were really opposed if the system would be reflecting the real meaning of boundary line. Their question was that if the system would be working as an official line. Thus, instead of that, other objectives should be introduced, focusing on general forest management (erosion prevention) and financial purposes (edible seeds and timer). It is also important to explain the tree line would not affect their tea development.

Selection of species to be introduced in the boundary system also plays an important role. As highly recommended by local authorities to select one species for the whole line, the species should also be widely adopted by farmers. Furthermore, other aspects needed to be considered, for instance, local suitability, financial purpose, and sustainability.

It is great important to keep local authority informed and get their involvement in the boundary establishment. Initially, the idea was shared with Provincial Project Management Unit (PPMU) for advice. At the district level, the design documentation was sent to District Agriculture Office for their information and comments. Commune representatives were asked to take part in the field survey for identification of tree positions.

The boundary establishment process took a rather long time, starting from planning to document design, implementation and monitoring. Planting trees for the boundary system were conducted out in June/July 2018, though the SNRM Project started its field work in Lai Chau in August 2016. Time for planting trees in rainy season should be seriously taken into consideration in the boundary establishment.

4.4. RECOMMENDATION

The SNRM Project highly recommends local authority, commune and particularly village level, to apply the following measures.

- Improve farmer awareness of protecting the trees from animal damage and other ways of violations such as stealing. Through village meetings, village management boards propagate farmers, particularly children and households having animals, to save the system
- Strictly protect the system from any damage. It is necessary to apply village regulations and discipline any means of tree violations
- Monitor regularly the tree development and identify any problem occurred and report to related agency for necessary treatment
- Provide seedlings for supplementary planting in the first years. This is mainly to cover the lost from natural death and landslides.
- As a multi-functional species, *Michelia* is highly recommended by farmers to harvest edible seeds for spice. This is to keep the tree line sustainable way.
- Re-plant the system only when there is no opportunity to harvest the seeds and mature timber.

5. FOREST REGENERATION

5.1. BRIEF DESCRIPTION

Forest regeneration is implemented with a goal of taking full advantages of regeneration and natural changes in the areas of forest land with timber trees to ensure the state of Ic with the reasonable intervention by the people to promote forest restoration for a certain period of time.

Forest regeneration is a quick and effective solution for forest restoration which is in line with the general planning of Lai Chau Province. The area planned for forest regeneration will be enjoying incentives policies and mechanism on investment in forests, including PFES that generates practical benefits to people living near by the forests. For example, income increasing and livelihood improvement for the people as well as contributing to increase forest cover, improve landscape and environment.

Under the support of the SNRM Project, about 71 ha of forest land in four villages were naturally regenerated in Phuc Khoa Commune. These regenerated areas belong in protection area.

5.2. MAIN FINDINGS AND ISSUES

VFPTs in these four villages installed totally 16 signboards in the area of natural forest regeneration in the villages. Each signboard contains general information such as area, location and regulations to increase awareness of local people.

During installation of signboards, land use conflict occurred between one household and community land (regeneration area). This happened because there was no clear or official boundary between agriculture land and forestry land. This problem was then settled by local commune authority.

Innitially, issue on free animal grazing arised in some areas of forest regeneration of the villages which has not been controlled seriously. This due to the fact of no common graze area for animals. Strenghening village regulations as well as VFPTs patrolling had then solved this issue.

These regeneration areas are patrolled regularly by VFPTs. According to monthly monitoring data as well as results of M&E surveys, there is no cases of land conversion and forest fire reported in these generation areas. Animal grazing is also forbidden within generation areas.

M&E data of M&E Round 3 has shown that about 70% of natural regenerated areas have become into forest. However, this is only an estimation of local farmers and it should be checked and confirmed by forest rangers. Forest areas, including regeneration areas, are yearly reviewed for PFES.

According to Lai Chau Forest Protection & Development Fund, about 45% (32ha) of the regenerated area have changed into forest. This means those areas are eligible to PFES. The achievement can be considered as successful protection of VFPTs, contributing to increase of PFES.

Photo 7: Regeneration area in 2019

Photo 8: VFPT installing signboard

5.3. LESSONS LEARNED

It is quire important to collaborate and agree, at the design step, among farmers who have land adjacent to generation area, village management board and commune local authority. This is to avoid any confict during implementation e.g. installation of signboards.

Village regulations have been strentherned by strong agreement between all villagers particularly animal owners and village management boards.

5.4. RECOMMENDATION

Regeneration areas must always be patrolled by VFPTs and protected by all local people.

No free animal grazing is allowed in regeneration areas.

Local authority should carry out more awareness raising activities to the local people on forest regeneration for common interest. Any violations must be handled by village regulations.

6. BIOGAS INSTALLATION

6.1. BRIEF DESCRIPTION

In order to reduce pressure on forests by reducing human dependence on forest resources (collection of firewood for cooking), the SNRM Project supported local households to install biogas plants to utilize livestock waste sources to create gas, while reduce environmental pollution.

Totally, the SNRM Project supported 26 biogas plants in 5 villages in Phuc Khoa Commune.

6.2. MAIN FINDINGS AND ISSUE

Farmers who use biogas gave a positive feedback; more than 90% of the plants operated very well and it seems to be easy to manage and use. Four households found some difficulties at the beginning but has been already solved easily after receiving instruction from the supplier. Only two households could not operate due to no input material which resulted from no animal raising. Farmers reported that live pig price has been droped significantly since 2017 due to serious diseases such as African Swine Fever, thus, so many households reduced scale of or stopped pig raising.

Before Project's introduction of biogas plant, it was worth to assess the current fuel use by local farmers. There were three main types of fuel used by the local households (firewood, rice husk and industrial gas), each of which is used for different purposes. Firewood and rice husk are often used by people for cooking animal feed, making alcohol, and boiling water, while industrial gas is used only for daily cooking for human. Source and price of different type of fuels included:

- ✓ Firewood collected from forests or purchased from market (price: VND 1,000/kg)
- ✓ Rice husk bought from the rice milling facilities (price: VND 5,000/pack)
- ✓ Gas (price: VND 250,000/tank)

A survey of 10 local hosueholds has shown fuel consumption (per household per year) in Table 3.

Table 3. Survey results of household fuel consumption per year

No.	Type of fuels	Unit	Fuel consumption per household		
			Lowest	Highest	Average
1	Firewood	Kg/year	2,000	7,000	3,636.4
2	Rice husk	pack/year	10	200	34.5
3	Industrial gas	tank/ year	4	20	7.6

Result of the survey has revealed the lowest, average and highest amount of fuel (shown in Table 3). After the Project's introduction of biogas plant, it showed that, according to interview to biogas users, a biogas plant could generate enough gas for 4-5 hours cooking per day and farmers did not have to use industrial gas for cooking. Therefore, using the biogas plant can help a household save about VND 1.5 million (6 tanks of gas) per year. In term of economic aspect, biogas is very economical, and especially for environmental aspect, it is extrembly clean.

Photo 9: Installation of biogas

Photo 10: The Project interviewing farmers for impact of biogas plant

6.3. LESSONS LEARNED

Cost for installation of biogas plant is rather big compared to household income; therefore, the support of the SNRM Project, 5 million VND per household, is a great help for farmers and contribute to increase number of biogas plants.

Installation of a biogas plant does not take much time but can be done about two or three days including preparation of materials. It also seems to be quite easy and simple to operate biogas.

6.4. RECOMMENDATION

Beside pig raising, biogas installation relies more on other animals such as buffalo and/or cattle. In order expand the scale of using biogas to many local households, it is necessary to encourage and support the households to cultivate fodder grass and building stables for cattle and buffalo to utilize manure for biogas, reduce free grazing and loss due to diseases.

7. IMPROVED COOK STOVES

7.1. BRIEF DESCRIPTION

Farmers in Phuc Khoa commune still use firewood for cooking food for animals, making alcohol, and boiling water, etc. This implies a big pressure on forest. Therefore, the SNRM Project decided to introduce some cook stove models to local farmers.

Studying about samples of firewood stoves that have been selling on the market and learning from results of the provision of improved stoves shared by SNRM Project in Son La Province as well as conducting a study-tour to Son La to learn about stove making technique, the project in Lai Chau have decided to support the registered people in 9 villages in Phuc Khoa commune with stove model learned from Son La. Total number of households supported by the Project are 44.

7.2. MAIN FINDINGS AND ISSUES

Results of M&E Round 4 have shown that 70% of the households are still using the cook stoves, of which 15% households daily use the stoves while 21% households some time use. Farmers often use the stoves for cooking feed for pigs or making alcohol. According to these farmers, the stoves were very useful and economical compared to their traditional stove.

Reasons for rarely use (34% of households) and stop using (30%) were that, on one hand, stove size is not perfectly suitable for their cooking pots and on the other hand, this cook stove model required small firewood pieces, meaning farmers need to chop the wood. This is somehow inconvenient. A few households reported about easy-broken material of the stove. It showed that some stoves have been slightly cracked. This happened after sometime using the stove.

Photo 11: villagers making cook stove by themselves

Photo 12: PPMU visiting cook stove model

7.3. LESSONS LEARNED

It has recently shown that more and more households use gas for cooking human meals. The firewood stoves are mostly used for cooking feed for animals or making alcohol, thus, their demand for the improved stove model was not high.

Some households have expressed their demand for bigger size stoves, so it is necessary to conduct survey to understand their demands before implementation of the activity to ensure it meets their needs.

Regarding the collection of counter-funding from the participating households, some village management boards collected during and after the support. Therefore, some farmers cancelled and others did not contribute timely.

7.4. RECOMMENDATION

Instead of an unique size, cook stove model should have different sizes so that they can fit farmer demand.

Contribution should be collected ahead, better when farmers register to participate in the activity, to avoid the late or no payment.

To avoid the break, cook stoves should have heat resistant material.

8. WATERMELON CULTIVATION USING MULCHING SYSTEM

8.1. BRIEF DESCRIPTION

Since over 10 years ago, farmers in Phuc Khoa Commune, Tan Uyen District, Lai Chau Province tried to grow watermelons on rice paddy and noticed that watermelons could be grown here. The fruit tastes rather sweet and be mostly consumed by local people. Thus, Phuc khoa has become a famous watermelon-growing center in the region. About more than 10 ha of land are yearly cultivated watermelons in Phuc Khoa. On average, the traditional farming practice yields about 1 ton per 1,000 m2 or 10 ton per ha; offering VND 8 million or VND 80 million, respectively. Compared with other crops, watermelon makes higher profit and be a good source of income. However, this traditional practice or local farmer's own experience applied for watermelon production remained quite low productivity and there is much potential for increasing the yields and thus profits.

Mulching cultivation system with agricultural films in watermelon production has become a widely agricultural practice in many different parts of Vietnam; however, this practice was still completely new to farmers in Phuc Khoa though watermelon has been produced there for a long time. In 2017, the SNRM Project started introducing the agricultural mulching system to watermelon farmers in three villages, namely Nam Bon 1, Nam Bon 2 and Pac Khoa villages in Phuc Khoa commune. Results after two cropping seasons applying agricultural mulches showed a markedly high yield, giving the farmers good profits compared with the traditional planting technique.

In Nam Bon 2 village, a watermelon production group (PG) was established in 2019 with the support from the SNRM Project, aiming mainly at transferring a new technique as a group, producing better-quality and large production and gradually accessing higher-value markets.

In 2020, two new PGs were formed in Nam Bon 1 village with 22 members, and new member joined the PG in Nam Bon 2 village, giving the total number of members from all PGs to 46.

8.2. MAIN FINDINGS AND ISSUES

Yield: In the first crop season of 2018, data of all households (7 households in the first crop and more in the next crop seasons) participating in the model indicated that the yield of watermelon ranged from 2 to 2.8 tons per 1000 m2, equivalent to 20-28 tons per ha. The average fruit size

reported was from 2 to 3 kg per fruit, the largest size could reach to be more than 5 kg. The yield of each household varied with specific growth conditions such as soil and/or water availability. In the second crop season of 2019, the yield was similar with the one in 2018, which is about 2.5 tons per 1,000 m2 or 25 tons per ha. In summary, the yield from new farming practice introduced by the Project was rather stable, gaining at least double yield compared with the traditional farming method which is maximum about 1 ton per 1,000 m2 or 10 tons per ha. Many households with the traditional farming method in 2019 had no harvest or very low productivity (see Image below) due to dry weather and poor farming method.

Income: The price of watermelon in 2018 quite fluctuated, started from VND 15,000 per kg and rapidly dropped to VND 10,000 and VND 8,000 in the peak harvest season; thus, the income from the model was calculated using the average price of VND 8,000/kg. Based on the yields, 2 to 2.8 tons per 1,000 m2, the farmers earned VND 16 million to VND 22.4 million. The actual income was a bit higher as better prices at the early harvest.

In 2019, the price was quite stable, remained almost at VND 15,000 per kg, even during the peak harvest time – still a competitive price on the market. This price was about VND 1,000 to 2,000 per kg higher than produce from traditional method due to the bigger size and produce of PG. The stable high price offered an opportunity for increasing income; 2.5 tons of watermelons per 1,000 m2 is worth VND 37.5 million. This price was unpredictable, according to local farmers, traders and/or consumers often offered different prices during the harvest time. Compared with the previous years, the price in 2019 increased by VND 3,000 to 5,000 per kg. Watermelon production by 9 households of the PG in 2019 totaled more than 6 tons, equivalent with VND 200 million, which gained a higher profit than last year crop.

Irrigated rice is traditionally and commonly produced in Phuc Khoa commune. Compared with the income from rice production, the income from watermelon had gone up within a short period. While the income from rice was estimated about VND 6 million per 1,000 m2, watermelons could generate far from this.

Net income or profit: Production cost for 1,000 m2 consisting of materials and labor cost was roughly estimated about VND 8 million, giving a farmer a net income or profit of VND 8 to 14.4 million. Importantly, the farmers themselves worked and they could handle all the production work but no need to hire extra labor. Therefore, labor estimated for calculation of profits here was based on market price, about VND 100,000 per man day. In reality, family labor is always very difficult to estimate as they often do not work full day but only a few hours a day. Excluding labor cost which is not related to cash payment, material cost only was estimated at about VND 5.4 million for 1,000 m2; according to the farmers' perspective, the profit reached VND 10.6 to 17 million.

Watermelon Production Group entitled Nam Bon II PG has been successfully established and operated; farmers were able to receive several beneficial services such as technical training, cheaper inputs and access to market. Formation of such production group always needs to be facilitated, encouraged and supported before it could operate itself. Other advantages of production group are apparent, mainly increasing experience sharing thus contributing the increase of adoption rate of new farming method, lowering production costs and avoiding unavailability of production inputs in local markets when ordering as a group.

Photo 13: Selling the produce at roadside stand

Photo 14: Placing stickers on the produce

Traditionally, individual farmers mostly sell small amounts of produce at the farm gate and roadside stands. Some traders also come and buy directly from the producers. However, gathering the PG's produce to sell at a special roadside stand designed for the PG has greatly attracted consumers. The banners and stickers play an important role in ensuring the safe crop produced locally and from the PG. Interestingly, there were more consumers buying produce at the PG's stand than other individual's stands. Moreover, the PG's stand and their produce also rapidly spread online via Facebook and attracted other consumers elsewhere.

8.3. LESSONS LEARNED

The SNRM Project wishes to focus on extension of the new farming practice. As such, the following key points were identified for further development.

- The Project has so far directly benefited some 17 watermelon farmers. After two crop years applying agricultural mulch, it has confirmed the yield applied agricultural mulching is quite stable and higher than the traditional technique. Farmers themselves can clearly see the benefits of doing this, for example, faster growth, less disease and insect affection, labor saving, higher yields, faster sale, higher income generation.
- Number of households applying the new farming method has increased from 7 households in 2018 to 10 households in 2019, implying agricultural mulching is gradually adopted in Phuc Khoa. Moreover, planting area applied by agricultural mulches without the Project's support, or self-invested, has increased in the second crop year (2,000m2), also indicating farmers are interested in and be willing to adopt the new farming technique. Though its profit has apparently and positively shown in 2018, the adoption rate remains below the Project's expectation. However, this seems to be normal in adopting new innovation technology because farmers are quite skeptical in applying new practice; thus, it often takes time. Nevertheless, selection of first farmers as successful pioneers is always important to increase the adoption rate.
- The fact shows production inputs for watermelons, for instance, good quality seeds, agricultural films, pesticides are not easily found and bought in local markets, but presently these need to be ordered from other regions such as Hanoi. It means that it is relatively difficult for individual farmers to order and buy a small amount. The main reason for being unavailability of inputs is because of watermelon production is not so popular in Lai Chau and therefore, specific inputs for watermelon are not imported by traders.
- Farmers are often not good at identifying ripe watermelons because some fruits were harvested when not fully mature. According to the Project trainer, once picking up immature fruit will stop ripening and thus affecting the quality. Maturity of the fruit is indicated when the fruit produce light green color. Furthermore, maturity and quality are always of prime importance in marketing watermelons. In short, immature harvest would negatively influence Phuc Khoa watermelon's reputation. Moreover, other farmers, often farmers applying

traditional farming method, were eager to harvest because earliness usually results in higher prices. This is in line with negative quality impact, thus affecting product reputation.

- The Project played a very important role in connecting all the stakeholders including farmers, local authorities (commune, district…) and mass organizations (Farmer Union, Women Union…) and initially offering technical and material support. It is also necessary to monitor, review and encourage the PG members to maintain the activity sustainably. In the long term, local mass organizations such as the Farmers' Union and Women's Union are the best to conduct the tasks as any project has limited time.

8.4. RECOMMENDATION

Based on results of two year implementation, the following recommendations are made for watermelon production in Phuc Khoa commune.

- The local authorities particularly the Farmers' Union and Women's Union at village and commune levels should strongly encourage farmers by organizing meetings to talk more about the benefits and advise them to adopt the new farming method, not only for watermelon production but also for other crops. One important support needed is to help farmers to be able to access to loans from formal or informal financial sources by establishing microcredit scheme. It is often seen as lack of investment by farmers.
- The District Center for Agricultural Services should organize regular technical training and at the same time provide reliable inputs and materials such as seeds and films. Moreover, technical assistance is also great of importance, for instance, improved harvesting by picking up when the fruit is completely ripe or mature also offers potential to increase quality and profits. Regular meetings, at least before and after the crop season, within the PG members should be organized to share experiences or agree on harvest schedule and get some lessons learnt.
- There is much opportunity for watermelon farmers in Phuc Khoa to extend the planting area. Generally, there is an oversupply of fruit during the peak season, leading to low prices. However, the selling prices in Phuc Khoa in 2019 remained almost unchanged even during the peak season. This means that the demand for watermelon in 2019 was rather high and the supplies were inadequate. To support the productivity of watermelon in Phuc Khoa, several weaknesses must be addresses such as improving irrigation system and supporting other farmers applying agricultural mulches to achieve a critical mass of production and access markets. There is potential for the increase of watermelon production area by irrigation system improvement. Much of land in one crop of paddy rice is facing a problem with water shortage and the land is often useless for a long time. By improving the irrigation system, this would be an opportunity to diversify into high-value crops such as watermelon production. Another potential to increase the productivity and profits is to cultivate watermelon in out-season as most of the PG members are practicing.
- Currently, watermelons produced in Phuc Khoa are largely consumed by local people in Lai Chau Province; however, if watermelon production is to be increased, it is important to engage bigger and higher-value markets such as Lai Chau City, Tan Uyen Town, Than Uyen District and Lao Cai Province. In 2019, the PG members have already received an order from traders in Lao Cai with large volume of 2 tons. However, they could not provide such amount. Of course, one thing that needs also to be considered is the competition with producers from other areas.
- Markets need to be sought when production exceeds local consumption capacity. This possibly happens when the whole area of two crops of irrigated rice in a year would be planted by watermelons with good harvest. For the solutions, such as bigger and more distant markets need to be sought or additional options such as business plan should ideally be advised by the local authorities. Certification can fetch certain premiums over non-certified. Therefore, product certifications for watermelons also need to be planned, depending on specific market requirements such as organic or just basic safe production.

- Establishing market linkage to higher-value markets offers potential to increase profits. One example of price differences is currently retailing in Phuc Khoa for VND 15,000/kg and in Lai Chau City for VND 20,000/kg. It is therefore financially beneficial to transport watermelons for sale in Lai Chau city if the transport costs are less than VND 5,000/kg. With the exception of the trucks for watermelon, this does not appear to be a constraint. The commune has strength and it should be exploited to its full potential, such as the good road networks linking Phuc Khoa to Lai Chau city and to district towns including Tan Uyen, Tam Duong, Than Uyen.
- The traditional marketing does not encourage quality improvement. Traders only pay farmers a standard price for all fruit sizes. Farmers particularly the PG members should get price premiums for grading fruits applied agricultural mulching practice. For example, Grade I should receive higher prices. Thus, there is an opportunity for increasing the value of fruits.
- In the long term, farmers need to be trained on preparing business plan and improving bargaining power in marketing their produce. Well-prepared business plan would help farmers avoid imbalance between demand and supply. In reality, farmers also lack the capacity to deal with ordering inputs.
- Farmers are better organized and formed into groups in terms of Production groups for multiple purposes such as self-help, experience sharing, purchase of inputs and marketing. There is much potential for the PGs for accessing to credit and other assistance in formal training. The buyers can deal with the group as a whole rather than with individual farmers because the group can grow enough produce to meet a buyer's volume requirements.
- It is rather important to select active farmers participating in the model. Successful model depends on not only certain level of investment but also following the strict regulations of the PG; for example, crop calendar, technical standard, selling price.
- Although the Project has been supporting the PGs in production and marketing of watermelons, it is critical for the PGs to consider a shift to other crop(s) in case they face difficulties in future marketing of watermelons. It is strongly hoped that the PGs together with other stakeholders have equipped themselves with sufficient knowledge and skills on management of technical and marketing issues for shifting to the other crop(s).

9. VEGETABLE CULTIVATION

9.1. BRIEF DESCRIPTION

Vegetable cultivation in Phuc Khoa Commune is for home consumption only, except two households in Phuc Khoa and Ngoc Lai villages cultivated vegetable for sales. In some villages where ethnic minority people living, area for rice production is large (i.e., Ho Bon village) or in some other villages where land for agriculture production is limited (i.e., Pac Khoa). After rice crop, land is uncultivated, while a number of households still go to forests to collect vegetable or bamboo shoot. Based on this, the Project decided to support the local households to cultivate vegetable which aims to help increasing their living standard and changing cultivation practices. At the village meetings, many households expressed their interest in this activity, especially for winter vegetable crop, therefore, the Project decided to support for vegetable cultivation in Phuc Khoa Commune.

In October 2017, the Project supported 224 households in 7 villages with seeds and vegetable

In October 2019, the Project supported to form a Producer Group with 16 members in one village, Ho Bon.

9.2. MAIN FINDINGS AND ISSUES

Based on M&E survey Round 1, it reaveled that

- ✓ Knowledge: 94.83% of the households know and understand vegetable cultivation technique (i.e., selection of seeds/seedlings, land preparation, density, fertilizer, tending, and pesticide

prevention)

- ✓ Application: 84.48% of the interviewed households partly applied techniques of using fertilizer, tending and 89.66% partly applied technique of preventing diseases.

There are 2 reasons why they only partly applied the trained technique.

- ✓ Fertilizer was unaffordable;
- ✓ Traditional practice of using only animal manure.

Impact: 34.48% interviewed households said that vegetable yield is higher than before (over 20%); 63.79% said that the vegetable yield increases but not very much.

98.55% of the interviewed households expressed that they will continue participating in winter vegetable crop in 2018 and applying trained techniques/guidelines, 94.83% of them will cultivate in a larger scale.

Market: 24.14% of the interviewed households sold vegetable and total income from the selling was about VND10,250,000.

100% of the interviewed households wished to receive support from the Project in building bridge with input/materials (seeds, fertilizers) suppliers and accessing to markets for selling outputs.

Photo 15: Watering vegetable

Photo 16: Marketing vegetable on village roadside

For the Production Group (PG), all households (100%) have sold their produce and got benefit. They marketed vegetable on village roadside supported by the Project (see Photo 16).

9.3. LESSONS LEARNED

The first vegetable crop supported by the Project showed that most of the households cultivated vegetable for home consumption, but only few households sold with very small production.

The second crop support by the Project in Ho Bon village, in early 2020, had good production and potential for market. Benefit is positive; average cash income is about 400,000 to 500,000 VND per 100m2 per households and the rest for home consumption.

Selling vegetable at a selling stand would attract better consumers.

9.4. RECOMMENDATION

Vegetable should be better produced by groups, in term of Production Groups. With large volumne and good quality, it would give an opportunity to access to market.

10. FODDER CULTIVATION

10.1. BRIEF DESCRIPTION

There is no common pasture existing in Phuc Khoa Commune where animals such as buffalos and cattles can be freely grazed. But animals are needed to take care of by children or old farmers in rice field or in forestry land. To reduce negative impacts of free grazing in forests and crop fields, the SNRM Project supported the local people to cultivate fodder grass.

The Project has provided two varieties of grass named VA06 and Mulato-II to the people to plant. These varieties are resistant to cold weather. It has high productivity, nutrition content, and soft leaves that are good for cows, buffaloes and goats, fish.

10.2. MAIN FINDINGS AND ISSUES

Fodder species are generally considered as very easy growing plants. Both species, VA-06 and Mulato-II, were reported to have a high survival rate (see results from M&E Rounds). Mulato species are grown by seeds while VA-06 by cuttings which often initially require more tending. Survival rate should have been higher; reasons for the current rate were due to infertile land and animal destroy.

Farmers planted fodder in home garden or on fish pond edges so that they can harvest and feed the fish.

Mulato farmers reported they observed animals, including buffalo, cattle, and fish, did not like mulato at all, this is definitely because of the bitter taste of the fodder. Mulato was first introduced in Phuc Khoa commune; this species was completely new to farmers here as well as local authority. Thus, there was no experience.

On contrary, VA-06 was quite familiar with farmers and local authority here. It was still perfereed and favourable to animals including fish.

It was observed that a few households were interested in reproducing the VA-06 by cuttings from households supported by the Project.

Photo 17: Fodder VA-06 grass species planting on the pond's edge

All Mulato households (26) stated that they would not continue planting this species while VA-06 (37 households) confirmed they would continue to plant/keep this species. As VA-06 species are able to reproduce, some other farmers have already planted by cuttings from supported households.

10.3. LESSONS LEARNED

Newly introduced species should be tested before delivering to a number of farmers.

Mulato is not a suitable species for animals including fish but VA-06 is favourable for most animals and fish as well.

10.4. RECOMMENDATION

It was encouraged to multiply VA-06 species to other farmers by using cuttings from supported households.

Mulato species should not be introduced and replaced by other species such as VA-06. Mulato farmers should replace the planted area by VA-06.

11. FISH RAISING

11.1. BRIEF DESCRIPTION

Phuc Khoa Commune is like a small valley, it surrounded by mountains on the north, east and west; the terrain is high in the north and west, lower in the east and south. There are two streams (Nam Bon and Nam Be Stream) flowing through this commune, which provide water for agricultural production and aquaculture. The terrain allows people in the low areas like Phuc Khoa, Ngoc Lai and Ho Ta village to dig ponds and small lakes for fish raising with size varies from 200 - 10,000 m^2, total pond area is about 12 hectares.

In order to make initial assessment on fish raising experience of the local people, hydraulic, hydrological conditions of ponds, in 2017, the Project has supported five households in Ho Ta village to do polyculture fish raising as a model of fish farming. In August 2019, the Project supported 54 households in Pac Khoa and Nam Bon 1 villages. Support from the SNRM Project were fingerlings and farming techniques.

11.2. MAIN FINDINGS AND ISSUES

All of these five households stated that they would continue with this activity. Fish farming contributes not only their household income but also a good source of food.

It is quite difficult to calculate the income from this model because of two reasons. One is because of different fish species in the same pond; therefore the harvest is in much different time. Second is their finished fish is not only for sales but also for home consumption. However, according to the M&E Round 3 and Round 4 benefit is absolutely positive. For instance, one household revealed that they sold and and got four million VND. Others have harvested some for home consumption.

Photo 18: Farmers on study tour on fingerling nursery

Photo 19: Technical training for farmers

Payment of contribution into village fund is such a problem; more specifically, two households have not been so far contributed any into the village fund of Ho Ta (one household owes 5 million VND and the other 4.6 million VND). Some reasons for this late contribution or no contribution include flooding, fingerling and fish death and family problem (illness). Nevertheless, this is an unfair to other households and a regulation violation.

11.3. LESSONS LEARNED

In Lai Chau Province, there is no artificial fish breeding facilities, the fingerling raising farms by alevin (2-3 cm) or fingerlings (4 – 6 cm) from other provinces like Phu Tho, Bac Ninh, Hai Duong to raise to bigger sizes before selling to the local people. Some fingerling sellers have brought size I and II from lower lands and then temporary raised in the pond before selling, so the fingerling quality does not meet requirement. For market fish raising HHs, they often buy big size fingerlings (0.5kg/fish) from early harvested ponds.

In order to promote fingerling supply chain in the locality, it is necessary to establish farmer groups (2-5 households) to raise fingerlings with different size and species (at least 3-5 specialized ponds for fingerling raising). In addition, it is important to provide guidance to the farmer groups on fingerling production and annual production planning as well as expected incomes to the households who raise fingerlings.

Most of the households raise fish in the water flowing ponds, which conditions are not stable, especially during rainy season (May – September). Rainfall flow into ponds with waste from the upper land, thus, the farmers should not release fingerlings during heavy rains. In addition, during May and June, when the local people prepare land for rice cultivation, muddy water can flow into ponds that can negatively affect the fish.

In order to mitigate negative impacts of contaminated water source, it is necessary to apply measures to ensure quality of the water source by placing lime powder pack at water incoming points of the ponds, preventing water flowing into the ponds during heavy rains, and checking water source if the water color is not normal.

As the ponds/lakes located nearby living and farming areas of the people, so it is necessary to check surrounding areas to prevent water waste (animal manure) flow to the ponds to avoid diseases.

The results of the monthly technical inspection report showed that most of the households provided only 50% of the required green feed to the fish (e.g. it requires 25 - 30 kg of green feed daily for every 100 kg of grass carp, but the local HHs provided only 15 - 20 kg of green feed for every 2 - 3 days). Moreover, starchy food for fish was not provided enough. This particularly happened to large ponds, for example, ponds of Mr. Don and Mr. Luan, during the dry season (from October to March) when the green food source is not available. In order to address this issue, people should cultivate fodder grass, banana trees around the pond banks or gardens to create feed source for fish.

The Project has provided a record notebooks and guideline for each household to record information on feed and diseases to fish, but they did not record fully. They explained that they have no recording habit, so the Project staff have to come and guide them to record information weekly. In July 2018, the Project mobilizes facilitator to join Project staff for checking 2 times/month and ask farmers filling in the forms for final model evaluation.

11.4. RECOMMENDATION

Manufactured feeds are important part of commercial fish, providing the balanced nutrition needed; however, it seems to be unaffordable by local farmers and be difficult to introduce it to the model farmers. Thus, it is recommended to get more external support in fish farming model.

Farmer contribution should be collected early enough to reduce the risk of late or no payment. It is advised to collect at least a small amount of contribution during activity registration, and the rest before activity implementation.

12. FRUIT TREE CULTIVATION

12.1. BRIEF DESCRIPTION

Rice and tea are two major crops planted in Phuc Khoa Commune. In recent years, the local farmers have been investing much in the tea development because this crop generates large income, while land for fruit tree cultivation is rather limited. Some farmers planted fruit trees such as pomelo, lime in their garden for home consumption only, and almost no households planted fruit trees in large scales. Other farmers who still had land available in their home garden were interested in planting fruit trees and requested Project support.

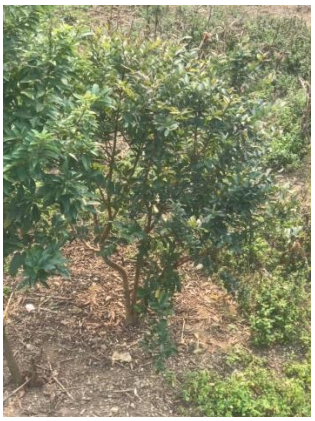
The Project has provided 5,402 seedlings to 471 households. The selected fruit tree species are Taiwan guava, lime (lime with rosy pulp and bearss lime varieties), crispy persimmon (no seeds), late ripe longan PH-M99.1, plum, and Dien pomelo. These species required at least three years to stably fruit.

12.2. MAIN FINDINGS AND ISSUES

After 15 days farmers planted the fruit frees, the Project had evaluated the survival rate and it reached at 95%. Those death trees were later freely supplemented by the supplier.

Data from Round 1 and Round 2 has shown the survival rate were 61% and 45%, respectively, implying a high mortality rate. At Round 3, the survival rate has increased to 58% and Round 4 to 60%. Reasons for this tree death included an affecttion from long rain and natural death. Like other crops, animal destroy was such a problem with many farmers at early planting stage, pulling down the survival rate of the trees. Furthermore, it was shown that planted trees were not tended well; reason was because of lack of knowledge. To solve this issue, the Project provided farmers tending and disease prvention training courses; local experienced consultant from district Center for Agricultural Service deliver this training. For animal destroy problem, the Project had tried to support farmers by finding out measures, such as collaboration with local leaders and village management boards for regulations.

A few farmers reported at Round 3 and Round 4 surveys that some fruit trees have already produced fruits, such as lime, guava. Feedback for fruit quality was quite positive. Production from early season was relatively small; therefore, farmers only kept for home consumption.



Photos 20 & 21: Guava and plum trees taken in March 2020

12.3. LESSONS LEARNED

If planted trees were not tended well, it is likely because of farmers were lack of tending knowledge. Early checking for whether trees are tended properly or not is important for providing appropriate tending training.

Animal damage on crops always need a strict regulation and strong collaboration between villagers, village management boards and sometimes also local commune authority.

Most of the fruit tree species supported by the SNRM Project often give fruits after three years planting; thus, it is rather early to evaluate at this time.

12.4. RECOMMENDATION

It is recommended to encourage farmers to tend fruit trees and protect the trees from animal destroy. Farmers should apply fertilizers for fruit trees such as animal manure. Furthermore, farmers also should apply the cultivation technique trained by the Project regarding disease prevention.

Recently, the combination of planting macamedia and tea in Phuc Khoa Commune was already carried out through a province/government program, though it is also early to conclude anything; however, it is also worth to have a similar combination of certain fruit tree species and tea.

13. VILLAGE FUND

13.1. BRIEF DESCRIPTION

As briefly mentioned above, farmer contribution is required for some activities in livelihood development only but not forest management. The Project set up a support policy and announced it before farmer participation in activity. In general farmers needed to contribute to their support in materials such as production inputs. Support in service such as training is completely covered by the Project. Activities which are required 50% of its value include: fish raising, watermelon cutlvivation, improved cook stove. Parcicularly, in the fruit tree cultivation activity, it is free of charge for farmers who register for 10 trees, and contribution is calculated, a half value, from the 11th tree.

Contributed money was collected and used as village fund and priotized for forest management.

13.2. MAIN FINDINGS AND ISSUES

Table 4 below presents farmer contribution to activities by village. It showed that actual payment or money collected accounted for about 65% of the total. Still about 35% of the money stay in debt; the reasons for not yet payment include mainly large investment per household and bad harvest.

Table 4 Farmer contribution to acitivities

No.	Village	Contribution by village					Actual payment	Debt
		Fruit tree	Improved cook stove	Water-melon	Fish raising	Total (VND)		
1	Hô Bon	1,602,500	1,610,000	-	-	3,212,500	3,212,500	-
2	Nậm Bon 1	2,702,000	-	11,200,000	11,505,000	25,407,000	14,207,000	11,200,000
3	Nậm Bon 2	2,621,500	230,000	17,217,000	-	20,068,500	13,437,500	6,631,000
4	Phúc Khoa	1,678,500	-	-	-	1,678,500	1,678,500	-
5	Ngọc Lại	693,000	1,380,000	-	-	2,073,000	2,073,000	-
6	Nà Lại	2,065,000	-	-	-	2,065,000	2,065,000	-
7	Nà Khoang	863,000	575,000	-	-	1,438,000	1,438,000	-
8	Hô Ta	2,495,500	1,150,000	-	17,922,450	21,567,950	11,876,500	9,691,450
Total (VND)						**77,510,450**	**49,988,000**	**27,522,450**

It is observed that it is rather easy to collect contribution regarding the fruit tree cultivation and improved cook stoves. This is perhaps not so many trees ordered and exceeded 10 seedlings, making a small the value.

However, for fish farming, particularly those 5 households in the model, farmers found some difficultires since their contribution is quite big, about 4 – 5 million VND per household. Of those 5 households, 2 households could not still pay back. There is almost no promising for these 2 households to contribute into the village fund though the village management board had also tried to persuade.

For watermelon cultivation, it is a bit different; the reason for a few households did not contribute is because of the bad harvest caused by unfavourable weather. Those households agreed and promised to payback in the next crop.

13.3. LESSONS LEARNED

Contribution should be explained clearly and the best is contribution should be collected before the activity started.

Village management boards stay an important role in selecting farmers participating in the acitivity. They understand their farmers well enough and whom are active farmers.

Village management boards should be also in charge of collecting farmer contribution and announce those farmers in debt in village meetings.

13.4. RECOMMENDATION

Carefully give advice to farmers who put large investment into the activity. It is often seen that large investment requires more and other resources such as fish raising require labor, feeding…

Payment should be devided into several times depending on capital availability such as harvest time of rice, fish and so on.

Set up clear regulations in case farmers cannot pay back.

ANNEXES

Annex 1. SUMMARY RESULT OF M&E ROUNDS

Monitoring item	Criteria	Evaluation indicator thresholds			Timing	Source	Round 1	Round 2	Round 3	Round 4
		Green	Yellow	Red						
1 Forest management										
101 Forest protection										
1-1 Forest allocation	Allocation of production forests and protection forests with actual forests to villages	All the forest lands with actual forests have been allocated.	Over 50% of forest lands with actual forests have been allocated.	Less than 50% of forest lands with actual forests have been allocated.	Only 1st round	FMB DPC	All the forest lands with actual forests have been allocated	All the forest lands with actual forests have been allocated	All the forest lands with actual forests have been allocated	All the forest lands with actual forests have been allocated
	Allocation of special use forests with actual forests to forest management boards	All the forest lands with actual forests have been allocated.	Over 50% of forest lands with actual forests have been allocated.	Less than 50% of forest lands with actual forests have been allocated.	Only 1st round	SUFMB	All the forest lands with actual forests have been allocated	All the forest lands with actual forests have been allocated	All the forest lands with actual forests have been allocated	All the forest lands with actual forests have been allocated
1-2 Forest protection contract	Contract on protection of special use forests with community/organization	Contract on protection of all the forests have been made.	Contract on protection of more than 50% of the forests have been made.	Contract on protection of less than 50% of the forests have been made.	Only 1st round1	SUFMB	Contract on protection of all the forests have been made	Contract on protection of all the forests have been made	Contract on protection of all the forests have been made	Contract on protection of all the forests have been made
1-3 Payment of PFES	Payment of PFES on production forests and protection forests to villages	PFES are paid to all the forests.	PFES are paid to more than 50% of the forests.	PFES are paid to less than 50% of the forests.	Yearly	PFES Fund CPC VH	PFES are paid to all the forests	PFES are paid to all the forests	PFES are paid to all the forests	PFES are paid to all the forests

		Payment of PFES on special use forests to forest management committees	PFES are paid to all the forests.	PFES are paid to more than 50% of the forests.	PFES are paid to less than 50% of the forests.	Yearly	PFES SUF MB	PFES are paid to all the forests	PFES are paid to all the forests	PFES are paid to all the forests	PFES are paid to all the forests
		Payment of PFES based on the forest protection contract to villages by forest management committees	PFES are paid to all the forests.	PFES are paid to more than 50% of the forests.	PFES are paid to less than 50% of the forests.	Yearly	CPC VH	PFES are paid to all the forests	PFES are paid to all the forests	PFES are paid to all the forests	PFES are paid to all the forests
		Utilization of PFES for forest management and protection	Sufficient amount of PFES is utilized for village forest manage-ment	Some amount of PFES is utilized for village forest manage-ment	PFES is not utilized for village forest management	Monthly	CPC VH	Some amount of PFES is utilized for village forest manage-ment (As one of 6 items, forest management and protection activities as a top priority can be sourced from PFES. For example, VFPT members are paid, at the end of the year, for actual patrolling)	Some amount of PFES is utilized for village forest manage-ment (As one of 6 items, forest management and protection activities as a top priority can be sourced from PFES. For example, VFPT members are paid, at the end of the year, for actual patrolling)	Some amount of PFES is utilized for village forest manage-ment (some other items are also sourced from PFES e.g. investment of village roadside lighting)	Some amount of PFES is utilized for village forest manage-ment

	1-4 Compliance of village forest protection and development regulations	Forest conversion to agricultural lands, forest fire, encroachment by animals, hunting, illegal harvesting of timber and NTFPs	Almost no case found.	There are some cases but not very serious.	Very serious condition.	6 months	VH	Almost no case found.	There are some cases but not very serious (2 cases found: **Jan 2019:** One illegal case found (tea extended in special forest – about 3.8ha) **Feb 2019:** There was a fire of 2,15ha belonging to Na Lai forest protection area – not forest land but rock and bushes (DT1 and DT2)	There are some cases but not very serious; e.g. 1 case found in **April 2019:** a fire of 0,07ha in protection forest area (destroyed 15 pine trees	There are some cases but not very serious (1 cases found in **October 2019**: an illegal logging of 0.121m3 (2 bars of wood) in special use forest of Ho Bon)
	1-5 Enforcement of laws / regulations	Handling of illegal acts based on laws or village regulations by forest protection officers or villages	Handling is conducted for all the illegal acts.	Handling is conducted for more than 50% of the illegal acts.	Handling is conducted for less than 50% of the illegal acts.	6 months	VH CPC	Handling is conducted for all the illegal acts	Handling is conducted for all the illegal acts (Local authority and VFPTs handled by uprooting all extended tea and reprimand was applied)	Handling is conducted for all the illegal acts	Handling is conducted for all the illegal acts
	1-6 Changes in forest conditions	Protection of forests	No significant change in forest area (-10% – +20%).	More than 20% of forest area is decreased.	More than 50% of forest area is decreased.	TBD	TBD	No significant change in forest area (-10% – +20%).	No significant change in forest area (-10% – +20%).	No significant change in forest area (-10% – +20%).	No significant change in forest area (-10% – +20%).
		Forest decrease for road development, conversion to agricultural	No affecting forest area at all	Some but not affecting the forest area	Seriously affecting forest area	TBD	TBD	No affecting forest area at all	Some but not affecting the forest area	Some but not affecting the forest area (the fire case found above)	Some but not affecting the forest area (the illegal logging case found above)

		lands, natural disaster etc.									
102 Forest regeneration											
	Tending of reforestation and natural regeneration	Almost regularly, being implemented .	To some extent, being implemented .	Not implemented at all.	6 months	VH HH	To some extent, being implemented	To some extent, being implemented	To some extent, being implemented	To some extent, being implemented
2-1 Compliance of forest regeneration procedure	Forest conversion to agricultural lands, forest fire, encroachment by animals, hunting, illegal harvesting of timber and NTFPs	Almost no case found.	There are some cases but not very serious.	Very serious condition.	6 months	VH HH	Almost no case found.	Almost no case found.	Almost no case found	Almost no case found
2-2 Change in forest conditions	Forest recovery and regrowth	More than 50% of current vegetation (DT2) has changed into forest categories which is eligible to PFES.	Less than 50% has changed into forest categories or No significant changes in current forest category (DT2)	Vegetation has changed into lower level of vegetation (e.x.DTR) or other land use.	6 months	VH HH	Less than 50% has changed into forest categories or No significant changes in current forest category (DT2)	More than 50% of current vegetation (DT2) has changed into forest categories which is eligible to PFES (farmers believed almost 70% changed into forest)	More than 50% of current vegetation (DT2) has changed into forest categories which is eligible to PFES (about 70% changed into forest—to be checked and confirmed by local authority	According to Lai Chau Forest Protection and Development Fund, about 45% (32ha) of current vegetation (DT2) has changed into forest categories which is eligible to PFES
	Forest decrease for road development, conversion to agricultural lands, natural disaster etc.	No affecting forest area at all	Some but not affecting the forest area	Seriously affecting forest area	6 months	VH HH	No affecting forest area at all	No affecting forest area at all	No affecting forest area at all	No affecting forest area at all

103 Af/reforestation											
	3-1 Compliance of village forest protection and development regulations	Tending of reforestation and natural regeneration	Almost regularly, being implemented.	To some extent, being implemented.	Not implemented at all.	6 months	VH HH	Almost regularly, being implemented	Almost regularly, being implemented	Almost regularly, being implemented	Almost regularly, being implemented
		Forest conversion to agricultural lands, forest fire, encroachment by animals, hunting, illegal harvesting of timber and NTFPs	Almost no case found.	There are some cases but not very serious.	Very serious condition.	6 months	VH HH	There are some cases but not very serious (animal destroy problem)	There are some cases but not very serious (1 household reported regarding animal destroyed)	There are some cases but not very serious (2 households reported regarding animal destroyed)	No case found
	3-2 Change in forest conditions	Survival of planted trees	Survival rate (70 – 100%)	Survival rate (40 – 70%)	Survival rate (< 40%)	6 months	VH HH	Surival rate at 82%	Survival rate at 71%	Survival rate at 71%	Survival rate at 71%
		Forest decrease for road development, conversion to agricultural lands, natural disaster etc.	No affecting forest area at all	Some but not affecting the forest area	Seriously affecting forest area	6 months	VH HH	No affecting forest area at all	No affecting forest area at all	No affecting forest area at all	No affecting forest area at all
104 Scattered Planting											
	4-1 Change in forest conditions	Survival of planted trees	Survival rate (70 – 100%)	Survival rate (40 – 70%)	Survival rate (< 40%)	6 months	VH HH	Survival rate at 65%	Survival rate at 73%	Survival rate at 73%	Survival rate at 70%

		Tending of planted trees	Almost regularly, being implemented .	To some extent, being implemented .	Not implemented at all.	6 months	VH HH	Almost regularly, being implemented	Almost regularly, being implemented	Almost regularly, being implemented	Almost regularly, being implemented
		Tree growth affected by animal destroy or natural disaster	Almost no case found.	There are some cases but not very serious.	Very serious condition.	6 months	VH HH	There are some cases but not very serious	There are some cases but not very serious	There are some cases but not very serious	There are some cases but not very serious
105 Boundary Planting											
	5-1 Change in forest conditions	Survival rate	Survival rate (70 – 100%)	Survival rate (40 – 70%)	Survival rate (< 40%)	6 months	VH HH	Survival rate at 88%	Survival rate of about 78% (dead reasons: natural death, animal destroy)	Survival rate at 82%	Survival rate at 81%
		Tending of planted trees	Almost regularly, being implemented .	To some extent, being implemented .	Not implemented at all.			Almost regularly, being implemented.	Almost regularly, being implemented.	Almost regularly, being implemented.	Almost regularly, being implemented.
		Forest conversion to agricultural lands	Almost no case found.	There are some cases but not very serious.	Very serious condition.			Almost no case found.	Almost no case found.	Almost no case found.	Almost no case found.
		Tree growth affected by animal destroy or natural disaster	Almost no case found.	There are some cases but not very serious.	Very serious condition.	6 months	VH HH	There are some cases but not very serious	There are some cases but not very serious	There are some cases but not very serious (2 households reported regarding animal destroyed	There are some cases but not very serious (In the last 6 months, 6HHs/50 HHs reported animals destroyed some trees)
106 Forest Patrolling											

			Regular forest patrolling by villages	Forest patrolling is conducted at least once a month.	Forest patrolling is conducted less than once a month.	Forest patrolling has not yet conducted.	Monthly	VH VFPT	Forest patrolling is conducted at least once a month.	Forest patrolling is conducted at least once a month.	Forest patrolling is conducted at least once a month.	Forest patrolling is conducted at least once a month.
			Regular reporting by villages to forest protection officers	Report from forest patrolling team is made at least once a month.	Report from forest patrolling team is made less than once a month.	Report from forest patrolling team has not yet made.	Monthly	CPC VFPT	Report from forest patrolling team is made at least once a month (often via verbal reports)	Report from forest patrolling team is made at least once a month (often via verbal reports)	Report from forest patrolling team is made at least once a month (often via verbal reports)	Report from forest patrolling team is made at least once a month (often via verbal reports)
			Forest change monitoring by forest protection officers based on report	Monitoring on all the reported forest changes is conducted.	Monitoring on more than 50% of the reported forest changes is conducted.	Monitoring on less than 50% of the reported forest changes is conducted.	Monthly	CPC	Monitoring on all the reported forest changes is conducted.	Monitoring on all the reported forest changes is conducted.	Monitoring on all the reported forest changes is conducted.	Monitoring on all the reported forest changes is conducted.
2 Livelihood development												
	2-1 Activities for alternative income generation and food security											
		201 Vegetable Cultivation	Continuation of the activity (+ reasons why not continue)	Ratio of HHs continuing the activity (70 – 100%)	Ratio of HHs continuing the activity (40 – 70%)	Ratio of HHs continuing the activity (<40%)	6 months	SGL HH	98% of households continuing the activity	NA (off-season)	NA (off-season)	92% of HHs continuing vegetable planting
			Sale of products	Already sold some	–	–	6 months	SGL HH	All ready sold some (24% households sold)	NA (off-season)	NA (off-season)	23% of HHs sold some vegetable and others for home consumption
			Annual income and expenditure for recent 3 months	Positive net profit	(Almost no net profit)	(Negative net profit)	6 months	SGL HH	Positive net income (rather low, 700,000 VND/ household	NA (off-season)	NA (off-season)	Positive net profit

		Outlook for continuation of the activity (+ reasons why not continue)	Will definitely be continued without any problem	Will possibly be continued / Not known	Will not be continued	6 months	SGL HH	Will definitely be continued without any problem	NA (off-season)	NA (off-season)	Will definitely be continued without any problem
	202 Water-melon Cultivation	Continuation of the activity (+ reasons why not continue)	Ratio of HHs continuing the activity (70 – 100%)	Ratio of HHs continuing the activity (40 – 70%)	Ratio of HHs continuing the activity (<40%)	6 months	SGL HH	Ratio of HHs continuing the activity (100%)	Ratio of HHs continuing the activity (100%)	Ratio of HHs continuing the activity (100%)	Ratio of HHs continuing the activity at 100%
		Sale of products	Already sold some	–	–	6 months	SGL HH	Already sold (sold in fresh on roadside stands or traders)	Already sold (sold in fresh on roadside stands or traders)	Already sold (some for home consumption)	Almost all produce were sold out (only small amount for home consumption) on roadside stands and for traders
		Annual income and expenditure for recent 3 months	Positive net profit	(Almost no net profit)	(Negative net profit)	6 months	SGL HH	Positive net profit (net about 13 mil VND/1000m2)	Positive net profit (Average yield of 2.5 tons per 1000m2 or 25 tons per ha; market price of VND 15,000 per kg; offering VND 37.5 million per 1,000m2 - about 5 times higher than rice production)	Positive net profit (Average yield of 2 tons per 1000m2 or 20 tons per ha; market price of VND 13,000 - 15,000 per kg; offering VND 26 - 30 million per 1,000m2 or VND 260 - 300 million per ha)	Net income/ profit ranged from 10-15 million VND per 1000m2
		Outlook for continuation of the activity (+ reasons why not continue)	Will definitely be continued without any problem	Will possibly be continued / Not known	Will not be continued	6 months	SGL HH	Will definitely be continued without any problem	Will definitely be continued without any problem	Will definitely be continued without any problem	Will definitely be continued without any problem

	203 Fruit tree cultivation	Survival of planted trees (+reasons why not survived)	Survival rate (70 – 100%)	Survival rate (40 – 70%)	Survival rate (< 40%)	6 months	SGL HH	Survival rate at 61%	Survival rate at 45% (reasons for death: narural death, diseases…)	Average survival rate at 58% (Guava: 79%; lime: 66%; persimmon: 44%; longan: 59%; plum: 19%; pomelo: 80%). Reasons for death includes natural death, diseases…	Average survival rate at 60% (Guava: 76%; lime: 70%; persimmon: 30%; longan: 69%; plum: 31%; pomelo: 77%)
		Harvesting of fruits (+reasons why not harvested)	Already harvested some	Not yet harvested (no fruits available yet)	Not yet harvested despite some fruits are ready to be harvested	6 months	SGL HH	Not yet harvested (no fruits available yet)	Not yet harvested (no fruits available yet)	Already harvested some	Already harvested some
		Sale of products	Already sold some	Not yet sold	–	6 months	SGL HH	Not yet sold	Not yet sold	Not yet sold (As still early in the first years for fruit and not many fruits, therefore, HHs mainly use for home consumption)	No HH sold the produce but only for home consumption as in the first years, not many fruits
		Outlook for continuation of the activity (+ reasons why not continue)	Will definitely be continued without any problem	Will possibly be continued / Not known	Will not be continued	6 months	SGL HH	Will definitely be continued without any problem	Will definitely be continued without any problem	Will definitely be continued without any problem	Will definitely be continued without any problem
	205 Fish raising	Continuation of the activity (+ reasons why not continue)	Ratio of HHs continuing the activity (70 – 100%)	Ratio of HHs continuing the activity (40 – 70%)	Ratio of HHs continuing the activity (<40%)	6 months	SGL HH	Ratio of HHs continuing the activity (70 – 100%)	Ratio of HHs continuing the activity (70 – 100%)	Ratio of HHs continuing the activity (70 – 100%)	87% of the HHs continue the fishing farming

		Sale of products	Already sold some	–	–	6 months	SGL HH	Already sold some (2 households sold as fingerlings; 2 households did not repay the contribution into village fund)	Already sold some (2 households sold; others for own consumption; 2 households did not repay the contribution into village fund)	Already sold some (1household sold; others for own consumption; 2 households did not repay the contribution into village fund)	Already sold some (for the farmers in the model supported in 2017) but farmers supported in 2019 did not sell because fishes are still small)
		Annual income and expenditure for recent 3 months	Positive net profit	Almost no net profit	Negative net profit	6 months	SGL HH	Positive net profit (2 households)	Positive net profit (1 household earned 2 mil VND; 1 earned 3-4 mil VND)	Positive net profit (1household earned about 4 mil VND)	Positive net profit (only for farmers supported in 2017: 1HH earned 3 mil VND; 1 HH 4 mil VND
		Outlook for continuation of the activity (+ reasons why not continue)	Will definitely be continued without any problem	Will possibly be continued / Not known	Will not be continued	6 months	SGL HH	Will definitely be continued without any problem	Will definitely be continued without any problem	Will definitely be continued without any problem	Will definitely be continued without any problem
	210 Fodder grass cultivation	Continuation of the activity (+ reasons why not continue)	Ratio of HHs continuing the activity (70 – 100%)	Ratio of HHs continuing the activity (40 – 70%)	Ratio of HHs continuing the activity (<40%)	6 months	SGL HH	Ratio of HHs continuing the activity (59%)	Ratio of HHs continuing the activity (40 – 70%)	Ratio of HHs continuing the activity (40 – 70%)	40% of HHs continue the activity (reasons for not to continue including: no land available, not prefered by animals)
		Survival of planted crops (+reasons why not survived)	Survival rate (70 – 100%)	Survival rate (40 – 70%)	Survival rate (< 40%)	6 months	SGL HH	Survival rate at 88%	Survival rate (70-100%)	Survival rate at 70%	Survival rate at Mulato 85% for Mulato and 64% for VA-06 species (reasons for not survived including water shortage)

		Amount of grass produced	Sufficient	Almost sufficient	Not sufficient	6 months	SGL HH	Not sufficient	Not sufficient	Not sufficient (50% of households reported insufficient)	About 70% of HH reported suffiicient
		Outlook for continuation of the activity (+ reasons why not continue)	Will definitely be continued without any problem	Will possibly be continued / Not known	Will not be continued	6 months	SGL HH	Will possibly be continued / Not known	Will possibly be continued / Not known	Will possibly be continued / Not known	Will possibly be continued / Not known
2-3 Activities to reduce firewood consumption and collection time											
	212 Improved cooking stove	Continuation of the activity (+ reasons why not continue)	Ratio of HHs continuing the activity (70 – 100%)	Ratio of HHs continuing the activity (40 – 70%)	Ratio of HHs continuing the activity (<40%)	6 months	SGL HH	Ratio of HHs continuing the activity (almost 100%)	Ratio of HHs continuing the activity (almost 100%)	Ratio of HHs continuing the activity (almost 100%)	70% of HHs are using the stoves (of which 15% of HHs use daily; 21% regularly; 34% rarely)
		Outlook for continuation of the activity (+ reasons why not continue)	Will definitely be continued without any problem	Will possibly be continued / Not known	Will not be continued	6 months	SGL HH	Will definitely be continued without any problem	Will definitely be continued without any problem	Will definitely be continued without any problem	Will definitely be continued without any problem
		Expansion of the activity to non-participating HHs	Considerable number of HHs	Small number of HHs	No	6 months	SGL HH	No (no new registration)	No (no new registration)	No (no new registration)	No (no new registration)
	213 Biogas plant con-struction	Continuation of the activity (+ reasons why not continue)	Ratio of HHs continuing the activity (70 – 100%)	Ratio of HHs continuing the activity (40 – 70%)	Ratio of HHs continuing the activity (<40%)	6 months	SGL HH	Ratio of HHs continuing the activity (91%)	Ratio of HHs continuing the activity (70 – 100%)	Ratio of HHs continuing the activity (70 – 100%)	86% of HHs use biogas plants (14% do not use because no raising animals anymore)

		Outlook for continuation of the activity (+ reasons why not continue)	Will definitely be continued without any problem	Will possibly be continued / Not known	Will not be continued	6 months	SGL HH	Will definitely be continued without any problem	Will definitely be continued without any problem	Will definitely be continued without any problem	Will definitely be continued without any problem
		Expansion of the activity to non-participating HHs	Considerable number of HHs	Small number of HHs	No	6 months	SGL HH	Small number of HHs	No new registration	No new registration	No new registration
3 Village fund management											
		Existence of village fund	Yes	Yes but not function well	No	6 months	VH VMB	Yes	Yes	Yes	Yes
		Record keeping	Yes	Yes but not satisfactory level	No	6 months	VH VMB	Yes	Yes	Yes	Yes
		Expense for VFPTs	Some cases of expense	Very few cases of expense	No expense at all	6 months	VH VMB	Some cases of expense	Some cases of expense	Some cases of expense	Some cases of expense
		Loans for new activities (+contents of the activities)	Some cases of loans	Very few cases of loans	No loans at all	6 months	VH VMB	No loans at all	No loans at all	No loans at all	No loans at all
		Status (Amount) of the fund	Tendency to increase	Almost no change	Tendency to decrease	6 months	VH VMB	Almost no change	Almost no change	Almost no change (Increase in some villages (Pac Khoa, Nam Bon 1, Nam Bon 2) through	Almost no change (except the cchanges in Nam Bon 1 and Nam Bon 2 villages through

										contribution for watermelon and fish activities)	contribution for watermelon cultivation)
		Outlook for continuation of the fund (+ reasons why not continue)	Will definitely be continued without any problem	Will possibly be continued / Not known	Will not be continued	6 months	VH VMB	Will definitely be continued without any problem	Will definitely be continued without any problem	Will definitely be continued without any problem	Will definitely be continued without any problem
4 Village Institutional Set up											
		Regular meeting VFMLD	at least once a month.	less than once a month.	not yet organized.	6 months	VH VMB	Rarely met and only meet when needed	Not yet organized. (Not organized because no issue needs to be discussed)	Not yet organized. (Not organized because no issue needs to be discussed)	Not yet organized. (Not organized because no issue needs to be discussed)
		Outlook for continuation of VFMLD (+ reasons why not continue)	Will definitely be continued without any problem	Will possibly be continued / Not known	Will not be continued	6 months	VH VMB	Will not be continued (All work, including project activities, needs to collaborate closely with village head, but villead head position is changing and is affecting the existing VFMLD)	Will not be continued (All work, including project activities, needs to collaborate closely with village head, but villead head position is changing and is affecting the existing VFMLD)	Will not be continued (All work, including project activities, needs to collaborate closely with village head, but villead head position is changing and is affecting the existing VFMLD)	Will not be continued (All work, including project activities, needs to collaborate closely with village head, but villead head position is changing and is affecting the existing VFMLD)