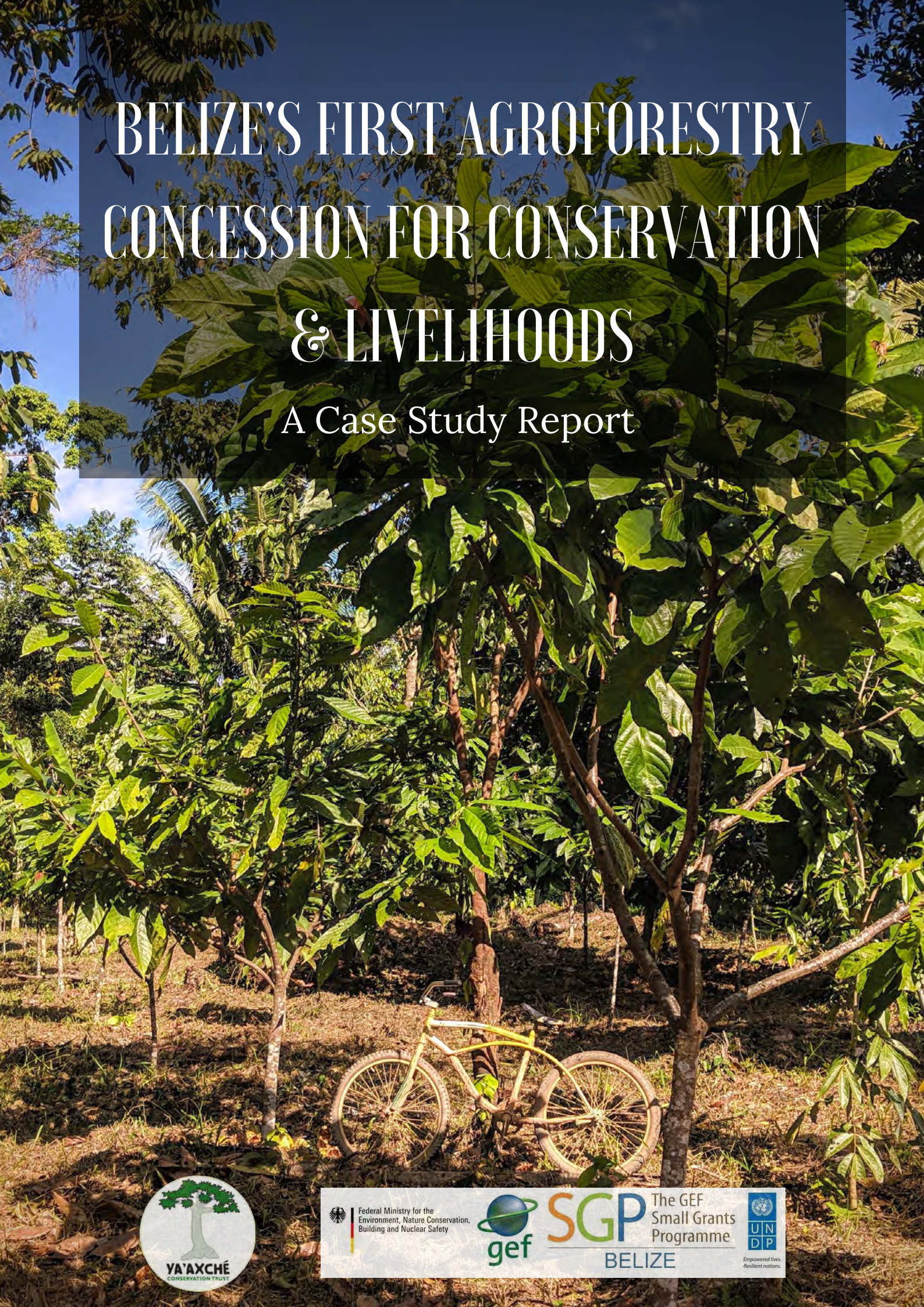
BELIZE'S FIRST AGROFORESTRY CONCESSION FOR CONSERVATION & LIVELIHOODS

A Case Study Report



YA'AXCHÉ CONSERVATION TRUST

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

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A Case Study Report
March 2019

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M.A. Sustainable International Development

ACKNOWLEDGEMENTS

Thank you to all who contributed to the MMNFR agroforestry concession, past and present. Your commitment and vision has made this model a reality in Belize. Special acknowledgement is given to Ya'axché Conservation Trust for their leadership in creating this model and TFCG for their vision and hard work in making the model a reality on the ground. Thank you to Global Environment Facility Small Grants Programme (GEF SGP) for funding this case study. Further acknowledgment is given to the following supporting partners for their contributions: Caribbean Community Climate Change Centre, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) CATS, InterAmerican Foundation, Fauna and Flora International, EU Forest Governance Project, as well as Lisel Alamilla (former Minister of Fisheries and Forestry) who believed in this work and granted Ya'axché the permit, and Percival Cho (CEO of the Ministry of Agriculture, Fisheries, Forestry, and the Environment), who drafted the rules and regulations.

Photo by M. Beaton, 2018

CONTENTS

ACRONYMS

CBO - Community-based organization
FD - Forest Department
MMNFR - Maya Mountain North Forest Reserve
PA - Protected Area
TFCG - Trio Farmers Cacao Growers

1. INTRODUCTION

In 2010, elders from the village of Trio came together to discuss the needs of their community. Many families, including the leaders in this group, had no land of their own. Their vision became to establish legal access to land for the benefit and improvement of their community and livelihoods. In 2012, the group consulted with Ya'axché Conservation Trust, and together they led the way for the first community agroforestry concession in Belize.

The Maya Mountain North Forest Reserve (MMNFR) community cacao agroforestry concession is Belize's first community concession allowing local residents to access a protected area and become stewards of that area. The community agroforestry concession model could open the door for more community forestry within Belize, where forests are abundant but threats to their sustainability are increasing. Through the work of Ya'axché Conservation Trust, the Belize Forest Department, and Trio Farmers Cacao Growers, this concession became a reality in 2015 and is providing valuable lessons for the future.

2. METHODOLOGY

This case study was carried out through mixed-methods by a third-party to 1) gather key knowledge about project benefits, challenges, and areas of opportunity 2) collect data on how beneficiaries perceive the project and its effect on their livelihoods, and 3) record achievements and lessons learned. Methods undertaken in this case study were 1) literature review of internal and external reports and documents 2) qualitative and quantitative data collection, including personal interviews, focus groups, and surveys and 3) a quantitative farm plot assessment.

Photo by Marvin Vasquez

Photo by Maximiliano Caal

3. CONTEXT

3.1 KEY STAKEHOLDERS

Ya'axché Conservation Trust, founded in 1998, is a non-governmental organization in southern Belize seeking to establish harmony between nature and human development for the benefit of both. Ya'axché co-manages the MMNFR agroforestry concession with the CBO, through an integrated management approach.

The Belize Forest Department regulates and enforces protected areas, including National Parks, Nature Reserves, Wildlife Sanctuaries, and Forest Reserves. The Belize Forest Department is the regulatory agency of the MMNFR agroforestry concession.

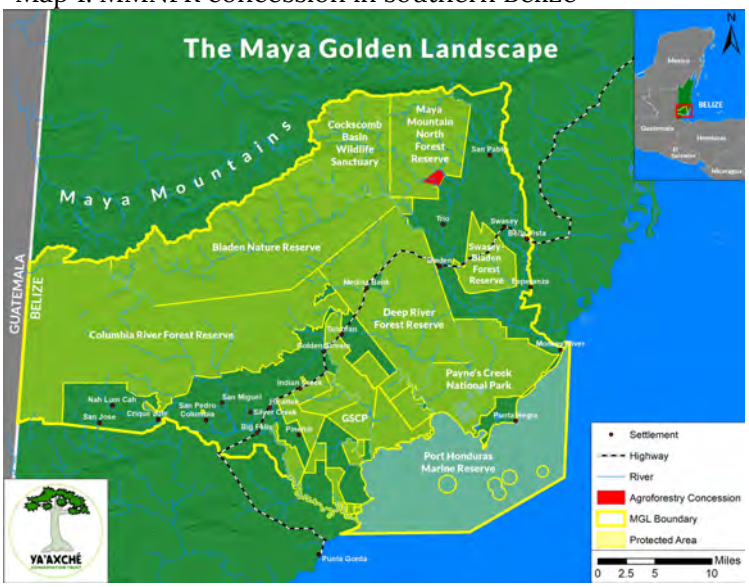
TFCG

Trio Farmers Cacao Growers Ltd. (TFCG) is a private, for-profit CBO registered in 2015 in the community of Trio. Members organized together starting in 2010 to seek access to land in MMNFR to support their livelihoods. TFCG is Ya'axché's associate and co-manager in the MMNFR cacao agroforestry concession.

3.2 LOCATION

The concession area occupies 936 acres in the southeastern corner of the 36,130-acre MMNFR in Toledo District, Belize, near the village of Trio as seen in map 1. MMNFR was established in 1997 because of its importance for biodiversity, timber, soil, and water security. It is now considered a key biodiversity area (KBA) by the Global Environment Facility and World Bank and has been prioritized for increased management and protection (Garcia, Ruscalleda, Mcloughlin, & Cal, 2014).

Map 1: MMNFR concession in southern Belize

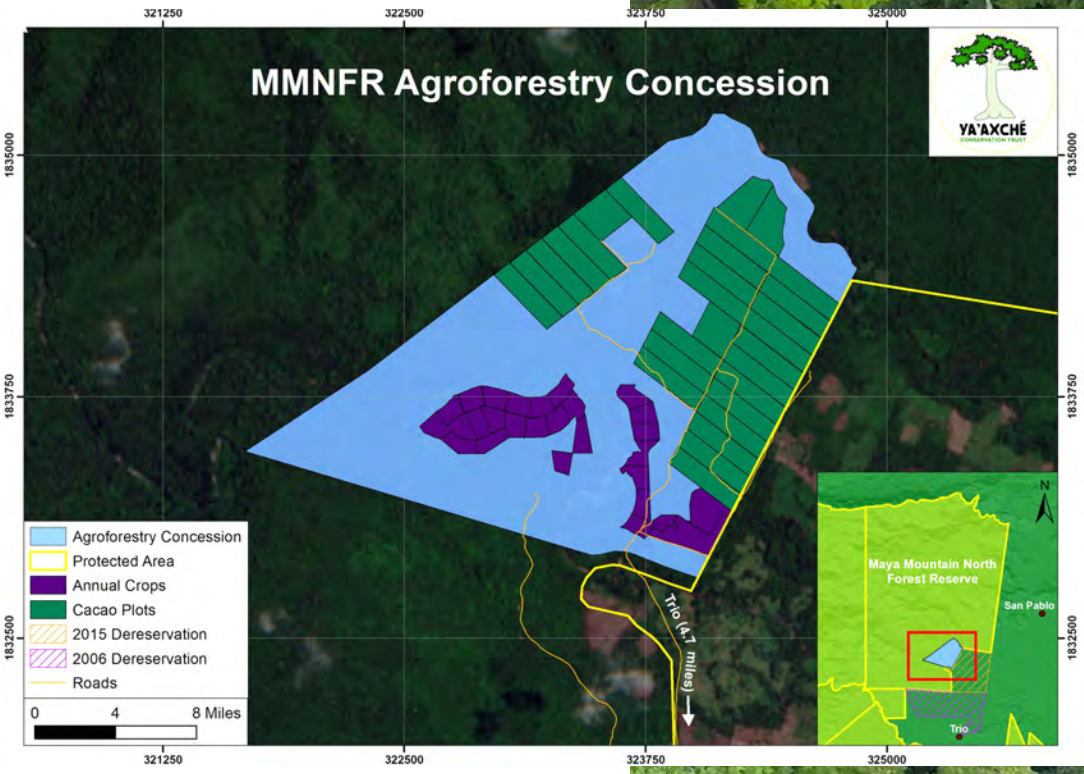


FOREST RESERVE

Forest Reserves are a category of PAs within Belize. Hunting, fishing, logging, extraction, camping, agriculture, and building permanent structures require a permit. Their purpose is to protect timber stores and conserve soil, watersheds and wildlife.

The adjacent village of Trio is a semi-remote buffer community of 188 households (Castillo, 2014). The village sits 4.5 miles from the Southern Highway via dirt road with no public transportation access. The concession entrance is another 4.75 miles past Trio, or another 30 minutes in a 4-wheel drive vehicle. Most farmers have no access to a vehicle so they walk or bike this route to get to their plots, which sit along three main access roads and various smaller footpaths as shown in map 2.

Map 2: MMNFR Agroforestry Concession



3.3 HISTORY

Encroachment into the southeast border of MMNFR near Trio increased when banana and citrus plantations developed along the reserve boundary and plantation workers began seeking resources and land within the reserve. In 2006, the Government of Belize de-reserved 2,938 acres of MMNFR in the area of these plantations, as seen on map 2. However, unfair and insufficient parceling allowed for many families to remain landless and they continued to press into MMNFR to support their households. In 2012, the government responded by carrying out an eviction. All crops, fences, and structures found inside of MMNFR were destroyed. A logging concession permit was granted for the area that same year. The permit-holder improperly managed the area and created conflict with local community members. Eventually the permit was revoked due to noncompliance.

Since as early as 2010, elders from Trio discussed forming a group that would represent and benefit the community. They imagined open access to a section of land in MMNFR for community agriculture or extraction but had no idea about sustainability or agroforestry models and had never farmed cacao before. In 2012, members of this group were directly affected by the eviction, losing valuable crops and equipment. They decided to approach the Belize Forest Department to inquire about gaining legal access to MMNFR for the benefit of their community. Ya'axché consulted with TFCG, assisting them in considering a community cacao agroforestry concession. In 2015, just as implementation began, another de-reservation of 2,310 acres was approved adjacent to the proposed concession area, further threatening MMNFR.


Photo by Tom Aveling

4. OVERVIEW

4.1 GOALS

The agroforestry concession's goals are to:

- "Bring sustainable economic development to buffer communities in MMNFR" (Ya'axché Conservation Trust, 2016).
- "Reduce current threats to biodiversity and habitat loss due to illegal and unsustainable agricultural developments within the reserve" (Ya'axché Conservation Trust, 2016).
- "Maintain water catchment function and flood regulation functions within and outside the reserve" (Ya'axché Conservation Trust, 2016).
- It is a mutual goal between all partners to assist TFCG in becoming a self-sufficient CBO and concession manager by 2029, the end of their contract's first term (Ya'axché leadership, Interview, November 2019)

CO-MANAGEMENT

Co-management is a formal arrangement between government and local community stakeholder(s), sometimes with agents such as NGOs, to share responsibility and authority for managing natural resources.

(Gilmour, 2016)

COMMUNITY FORESTRY

Community Forestry is a term describing the process of involving local community members in managing and benefiting from their forests.

(Gilmour, 2016)

4.2 DURATION

The legal terms for the agroforestry concession were approved through Forest Rule 23 in late 2014. Implementation began in 2015 with a renewable contract end date in 2029. The implementation schedule called for two acres to be planted per farmer per year until each farmer reached 10 acres total by 2020. This is a long-term model. On average, cacao trees require three to five years before producing, with productivity lasting for 20 to 40 years (Ya'axché extension, interview, February 2019).

4.3 MEMBERSHIP

The group directory as of December 2018 enlists 31 members—28 men and 3 women—and a total of 26 households. The group has an 8-member leadership board and the construction of the groups bylaws and vision and mission are underway. Currently, members pay a one-time fee of $800 BZE ($400 US) to join, with the option of paying in installments.

4.4 POLICIES

The policies guiding this project were designed to be win-win, benefitting both the ecosystem and the stakeholders, while also being conditional on conservation compliance (Garcia, Ruscalleda, Mcloughlin, & Cal, 2014).

Three documents outline the terms and conditions to which parties committed:

1) Forest Rule 23 Permission to Cultivate, was passed in 2014, granting legal permission for Ya'axché (and its associates) to cultivate inside of MMNFR;

2) The Concession Management Plan, was signed in 2015, outlining Ya'axché's management and implementation strategy;

3) The Conservation Agreement was signed in 2016, between all parties (Ya'axché, FD, TFCG), establishing the conservation rules and regulations to be followed within the concession

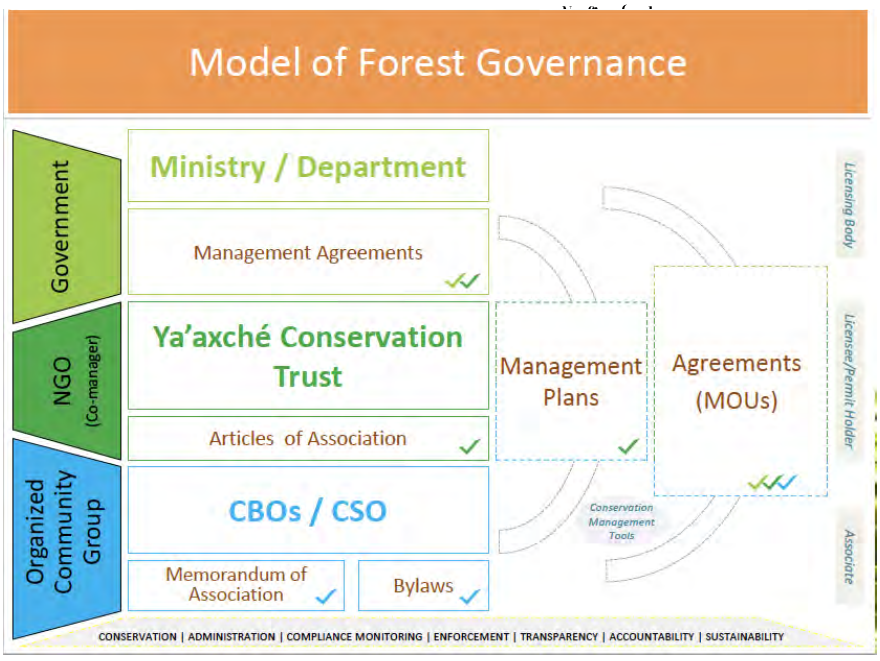
Table 1: Concession Permit Rules and Regulations

50% permit area remains natural forest with original canopy	50% can be contributed by cacao	Annuals cover no more than 10% of permit-area	Minimum 60% shade for first 5 yrs (except annuals)	Forest canopy never cleared to below 30%	100m riparian buffer zone left undisturbed
No use of agro-chemicals	Native cacao species only	No artificial irrigation (except in nursery)	No permanent structures	Boundaries to be clearly maintained	Group assists in preventing & reporting forest fires & offenses

(Ya'axché Conservation Trust, 2016)

The MMNFR agroforestry concession is a multi-stakeholder community forestry model that integrates multiple objectives benefiting the community, forest managers, and the environment. This model could be replicated with CBOs in other protected areas.

Figure 1: Concession Conceptualized Model



(Requena, Garcia, & Vasquez, 2018)

5. IMPLEMENTATION

In 2014, in preparation for establishing the concession, key leaders and staff traveled to Uaxactún, Guatemala to learn from established community concessions. It was here that leaders were able to see what it looks like for a community group to access and manage a protected area sustainably. Key members of the board of Uaxactún also came to Belize to share their experience with the entire community of Trio and TFCG. This exchange built the necessary vision for the group.

TFCG members had no prior experience in cacao farming, agroforestry, or organic techniques, therefore training and capacity building were given significant investment in the early stage of this model. The concession management plan outlined step-by-step how the concession would be implemented and trainings covered each step of this implementation.

TFCG's primary implementation activities would include:

- Nursery: construction, maintenance, and cultivating seedlings
- Preparation: felling trees for proper shade management and under-brushing dense vegetation
- Planting: transplanting seedlings to subplots, setting rows, and maintaining young crops
- Plot maintenance: controlling weeds, pruning, forming cacao canopy, and managing shade
- Harvesting: picking pods, breaking pods, and transporting wet cacao seeds

TFCG also built an annual crops section, repaired the current entrance access road, built two bridges, and repaired one bridge during implementation of the concession.

Table 2: The implementation timeline (a two acre subplot is added each year "Y")

Year 1	Plant Y1	-	-
Year 2	Plant Y2	Plot maintenance Y1	-
Year 3	Plant Y3	Plot maintenance Y1, Y2	-
Year 4	Plant Y4	Plot maintenance Y1, Y2, Y3	Harvest Y1
Year 5	Plant Y5	Plot maintenance Y1, Y2, Y3, Y4,	Harvest Y1, Y2
Year 6	-	Plot maintenance Y1, Y2, Y3, Y4, Y5	Harvest Y1, Y2, Y3...

Photos by Maximiliano Caal

5.1 ANNUAL CROPS

An annual crops section was planned into this concession model with special permission from FD so that members could plant and harvest crops for subsistence and local sale while waiting for cacao to mature and generate income. This diversifies the farmer's assets and improves climate resilience by providing a safety net from crop failure and market shocks.

One major setback was the failure of the vegetable greenhouse in 2016. According to Ya'axché staff and TFCG members, a lack of expertise in greenhouse work, especially in natural pest management, contributed to some greenhouse annual crops failing. Although many farmers wanted to grow annual crops they realized that as the demands of cacao work compounded, they did not have enough time to do both. Road conditions, distance to the annual crop section from cacao plots, and river flooding before the main bridge was built, also presented challenges. Despite these obstacles, in 2018, at least eight members harvested organic food crops in addition to cacao. In 2019, five more members plan to join them. In a focus group meeting, TFCG board members expressed their want for this project component to continue because of its essential role in providing household food.

5.2 PLANTING

In 2015 and 2016, all active members stayed on schedule with planting, working mostly as a group. In 2017, many farmers began to fall behind pace. Due to differences in pace and work effort, farmers began operating more independently thereafter. In 2018, 13 members did not complete their scheduled planting and struggled to keep up with plot maintenance. Twelve members stayed on schedule (8 acres) and four members worked ahead of schedule (10 acres). Two members were new as of 2017 and are currently working ahead of pace. As of December 2018, TFCG planted 240 acres according to the plot assessment conducted for this case study.

5.3 PLOT MAINTENANCE

Proper maintenance, including cacao canopy formation, clearing of vines, pruning, proper shade, and weeding is associated with plots exhibiting the highest production levels and is important for compliance to the agroforestry model. During the plot monitoring assessment in November, 2018, most first-year plots (acres 1 and 2) for each farmer, scored "good" or "excellent." These plots had sufficient shade trees in the overstory and were cleaned of weeds and vines.

Figure 2: Photos of well-maintained plots (Photos by M. Beaton, 2019)

The plot assessment also indicated that plots for acres 5 through 8, had maintenance issues, affecting both forest conservation and cacao production.

- most of these plots exhibited less than 60% shade cover
- 8 subplots were cleared to less than 30% of the original canopy
- 6 plots were labeled abandoned

According to TFCG leaders, as work compounded it became hard to keep up with. In addition, the felt-need for cash income at home, created a dilemma for many members. Those members that had some outside income generation but still enough time to spend in their plots were most successful. Additional disengagement may have been due to what occurs around the plots. Threats along the boundary, and slow government response, may have made members question the value of their work and certainty of their future.

Regarding shade, farmers and extension officers have observed that 60% shade is too much and trees are producing more with less shade (around 30 to 40%). Being new to cacao farming and agroforestry, some members may have wanted to experiment with jumping to a lower percentage of shade in hopes of greater production and more efficient felling. However, subplots with too much sun, (less than 30%) are now experiencing stunting and increased presence of weeds, especially when trees are young, and this practice goes against the conservation agreement to conserve original canopy. These plots will be focused on by extension officers for the importance of the forest and biodiversity moving forward. The group has made efforts to address abandoned plots, including through assisting the managers of these plots, considering sanctions, and devising group work schemes.

Moving into 2019, Ya'axché and TFCG will delay planting acres nine and ten for those that have yet to plant so that farmers can focus on maintenance and improved management in their established plots. More strategic and consistent monitoring will be key. Finalized TFCG bylaws will put in place structures to address noncompliance to agreements signed. A future session on green laws will remind the group of their obligations to the conservation rules and regulations to which they are responsible.

Figure 3 clockwise from top left: over-felled plot, cacao tree with too much sun, abandoned plot, over-felled plot (Photos by M. Beaton, 2019)

5.4 HARVESTING

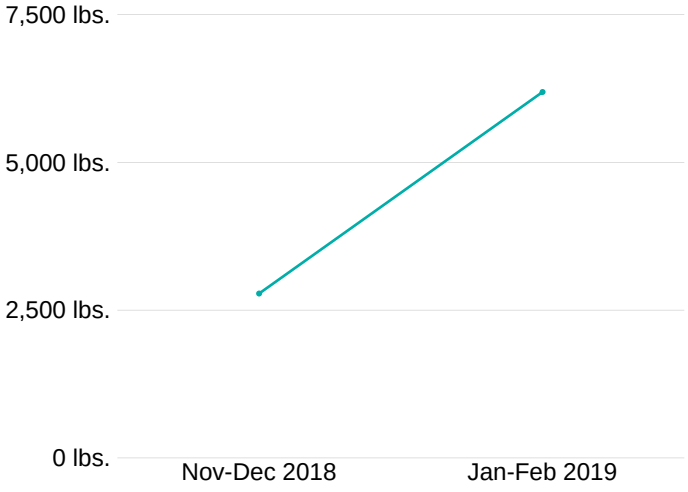
In November 2018, Mayacert audited and approved TFCG's organic certification. The first harvests for sale also began during this time. By the end of 2018, at least 22 members had harvested and sold a total of 2,781 pounds of cacao to a local organic buyer at $1 BZD per pound ($0.50 USD per pound). This sale price could increase with more bargaining power and a TFCG harvesting committee was formed in February 2019 to work on this. The most productive first year 2-acre plot contributed 703 pounds and the least productive plot contributed 2 pounds during this time. Given the large variability among member production levels, there is immense opportunity for increasing group yields as more farmers commit to tending their plots. One group member testified to his decision to quit his other job and put all his effort into his plot, saying-

"the trees want to produce"

(TFCG member, monthly meeting, Jan. 31, 2019)

In 2019, production increased. The largest single harvest per farmer per week occurred in the first week of February 2019 at 375 pounds on a 2-acre subplot. By the end of February total group production reached 6,191 pounds (1,616 in January and 4,575 in February). February is at the beginning of the peak productive season so harvests will likely increase (note: in Belize, the *peak* productive season is February through June but cacao has shown to produce year round). As each farmer's *additional* 2-acre plots begin to produce over the next four years, total harvests could multiply by up to five, since each farmer has five 2-acre subplots.

Figure 4: Harvests in Nov/Dec 2018 & Jan/Feb 2019



6. ACHIEVEMENTS

6.1 POLICY

Ya'axché contributed significantly to the planning and preparation of this model by preparing maps and spatial data, coordinating meetings with FD and the community, and creating a detailed case for the agroforestry concession. Unlike extraction-based concessions, such as logging, the agroforestry concession required a new set of guidelines for how to sustainably cultivate a crop within a protected area forest system and effectively include the local community. When "Forest Rule 23 Permit to Cultivate" was approved and signed, it was a major achievement, paving the way for new integrated solutions to forest management in Belize that include multiple stakeholders and yield multiple benefits. The policy set an important precedent for Belizean conservation and created a model that could be replicated.

6.2 CONSERVATION

Under the conservation agreement, no chemicals are used, riparian zones are respected by 100m on all sides, no cattle or domesticated animals are permitted, and no fire is used (except for a controlled burn used to clear the annual crops section initially). TFCG members no longer use slash and burn techniques, rather have learned a new skill-set in climate-smart agriculture and agroforestry. Leaders report that there is a transformation happening in the group because they are practicing and "getting better" at this type of farming; members are excited about wildlife sightings and their ability to protect their soil (Leadership board participants, focus group, Dec. 12, 2019).

The de-reservation along the border of the concession has served to highlight how unregulated human activity is a threat to PAs and farmers are experiencing this first-hand. In 2016, fire from agriculture in the de-reserved area spread into the concession, burning two acres of cacao. On multiple occasions, cattle from bordering ranches broke into the concession and ate vegetation. Agrochemical-leaching from the de-reservation could also threaten the groups organic certification. As TFCG experiences these threats to their crops and to the forest in which they grow, they specifically want more mechanisms to be put into place to protect against them. This has sparked discussions about the importance of a "buffer zone" around protected areas and serves to illustrate that country-wide, PAs should be protected from unregulated de-reservations along their borders (sample de-reservation land-use plan in Appendix 10.1).


Photo by M. Beaton

Soil

In an independent focus group, five board members recalled from their former farming experience that the use of chemicals changes soil over time, eventually making it "hard and dead." They mentioned that, even with the use of chemical pesticides, other pests new to the area become a problem. When asked if they would use agrochemicals such as pesticide, herbicide or fungicide spray in their cacao plots if given the chance, leaders responded that even if they were allowed, they “couldn’t use them,” because “they have to protect their soil” (Leadership board participant, focus group, Dec. 12, 2019).

Transect monitoring

Ya’axché extension officers, rangers trained in biodiversity monitoring, and TFCG members have confirmed the occurrence of important endangered species in the concession area, including: Jaguar, Harpy Eagle, Baird’s Tapir, Yucatan Black Howler Monkey, White-lipped Peccary, and Red Brocket Deer. They have also noted the increase in large flocks of Scarlet Macaws (a locally endangered species) of up to 30 to 40 birds. Other important bird and mammal species in the area include the Spectacled Owl, and Collared Peccary. Two transects and a camera trap have been set within the concession to monitor and evaluate the presence of key species and a full impact assessment will be carried out.


Photo by Ya'axché


Photo by Panthera, Ya'axché, UB-ERI

Freshwater monitoring

The concession has assisted in regulating a 100m riparian buffer zone, which is now protected and monitored by TFCG members. Riparian buffer zones, such as the one designed in the concession, are an efficient natural method to control nonpoint source pollution (Megahan & King, 1985). From 2015 to 2017, four samples were collected to monitor water quality at two sites within the MMNFR concession area over the course of two years. The overall rate of water quality for these two sites remained in the excellent and good range during this trial (Bol, 2017). Research concluded that the agroforestry concession had not made any adverse impacts to the water quality during the study period (Bol, 2017).

Greenhouse gas (GHG) emissions

In comparison to monocultures such as pineapple, banana, and other slash-and-burn farming bordering the forest reserve, greenhouse gas emissions can be assumed to be lower in the agroforestry concession. Cacao and shade trees sequester CO2 from the air, storing it within trunks, branches, roots, and leaves of trees. The slash-and-mulch (no-till) method, allows living organisms to remain within the soil, also increasing carbon storage. This model eliminates GHG emissions associated with agrochemicals leaching and releasing into the air and minimizes the release of GHGs from soil degradation. A full calculation of GHG reduction has yet to be carried out.

Deforestation

Figure 5: Agriculture causes deforestation in the de-reserved zone along the MMNFR concession border

Location	Deforestation rates (percent mature forest/year)				
	2017	2016	2015	2014	2013
MMNFR	0.12	0.11	0.05	0.01	0.05
De-reserved zone 2006	4.21	0.94	1.19	0.59	3.03
De-reserved zone 2015	4.54	4.35	2.86	1.71	4.03

Table 3: Deforestation rates 2013 to 2017 (Voight, 2018)

The deforestation rates within the PA including within the concession zone, are significantly lower compared to the de-reserved zones next to it. This comparison indicates a potential improvement in the type of anthropogenic activity being used in the concession zone compared to the de-reserved zone in terms of impact on forest cover. Within the concession, climate-smart agroforestry methods are creating less disturbances to the forest landscape than slash and burn practices, agrochemical practices, and cattle ranching employed in the adjacent de-reserved zones as pictured in figure 5.

The presence of TFCG along the boundary of MMNFR and Trio may be discouraging illegal logging and agricultural encroachment into MMNFR. Ranger monitoring reports show minimal illegal activity here but increased activity further north in other buffer communities (Ya'axché leadership, interview, October 2018). The formal control and regulation within the concession, including the accountability of all parties to follow conservation rules is an improvement from land-grabbing in de-reserved zones where Ya'axché measures the highest rates of deforestation. Since the concession area has transitioned from a logging concession to an agroforestry concession, many timber species are regenerating (Voight, 2018).

6.3 LIVELIHOODS

Livelihood improvements are occurring through increased economic assets, increased technical skills, rights of access to land, access to organic food production and improved nutritional sovereignty, increased climate resilience, community building, leadership development, and a new sense of stewardship and self-determination.

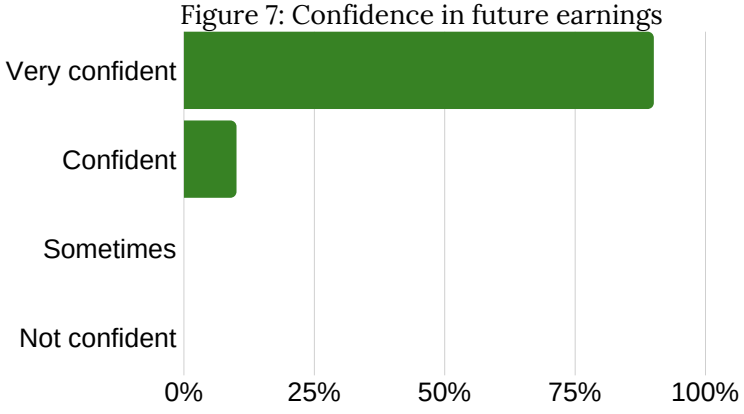
Perceived benefits

In a focus group session, five TFCG board members shared that they are confident in the concession benefits belonging to them and the community. In the long-term, board members believe that the concession will stimulate the local economy and lead to improved community development. Their dream is that within seven to ten years the concession will have encouraged an increase in small businesses, children in higher education, transportation quality and access, and improvements in home structures (Leadership board participants, focus group, Dec. 12, 2019).

Economic benefits

As seen in figure 7, 90% of group members surveyed felt “very confident” and the rest felt "confident" that future earnings from cacao would cover their household expenses in the next 5 years. All respondents were “satisfied” and “very satisfied” with current cacao earnings and most respondents were satisfied with the overall concession model (for full survey, see appendix 10.3).

Figure 7: Confidence in future earnings



Recent cacao sales, indicate that, compared to alternative weekly earnings available to group members, cacao earnings will be greater. Figure 8 shows earnings for other other jobs worked by group members based on a 5-day work week compared to the most recent highest cacao sale per week.

Better off than before

In a survey conducted at the first 2019 monthly meeting, 18 TFCG members quantified their perceptions of livelihood benefits and their own satisfaction with the concession. Because of the concession, 83% of respondents felt that they were better off than before, as illustrated in figure 6 (full results in appendix 10.3)

Figure 6: Better off than before

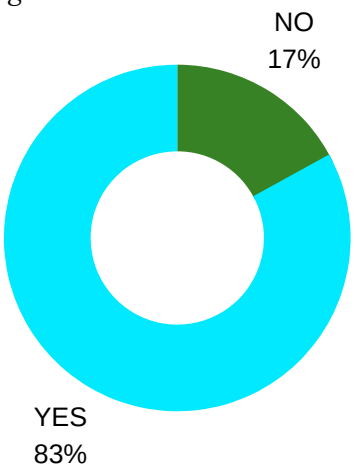
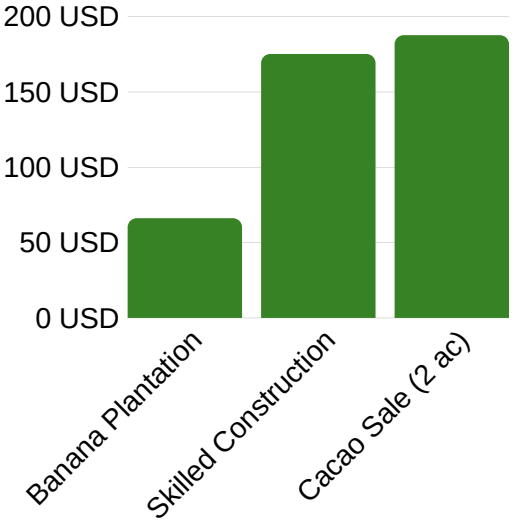


Figure 8: Relative weekly earnings for TFCG jobs worked February 2019



Banana plantation wages at the time of this study, were $26.40 BZD or $13.20 USD per day and skilled construction work was average $70 BZD or $35 USD per day (Personal conversation, February 2019). Weekly, these figures are $66 USD and $175 USD based on a 5-day work week. The highest grossing weekly cacao sale exceeded these earning at $375 BZD or $187.50 USD per week (see figure 8). As the harvest season progresses through June, baseline figures like these will likely increase. Over the next few years, sales could also multiply up to five times as the remaining four 2-acre subplots reach production. Please note: cacao sales data is insufficient for full analysis; figures represent baseline data being presently gathered.

Trainings and Capacity Building

TFCG members have attended a series of technical and organizational trainings, contributing to capacity building and skills development for members. Technical and organization trainings covered the following:

- Nursery establishment & management
- Plot design & transplanting
- Biology of cacao
- Agroforestry
- Cacao pest, disease management
- Organic fertilizer, biological pest control
- Shade management
- Cacao tree health, pruning
- Under-brushing, directional felling
- Fire management
- Community ranger training (8 members)
- Bylaws & regulations
- SWOT analysis
- Conflict resolution
- Inventory & record keeping
- Internal governance structures
- Introductory computer and GPS mapping
- Project management
- Finance
- Leadership
- Governance


Photo by Maximiliano Caal


Photo by M. Beaton

Leadership

TFCG has an 8-member board. Some board members have no formal education yet have learned not only the technical skills to do organic cacao agroforestry but also to lead a for-profit CBO (small business). The opportunity for members to step into leadership highlights this model's ability to empower individuals socially and create streams of upward mobility.

The leaders passion comes from the opportunity to create a business that will benefit them, their families, and the community for the next generation (Leadership board participants, focus group, Dec. 12, 2019). The concession is an opportunity to dream and plan long-term for a better future.

Access to rights to land

TFCG members have formal access to forested land and the opportunity to work sustainably on this land for cash income while also respecting the forest. For some members, respecting the forest and natural resources is an important part of their livelihood, but the socio-economic structures to do so are not in place. The community agroforestry concession model is one pathway to allow members to earn a cash income while also becoming stewards of the forest and living in balance with nature as hallmark to their livelihoods.

> "In the Maya view, when you need something from the forest, you ask for permission first, because the forest is living and has guardians. What you ask for is for subsistence and it is sustainable for the forest because you do not take excess. First, you prepare yourself by fasting, then you burn incense made of copal tree sap and offer prayers. Today, this form of living is difficult because life is business-driven so communities need to sell natural resources for money and profit. In the concession, we can participate in the cash economy while still respecting the forest."
> (Group member, interview, translated from Q'eqchi', Jan. 2019).

Photo by M. Beaton

7. LESSONS LEARNED

Annuals

In the MMNFR concession, the distance of the annuals section from farmers cacao plots, threats from border cattle eating these crops, as well as inconvenient road access, and flooding were all barriers to growing and harvesting abundant organic annual crops. Organic pest management and cultivation methods may have required more time and training initially, as organic methods represented a shift from the traditional slash-and-burn methods and the chemical pesticides, herbicides and fungicides normally used in Trio's plantations. The annual crops section was a valuable component that aimed to assist households financially while waiting for cacao to produce and increase access to organic nutrition. Further exploration on how to increase success for this component and on other ways to diversify the agroforestry concession model to include multiple value streams will benefit households, especially in the short-term while waiting for long-term financial benefits.

Workload

TFCG leaders shared that ten acres was an ambitious goal and created its own hurdles, especially in plot maintenance as work compounded. Despite their initial request for up to 30 acres each (Garcia, 2013), their feedback in the focus group (2019) was that 5-acres would have been enough for the first phase. After that was fully developed and harvesting began, more could be added. Staff and farmer feedback also showed that from the outset, there may not have been an accurate and clear idea about the time and level of work required for this scale and type of cacao agroforestry. Recording and evaluating the implementation and harvest timeline from this concession will assist in creating more clear and realistic expectations and goals for future concessions and the CBOs involved. Other factors affecting farmers work were the distance that they must travel to get to their plots, lack of transportation, poor road quality, and working additional jobs to cover household expenses.

Photo by M. Beaton

Canopy conservation

Consistent monitoring and a formalized protocol from the Forest Department and Ya'axché for maintaining at all times a minimum of 30% original canopy, will help group members remember their role in maintaining a healthy forest cover. The practice of tagging trees for felling was discontinued in 2017; however, Ya'axché is considering returning to this as a best-practice for implementation. In March and April, Ya'axché will begin scientific research on the proper percentage of shade for cacao in this context. However, the conservation rule for maintaining 30% original canopy should remain distinguished from discussions on shade and prioritized first and foremost.

Financial return

Slow financial return from the concession was a major theme from Ya'axché staff and TFCG interviews. Most members will not see significant financial return from cacao until 2019 or 2020, four to five years after planting. While the annual crops section was planned into the model to bring in cash and valuable household nutrition in the interim, the behaviors and feedback of most members showed that this component was not comparable to the return that farmers would receive from other local work. Consequently, many farmers in the group spent their time working other jobs in order to secure a regular cash income. According to TFCG president, as of February 2019, 12-15 members worked at the local banana plantation, six worked in local construction, and 10 had no other jobs except for one household that has a small shop. In the future, researching local wages, creating basic household budgets and establishing realistic financial targets to cover those budgets could help more members stay engaged and manage their time and expectations. Tracking sales data to create more knowledge around expected financial return once cacao begins to produce will increase drive and determination to reach harvest.

Financial analysis

Ya'axché estimates that at least 2.3 million BZD (1.15 million USD) in grant funding and much more in in-kind contributions from both farmers and staff have been invested into this concession. A cost-benefit analysis will serve all stakeholders in improving the cost-effectiveness and efficiency of the model and serve as a tool to clarify the value of this model.

Boundary line conflicts

The Belize government should work in partnership with future concession stakeholders to ensure that de-reservations do not create unexpected threats along boundaries in areas where concessions are zoned for implementation. Ya'axché sought to work with the village council and the government to discuss land-control, tenure and sustainable land-use, within the surrounding de-reserved area (see appendix 9.1) and plan in a 100m buffer zone from the onset, but actions were not taken and were outside of Ya'axché's jurisdiction. In the future, more partnership from the government and village council will assist in protecting the concession area and ultimately the forest reserve as a whole from threats along the boundary. Future concession designs will place plots more than 100 meters from the border of the PA in order to protect organic produce from threats.

Patrolling and enforcement

The importance of patrolling and enforcement on multiple levels is a major lesson-learned. Initially Ya'axché provided community ranger training to eight TFCG members (Mcloughlin & Coals, 2014). Patrols by FD officials and Ya'axché rangers would have added an extra level of compliance enforcement. This is especially important given that some TFCG members have hired assistants that are not trained in climate-smart agricultural practices and are not aware of the conservation rules and regulations. These patrols would boost confidence in the Trio community that rules were being enforced equally for everyone. Strategic patrols would also have served Ya'axché in monitoring and evaluating the impact of the concession on illegal activity.

Farm data reporting

Creating clear systems to gather critical information about what is happening on the ground will help both TFCG and Ya'axché get the data they need to highlight their success. Of all 18 Ya'axché former and present staff surveyed, most wanted to know about farm progress such as how many trees were planted, how many acres were planted, survival rates, health of trees, harvest amounts, and sales. From the project-start, being clear about reporting requirements for CBO members (TFCG), the managing partner (Ya'axché), and the government partner (FD) will allow this data to be recorded and analyzed more systematically.

Monitoring and evaluation

While M&E was suggested from the consultation phase (Garcia, 2013), this was never carried out fully. With more time and resources for up-front planning, Ya'axché has in place the right teams to do strategic M&E and the results could make a significant contribution to research and policy. For this model, data that reveals how the concession is associated with changes in biodiversity, forest cover, illegal activity and indicators for livelihoods will provide key quantifiable evidence for reaching stated goals. This data should be collected at baseline and endline and within target and control zones, to see how the concession is impacting the immediate area compared to the zones around it. In a staff survey, most former and current Ya'axché staff requested these data points as ways to understand the progress and results of the concession (full results in appendix 10.2).

Photo by M. Beaton

Partnership and autonomy

A key theme from the staff survey involved navigating how to support TFCG while also allowing them to become autonomous. According to the focus group, TFCG holds a sense of ownership over their plots and in their vision for their community. Increasing autonomy for TFCG in handling compliance issues might require more capacity building for leaders before the project-start while also strategizing with leaders and members on how to budget their time and finances during implementation. It also might involve finalizing bylaws early-on. Creating and reiterating clear roles, rules, expectations and commitments and monitoring these from the project-start will improve each member's effectiveness at operating independently. Having individual members sign individual concession agreements and following-up individually with members once and a while might also serve to increase the ownership and capacity of each member. Increasing partnership, according to surveys and focus group themes, involves improving transparency about funding and planned activities from Ya'axché to the group and relatedly, improving communication and clarity. More involvement from the Forest Department as an important compliance enforcement stakeholder will increase accountability across the board and help the tripartite partnership to flourish.

Photo by Maximiliano Caal

8. CONCLUSION

Ya'axché believes that communities need access to local forests, should have access to local forests, and should benefit from this access. Of those surveyed, 100% of all Ya'axché former and current staff support community access to protected areas as beneficial to both livelihoods and conservation (appendix 10.2). The agroforestry concession is a new pathway forward for protecting natural spaces in Belize. It offers valuable land access to rural households in need, while also creating a regulated, climate-smart zone between PAs and nearby threats such as fire, agrochemicals, cattle and encroachment along boundaries. Learning from and improving this model is therefore key. Overall, the agroforestry concession has contributed positively to most TFCG members' lives. Most members show great commitment even while they face significant challenges with resources and time. TFCG leaders are hopeful when they think about the future and they are allowing themselves to dream about new possibilities for their community.

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A Land Use Plan for the De-Reserved Area in MMNFR

Ya'axché Conservation Trust

June 2016

Background

In July of 2015 a new Statutory Instrument was approved for the Maya Mountain North Forest Reserve (MMNFR). This entailed the de-reservation of more than 5,643 acres of reserve, 3,333 of which were parcelled in 2006 and have been under use since then. This leaves 2,310 acres that are outside of the reserve but have not been parcelled. Despite this fact, farmers from Trio village have been working on these 2,310 acres for the past 5 years. The goal of this document is to establish a land use plan for this area, taking into consideration soil potential for agriculture and previous use.

Area description

1,585 of the 2,310 acres are covered by broadleaf forest as of 2016 (725acres have already been used at some point in time or are being used now). The area is irrigated by the Trio Branch and the Waha Leaf Creek. It has three types of soil: low agricultural potential, medium agricultural potential and high agricultural potential (see Figure 1).

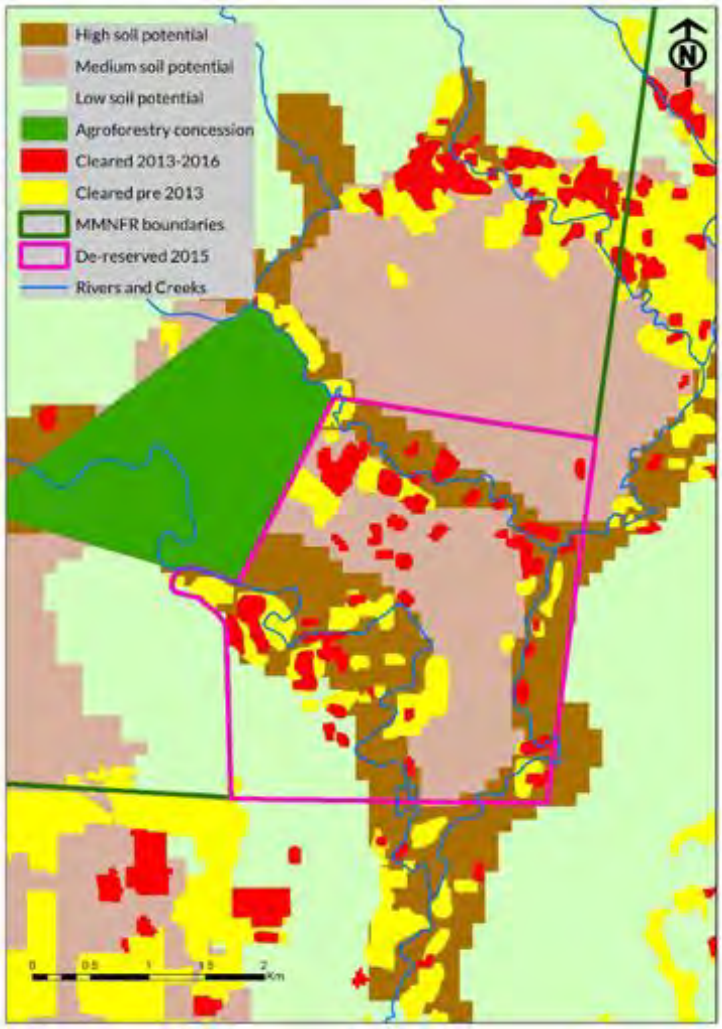


Figure 1. Soil types in the de-reserved area

Buffers

The adjacency of this area with the MMNFR, both with a forested landscape in the north and the agroforestry concession in the west, calls for the establishment of safeguards to avoid damaging the integrity of the forest reserve. 100-meter buffers along the northern and western borders of the de-reserved area are recommended in order to avoid escaped fires and other types of disturbance penetrating the reserve. In the same way, a66-foot riparian buffer, as established by national law,is suggested (see Figure 2).

Zoning

The distribution of soil type calls for a coherent approach when choosing which kind of agricultural activities should take place in different sections of the de-reserved area. By looking at soil types and at which areas have been used in the past, we suggest a zoning scenario as detailed below(see Figure 2). Because fire poses a threat to many sustainable agriculture techniques, fire should not be utilized in the de-reserved area. Slash and mulch techniques are recommended for wamil and young secondary forested areas if these are to be transformed into annual crop agricultural areas. If for any reason fire is used to clear high forest, which is by no means recommended in this document, fire should only be used under safe conditions, that is establishing a 6 to 10 ft fire pass, using directional felling to fall trees towards the area that will be burnt, paying special attention to cohune palms on or near the fire pass, and having at least 10 people for every 6 acres to assist with the burn until all fire is extinguished.

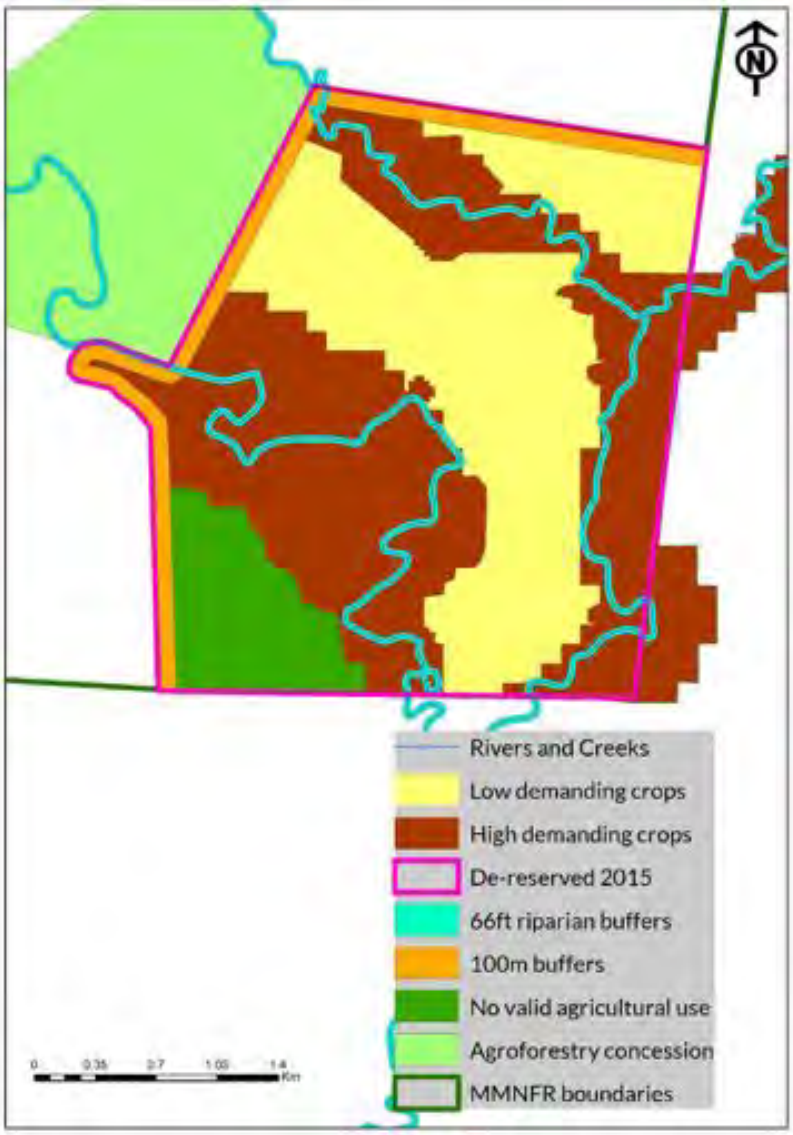


Figure 2. Buffers and zoning

High soil qualityareas

These areas should be utilized for crops that require high soil quality. Cattle ranching and crops that do not require high soil quality should be avoided here in order to maximize use of the high soil potential. Likewise, the use of agro-chemical products is not recommended in these areas as it will contribute to the degradation of high quality soil that, if used sustainably, can provide crops for many years to come.

Areas that have been used in the past should berehabilitated through inga alley cropping (see Annex 1)and subsequently used for continued annual crop cultivation (corn, beans, pumpkin, etc.). These areas can also be used for agroforestry from wamil (described in Annex 1), which would extend the productive life of these areas and help farmers access funds through the growing cacao and coffee markets.

In areas that have not been used in the past,the forest can be thinned for the extension of agroforestry areas (cacao, coffee, cardamom, etc.) using the cabrucca method (see Annex 1).

Medium soil quality areas

These areas should be utilized for agricultural methods that do not require high soil quality in order to reserve the high quality soil for crops that require it.

Areas that have been used already should be rehabilitated through inga alley cropping and subsequently used for continued annual crop cultivation.

In areas that have not been used in the past,we recommend the cultivation of pineapples, plantains, and root crops as part ofthe inga alley cropping system.

If cattle ranching is implemented in the de-reserved area, this would be the appropriate place to locate it. We recommend the promotion of silvopastoral techniques (see Annex 1) with proper fencing to make sure cattle won't damage other agricultural and forested areas. Additionally, pump stations should be established to bring water to drinking areas, and cattle pasture areas should not be located adjacent to rivers (respect 66ft buffer). Proper fencing is also recommended for cattle areas, to avoid cows being attacked by predators or escaping and damaging crops in nearby areas.

Low soil quality areas

These areas do not exhibit the right conditions for agriculture, which is demonstrated by the fact that there has been barely any development in this area in the last 10 years. They offer poor drainage and contain acidic soil types that are very difficult to manage for agricultural production. Agricultural activities conducted here would have less than desirable results. For this reason these areas should be left as standing forest to provide ecosystem services to the downstream communities.

Parcelling

We suggest parcelling in different categories:

Small scale farmers

Farmers who will grow subsistence crops (corn, beans, pumpkins, etc.)as part of the inga alley cropping system should receive 3 acres.

Farmerswho will grow agroforestry crops (cacao, coffee, cardamom, etc.) should receive 5 acres

Farmer groups/cooperatives

Groups or cooperatives should receive 100 acres for the cultivation of crops such as pineapple, banana, cacao, etc. These activities should be carried out through either inga alley cropping or agroforestry, as appropriate. There should be no clear cutting.

Cattle ranching

Cattle ranchers should receive 30 acres. Ranchers should be required to utilize the silvopastoral system, which maintains forest cover rather than clear cutting (see Annex 1).

Annex 1

Inga alley cropping

Inga alley cropping is a method in which nitrogen-fixing leguminous inga trees are planted in rows with annual crops in between the rows. The inga trees add nutrients back to the soil as the annual crops draw them out of the soil, and the fallen inga leaves provide natural mulch as they decompose. As a result, soil fertility is increased, land can be utilized for longer periods, crop yield is higher, and less land is needed for the same harvest. Inga alley cropping can be implemented on slopes as well, since the roots of the inga trees serve well for soil retention. Additional benefits include fewer weeds, firewood, and crops that are more resistant to dry weather.

How is it done?

1. Ideally, you will set up three acres for inga alley cropping that you will use in arotational way (one acre per year). You can also do this process in a single plot.

2. Plant inga trees in rows. Trees should be planted 1.5ft (18 inches)apartwithin the row,and rows should be 10ft apart (see Figure 1).

3. Plant the corn in rows in between the ingarows. Corn can be planted 1 ft apart within the row, with 2 ft separating rows, but these measurementscanbe adapted to the localconditions or a farmer's traditional way of planting. Use the local variety of corn, at 2 grains per hole, as it will allow you to replant the same seeds the next year.

4. When the Inga is around 12-15ft high (which takes 20 months) and its canopy isshading the whole field, cut the tree trunk at around 5ft from the ground. Thisreleases the nitrogen accumulated in the tree's roots into the soil, making it availablefor the corn. Nitrogen is a key nutrient and acts as a natural fertilizer. After thepruning, you can plant the corn in the same way you did in step 3.

5. The tree will start re-growing from the cut. After harvesting the corn, you can move to the next acre of alley cropping, repeat the same procedure, and leave the used one to fallow so that Inga trees can regrow to 12-15ft again.

6. Leave the leaves on the soil, as they will help improve soil quality and prevent weedgrowth. Use the wood for domestic use or to make biochar.

7. You can plant madre-de-cacao on the edges of your plots to act as wind-breakers.

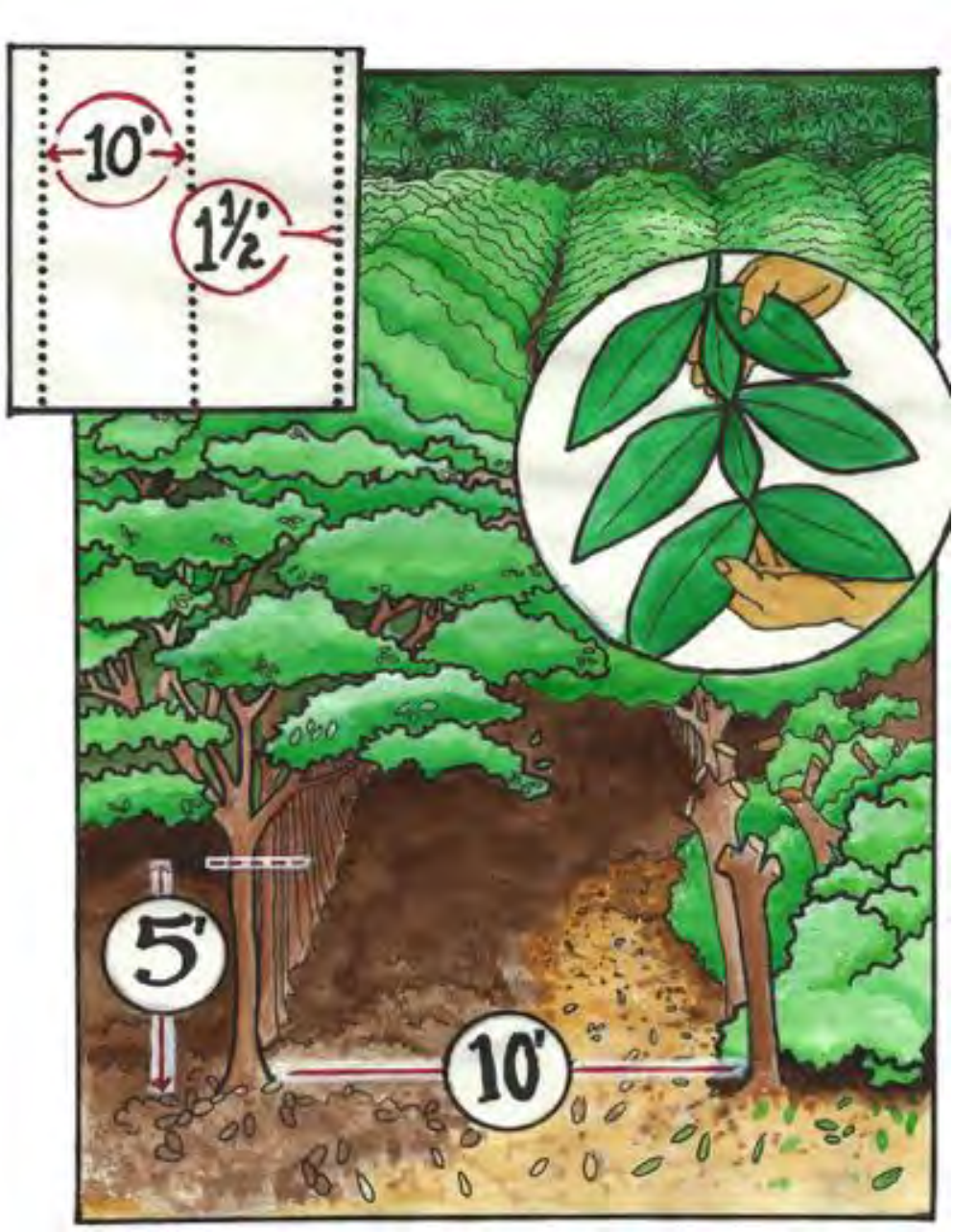


Figure 1. Spacing between inga trees and between rows

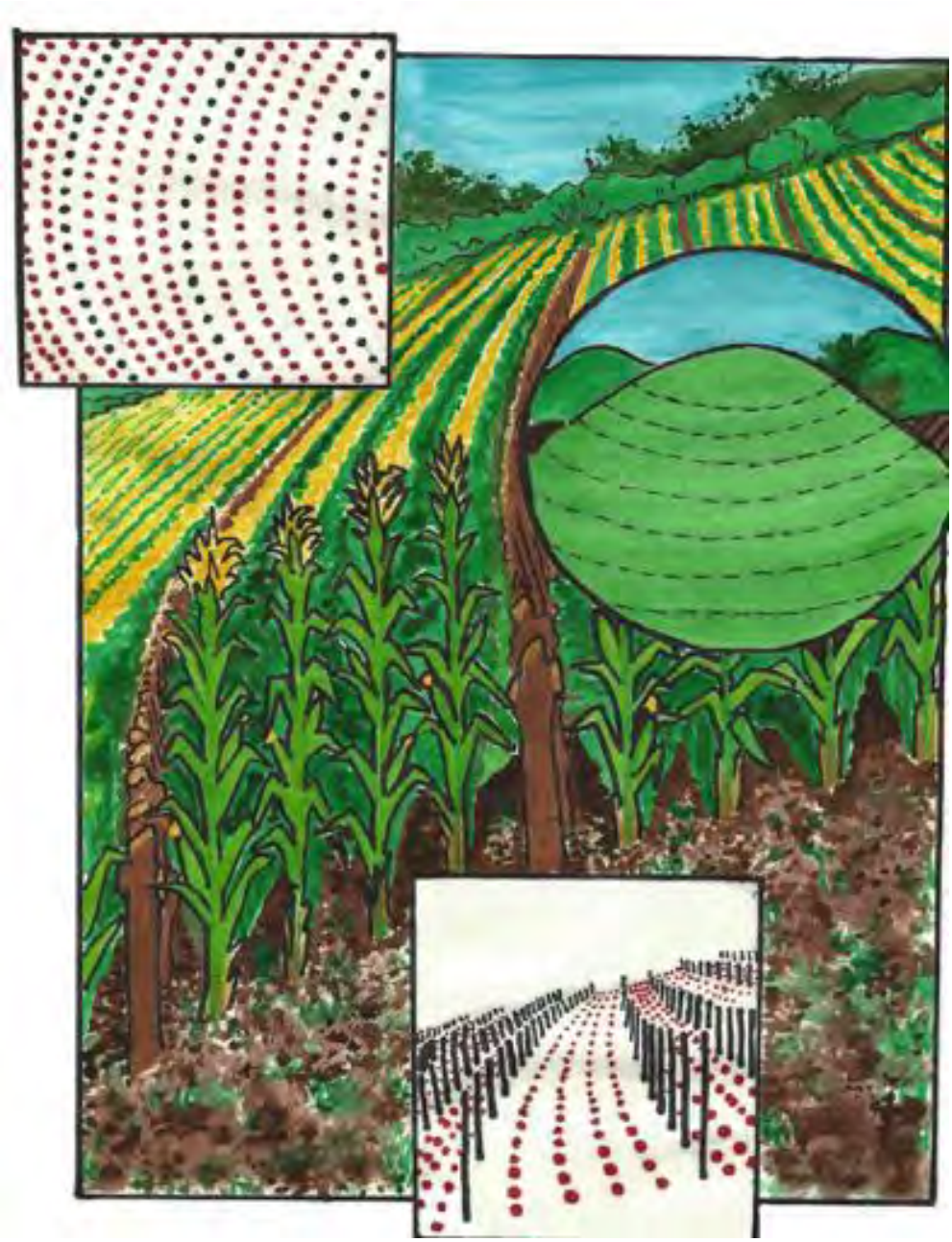


Figure 2. Inga alley cropping on a slope

Agroforestry from wamil

In an area of wamil that was previously used for milpa or cattle, you can clear any existing vegetation (leave cohune trees and any other valuable trees) and establish your cacao or coffee plantation.Years 1 to 5 are very important for the future of your cacao or coffee farm. Take a look at the figure on the next page to understand how your farm should look in years 1, 5 and 10. These are the trees that you can plant at different stages of your farm:

Year 1

1. Pioneer species will create mulch, enrich the soil and provide economic benefit.
They will also provide shade for cacao in its initial stages. These species include bananas,plantains, papaya, pineapple, pigeon pea, cassava, cocoa yam and lemon grass(especially appropriate on slopes).

2. Permanent shade trees provide shade for your cacao, as well asnutrients for the soil and food and income for the farmer. Species include:

   a. Fruit trees: jackfruit, breadfruit, avocado, mango, golden plum, mamey,suriname cherry, golden plum, noni, anonna, peach palm, Malay apple, soursop, and many more.
   b. Timber trees: samwood, mahogany, cedar, rosewood, santa maria, mayflower.
   c. Leguminous trees: leucaena, inga, bukut and mayflower.

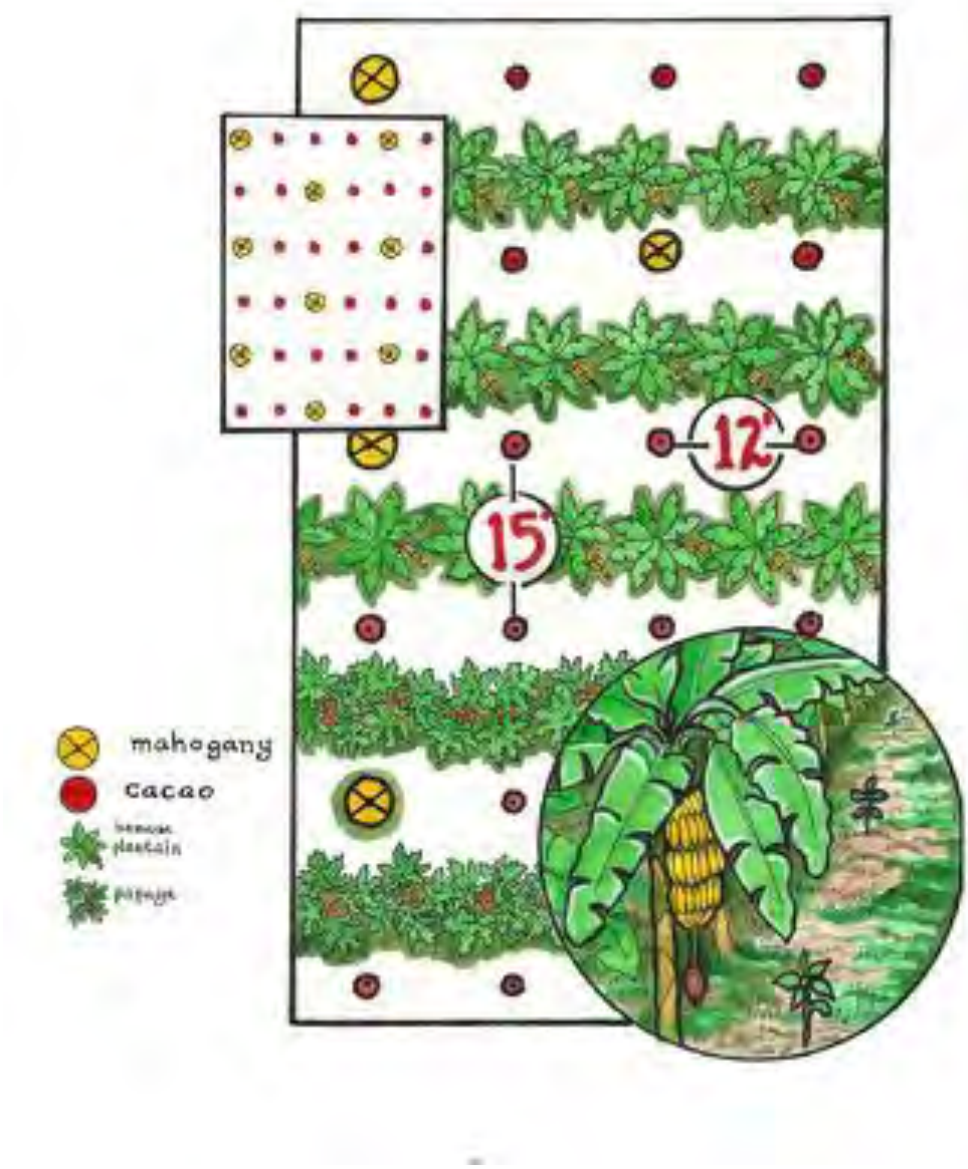


Figure 3. Agroforestry from wamil initial stages.

Year 2
Plant cash crop trees, such as grafted cacao and/or coffee. The shade generated by the plantains and bananas will be enough to plant the cacao/coffee trees under them in a 12ft by 15ft grid.

Years 3-4
Some of the permanent shade trees will have grown high enough that you can remove some of the temporary shade trees like the bananas and the Madre-cacao. At this point in time, shade on the cacao trees should be approximately 60%.

Year 5
Your cacao trees should be bearing by this time, and your shade should be reduced to 40%.

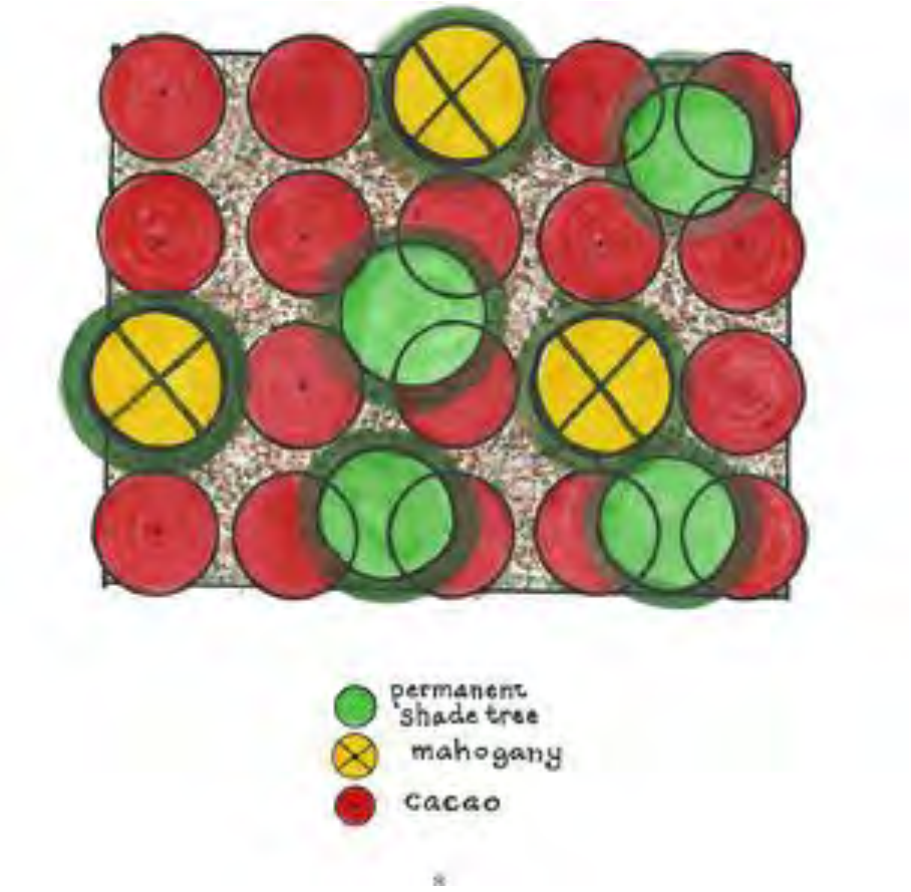


Figure 4. Agroforestry from wamil shade management in mature phase.

Year 10

The cacao will keep on producing, and most of the fruit trees will be producing already. You will need to bring down the shade level to 30% by taking out some of the shade trees, especially the leguminous trees like the inga or Madre-de-cacao.You can start adding more productive plants in your farm, like cardamom, vanilla, ginger, turmeric and black pepper.

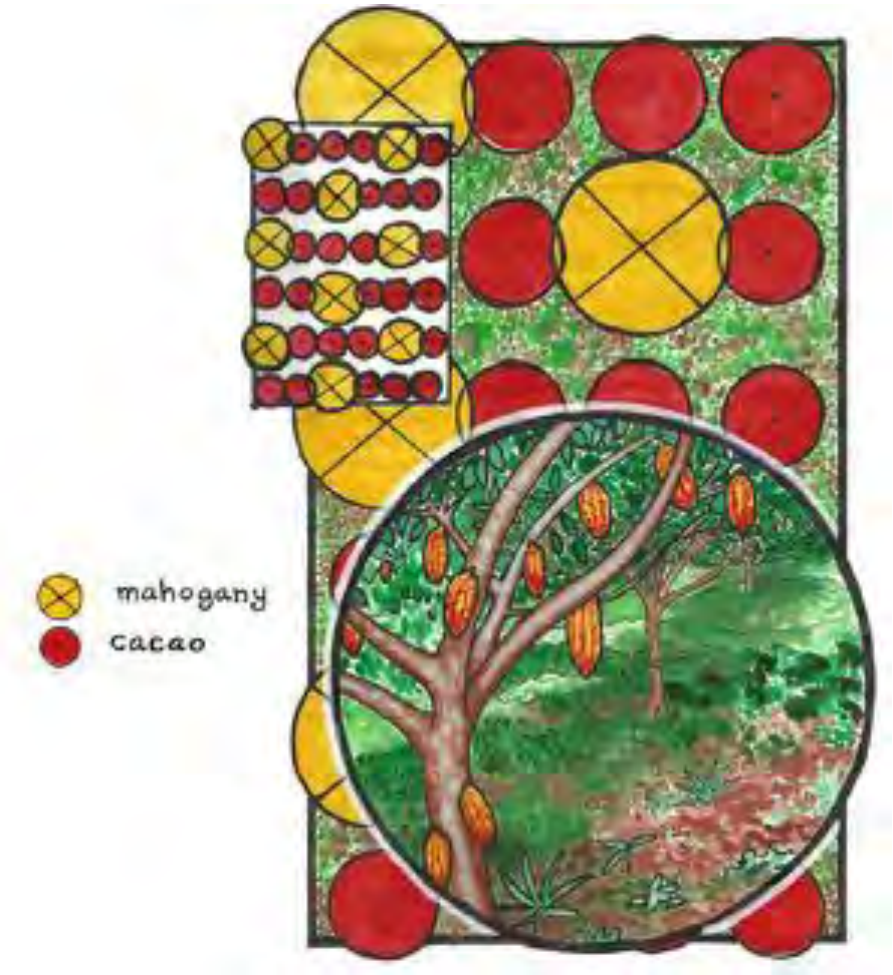


Figure 5. Agroforestry from wamil final stage.

Agroforestry from cabrucca

You can create an agroforestry plot from an already existing forest.The first step is to thin the existing forest so that there is 60% shade on the soil. Leave alleconomically valuable species like cohune, bay-leaf and any valuable timber trees.

Year 1

Thin forest down to 60% shade and plant cacao or coffee trees in a 12ft x 15 ft grid asillustrated in Figure 1.

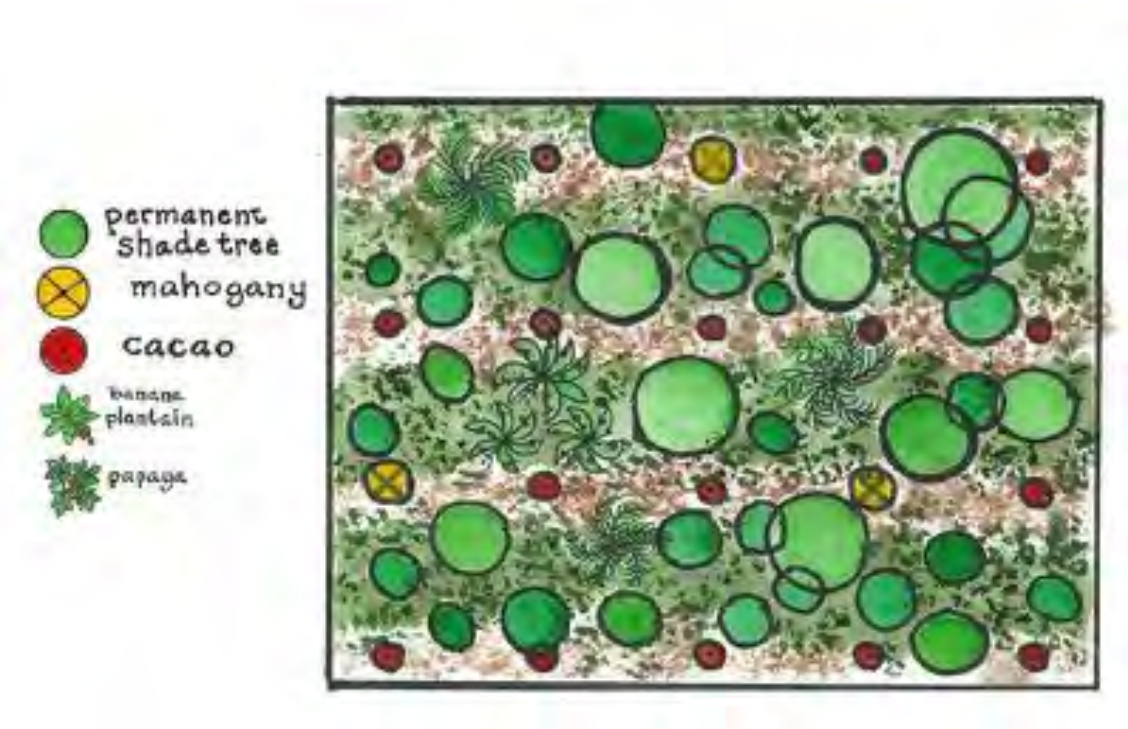


Figure 1. Diagram for year 1

Year 5
Thin forest down to 40% shade depending on local conditions (see Figure 2).

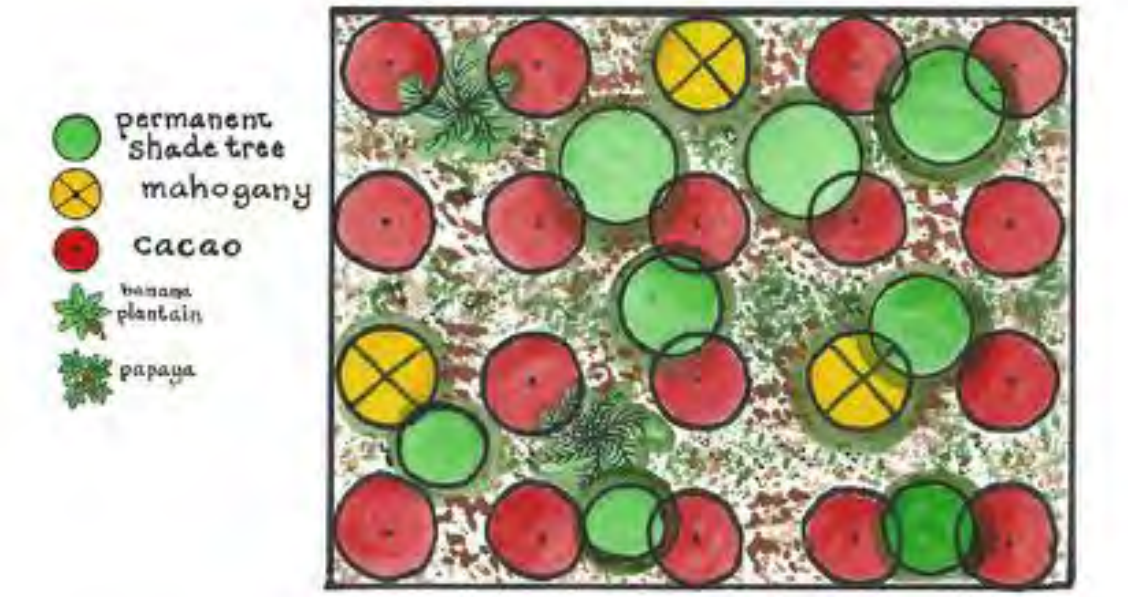


Figure 2. Diagram for year 5

Year 10
Thin forest down to 30% shade as shown Figure 3. Prune cacao trees ona yearly basis.

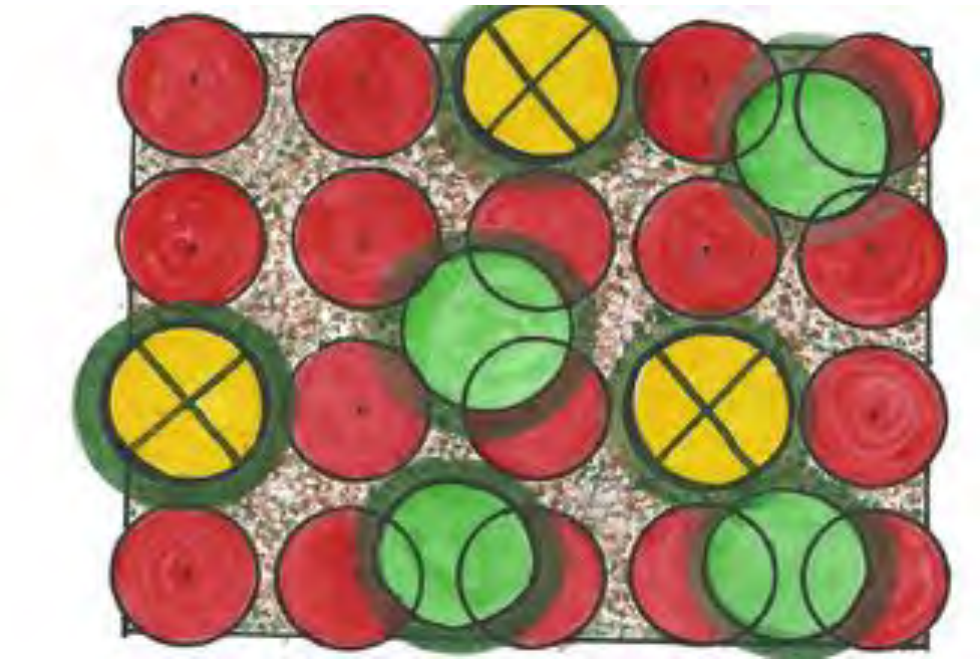


Figure 3. Diagram for year 10

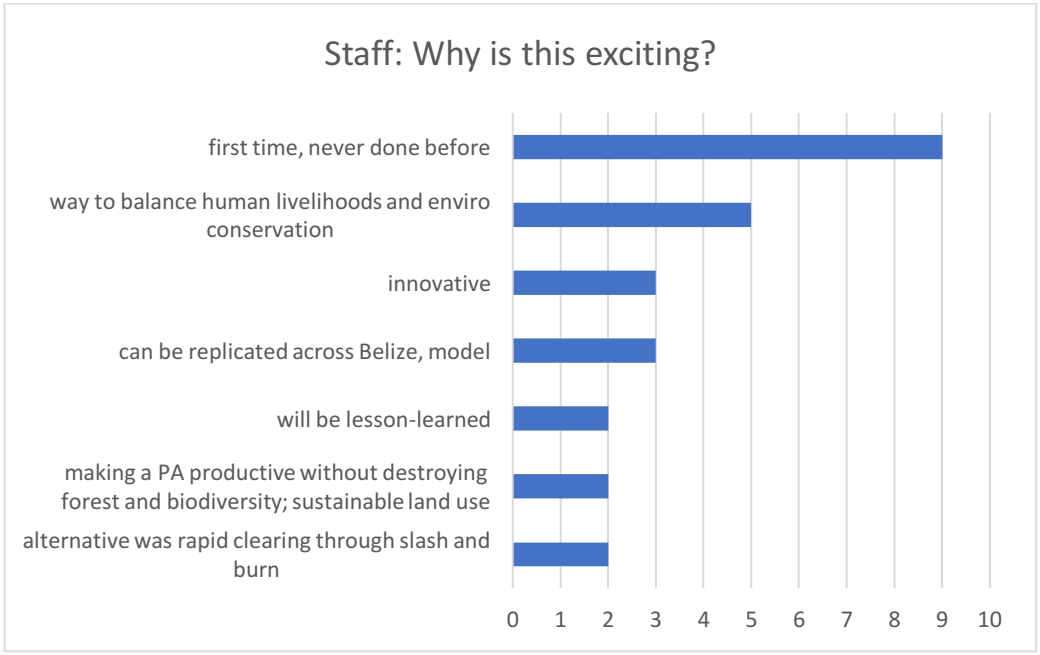
Silvopastoral systems

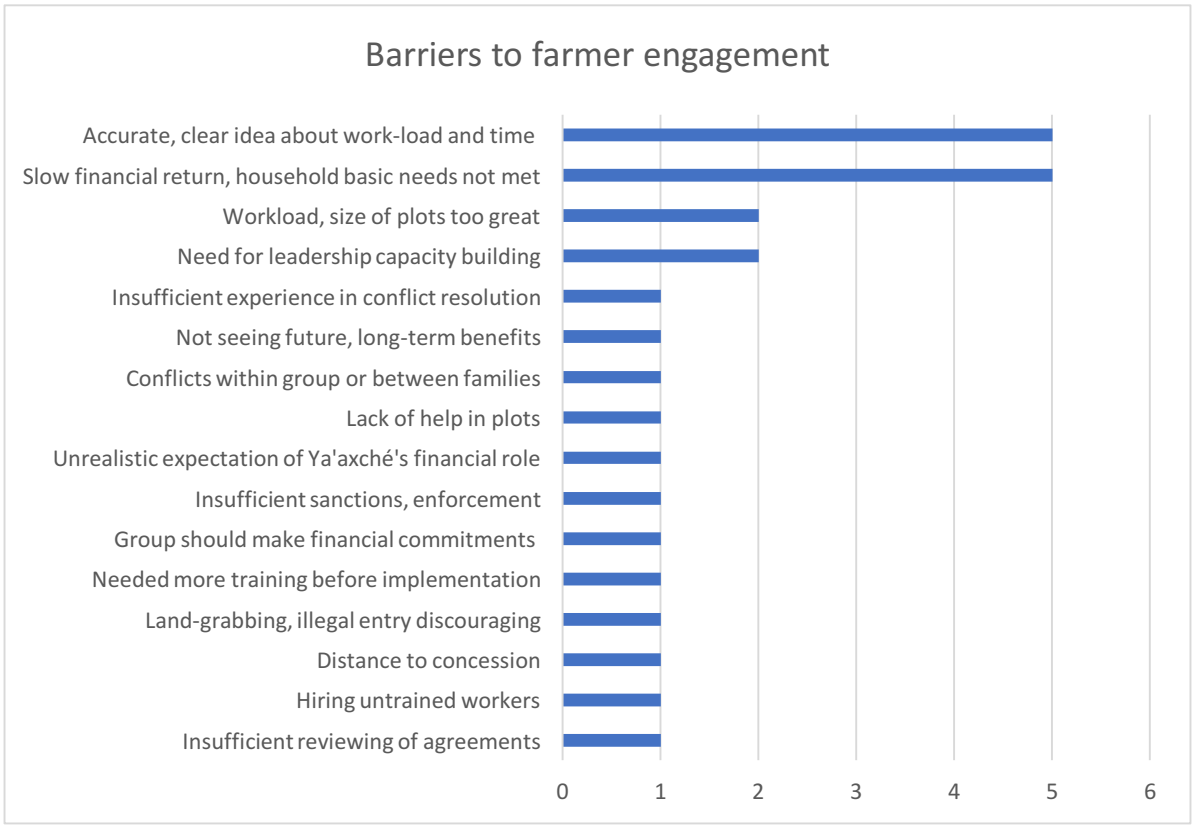
By establishing select forages in a manipulated forest environment, an area can be jointly managed for grazing and timber production. In most forests, the key to successful silvopasturing will be forage production. Levels of forage production will hinge on two factors: having the light necessary for forage growth and response, and proper rotational grazing. Soil fertility should be adjusted to enhance forage development, and light adjusted by reducing tree density and managing tree spacing. It is important to recognize that long-term timber value and silvopasture viability hinge on selecting trees to remain that are appropriate for the site and of high quality. Forages should be selected that match grazing objectives and light availability.

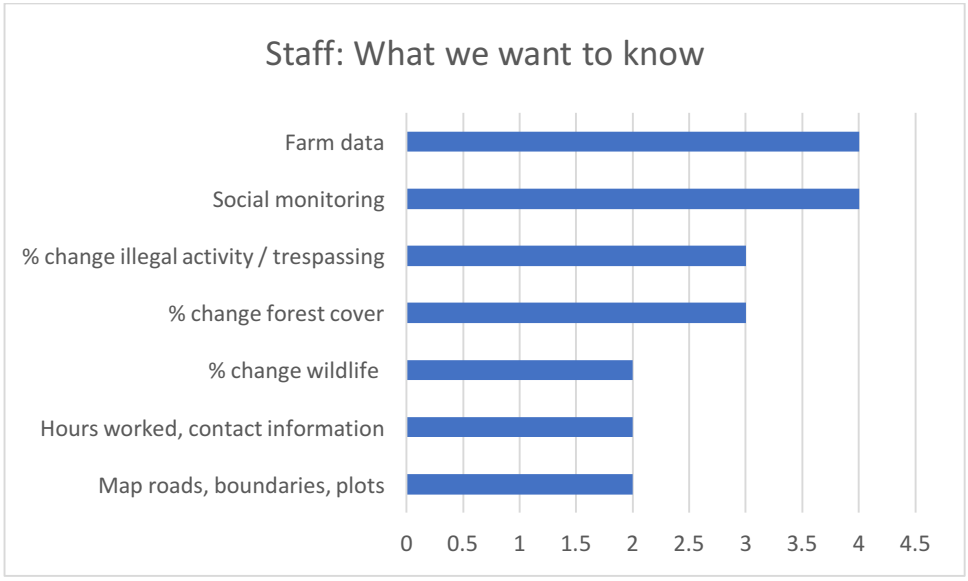
7 Nov. 2018
Meredith Beaton Marx
Staff Survey

MMNFR Concession Project with TFCGA
Ya'axché staff survey

1. What is or was your top highlight from work on this project?
2. Why, from your perspective, is/was this project so exciting for stakeholders including yourself?
3. What was effective?
4. Ineffective?
5. In hindsight, what were some unanticipated challenges or blind spots that were not considered?
6. If this were to be done again, what would you suggest changing?
7. What do you want to know about this project (progress, results, issues)?
8. Farmer work ethic, engagement, & commitment has been discussed as a current problem. What do you think are some of the root causes to this?
9. What is your perception of female farmer participation in this project? What barriers to their involvement have you noticed?
10. What training do you think the Ya'axché team could utilize in order to amplify this project? TFCGA?
11. What is your opinion on accessing Protected Areas for this type of work? This is the first time in history that a PA is being used to enhance a livelihood in Belize and we would like to hear about your perception of the idea.
12. Is there anything else that you would like to share?


Staff: Why is this exciting?
first time, never done before
way to balance human livelihoods and enviro conservation
innovative
can be replicated across Belize, model
will be lesson-learned
making a PA productive without destroying forest and biodiversity; sustainable land use
alternative was rapid clearing through slash and burn
0 1 2 3 4 5 6 7 8 9 10


Barriers to farmer engagement
Accurate, clear idea about work-load and time
Slow financial return, household basic needs not met
Workload, size of plots too great
Need for leadership capacity building
Insufficient experience in conflict resolution
Not seeing future, long-term benefits
Conflicts within group or between families
Lack of help in plots
Unrealistic expectation of Ya'axché's financial role
Insufficient sanctions, enforcement
Group should make financial commitments
Needed more training before implementation
Land-grabbing, illegal entry discouraging
Distance to concession
Hiring untrained workers
Insufficient reviewing of agreements
0 1 2 3 4 5 6


Staff: What we want to know
Farm data
Social monitoring
% change illegal activity / trespassing
% change forest cover
% change wildlife
Hours worked, contact information
Map roads, boundaries, plots
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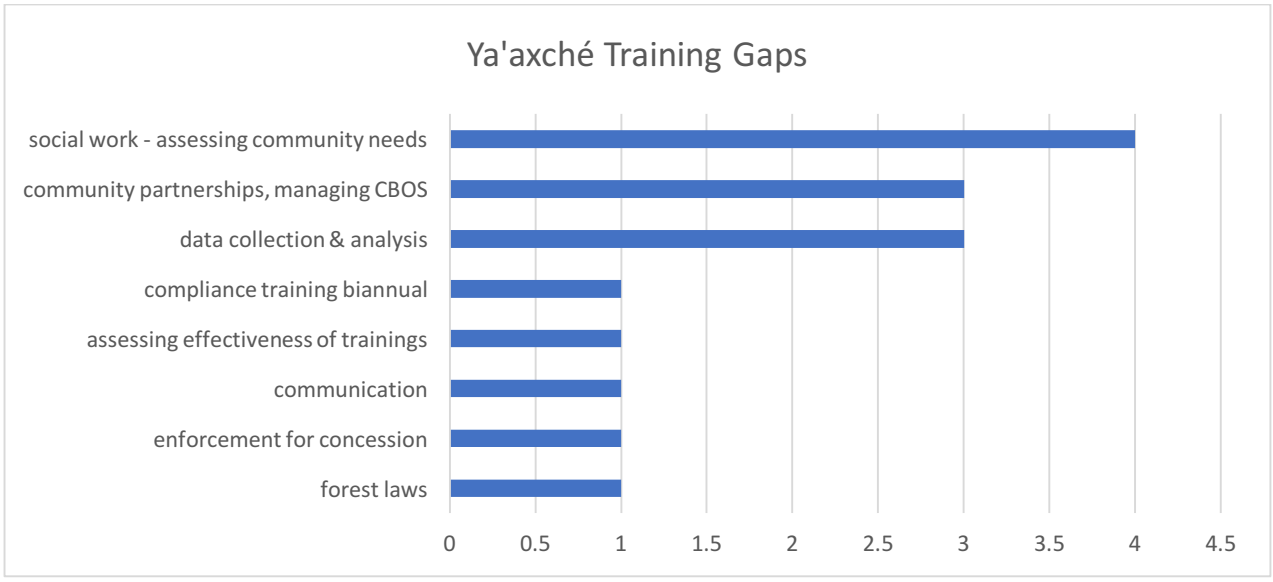
1
1.5
2
2.5
3
3.5
4
4.5


Ya'axché Training Gaps
social work - assessing community needs
community partnerships, managing CBOS
data collection & analysis
compliance training biannual
assessing effectiveness of trainings
communication
enforcement for concession
forest laws
0
0.5
1
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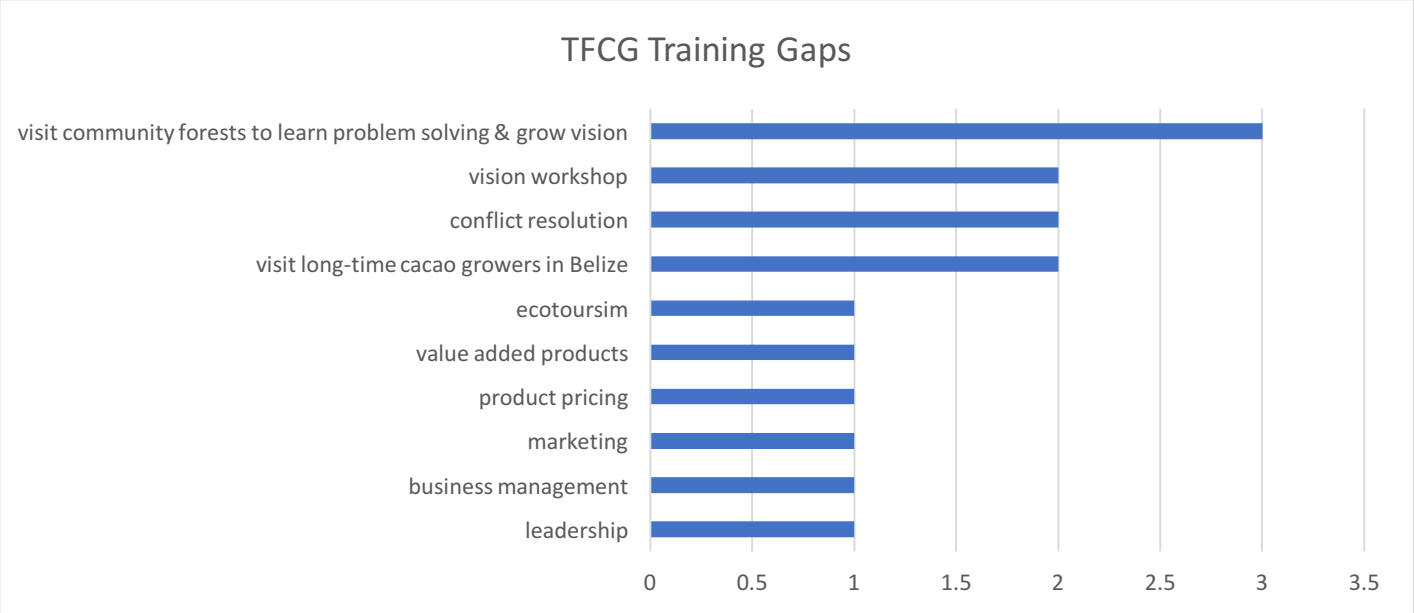
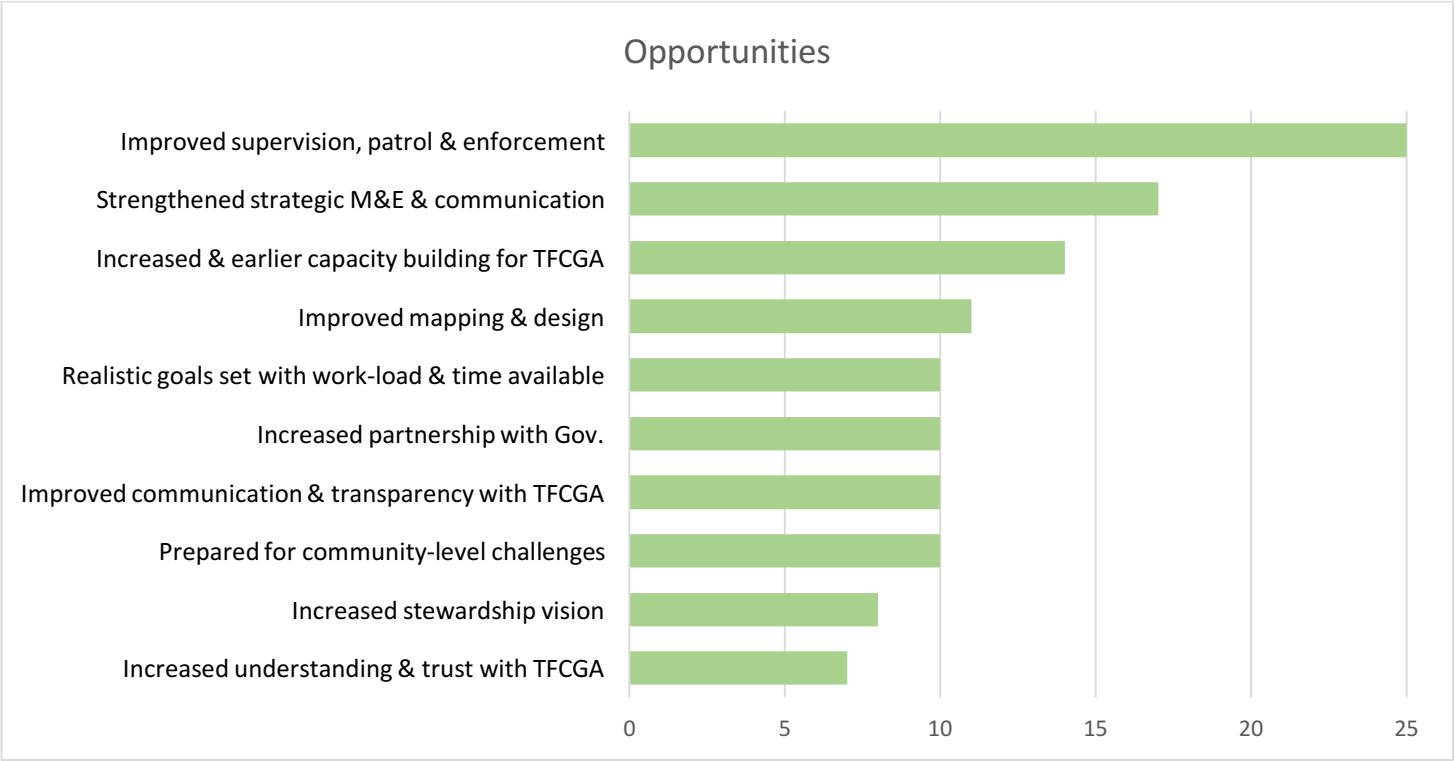
2
2.5
3
3.5
4
4.5



Accessing PAs for models like this:

100%	Yes
0%	No
Precautionary comments	
	Important that the type of Protected Area is considered; Forest Reserves are more open
	As long as we learn as we go and continue to network for support and learning
	Yes but consider more diversified uses in the future and consider tourism in the design
	Yes but consider land tenure issues
	Yes but consider a panel for exploring best activities for Pas in Belize to diversity the model


Opportunities
Improved supervision, patrol & enforcement
Strengthened strategic M&E & communication
Increased & earlier capacity building for TFCGA
Improved mapping & design
Realistic goals set with work-load & time available
Increased partnership with Gov.
Improved communication & transparency with TFCGA
Prepared for community-level challenges
Increased stewardship vision
Increased understanding & trust with TFCGA
0
5
10
15
20
25

31 Jan. 2019

Member satisfaction & benefits survey

Explanation:
The purpose of this survey is to measure your satisfaction with the concession. This will help Ya'axché to learn about how you feel about the concession benefits. The results of this short survey will give us some quantitative indicators for how the concession is improving your lives, which is very important information since this a main goal for the concession.

I am an independent reviewer and I will be analyzing this data and writing a report that will include the results. These results will be anonymous. The report will be sent to Ya'axché, TFCGA, FD and other stakeholders so they can learn more about the concession.

I want to ask that you give your most honest response. This is an opportunity for you to share your voice and opinion. Please feel free to spread out so that everyone has privacy and can respond without any pressure from the group.

Instructions:
Julio will read each question and the response options slowly. When you are done answering, please cover your response and look up so we know you are done. If you need assistance please raise your hand and myself or Julio will come to assist you.

Does anyone have any questions?

31 Jan. 2019

Member satisfaction & benefits survey [Leader]

1. Because you are involved in the concession, do you think you are better off than before? *Q'eqchi - Chalen awok'ik sa li canjel se concession, ma'x usa la yuam chiru nak xatwanko chak jun xil*
   Circle one: Ta sur rix lix sumenkal li patzomj
   Yes No

2. How satisfied are you with the quality of extension services, including trainings, offered to you and your group? Qeqchi: Chanru nakaweka chirix eb li neke chal chi rilbal la canjel ut ajcui chirix li tzolok naka cul riquineb cho'ok awe ut re li chu'ut
   1. I am very unsatisfied
   2. I am somewhat satisfied but I wish it was better
   3. I am satisfied
   4. I am very satisfied

3. How satisfied are you with the cash earned from cacao in the concession? Qeqchi: Chanru nakaweka chirix li ru li Cacao li tyo chi elk chak sa li concession?
   1. I am very unsatisfied
   2. I am somewhat satisfied but I wish it was better
   3. I am satisfied
   4. I am very satisfied

4. How confident are you that the cash you will earn from cacao sales will cover your household expenses in the next 5 years? Qeqchi: Ma coj'co la chol ruquin lix tzak la cacao li takayi chok re chix junil li ajel ru sa la jun cablal cho'ok re joob hab mas chi ubej?
   1. I have no confidence that they will cover my household expenses
   2. I have low confidence, but it is possible
   3. I am somewhat confident that they will cover expenses in the next 5 years
   4. I am very confident that they will cover my expenses in the next 5 years or they already cover my expenses

5. How satisfied are you with the concession overall? Qeqchi: Ma coj'co la chool riquin chix junil le karu chi banumank sa concession?
   1. I am very unsatisfied
   2. I am somewhat satisfied but I wish it was better
   3. I am satisfied with the concession
   4. I am very satisfied with the concession

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31 Jan. 2019

Member satisfaction & benefits survey [Participant]

1. Because you are involved in the concession, do you think you are better off than before? *Q'eqchi - Chalen awok'ik sa li canjel se concession, ma'x usa la yuam chiru nak xatwanko chak jun xil*

   Circle one: Ta sur rix lix sumenkal li patzomj

   ✓ Yes ✗ No

2. How satisfied are you with the quality of extension services, including trainings, offered to you and your group?
   Qeqchi: Chanru nakaweka chirix eb li neke chal chi rilbal la canjel ut ajcui chirix li tzolok naka cul riquineb cho'ok awe ut re li chu'ut

3. How satisfied are you with the cash earned from cacao in the concession?
   Qeqchi: Chanru nakaweka chirix li ru li Cacao li tyo chi elk chak sa li concession?

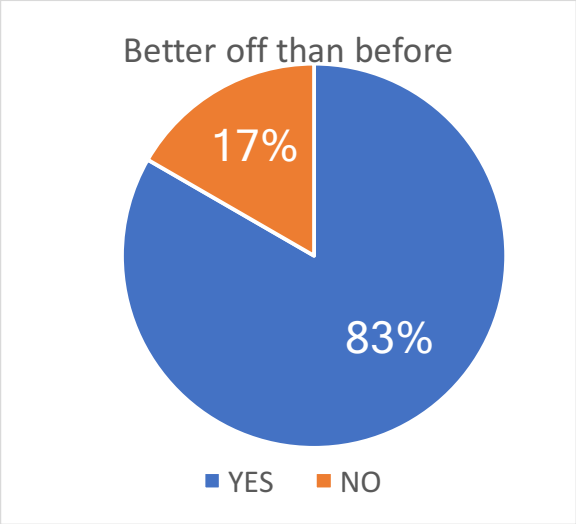
4. How confident are you that the cash you will earn from cacao sales will cover your household expenses in the next 5 years?
   Qeqchi: Ma coj'co la chol ruquin lix tzak la cacao li takayi chok re chix junil li ajel ru sa la jun cablal cho'ok re joob hab mas chi ubej?

5. How satisfied are you with the concession overall?
   Qeqchi: Ma coj'co la chool riquin chix junil le karu chi banumank sa concession?

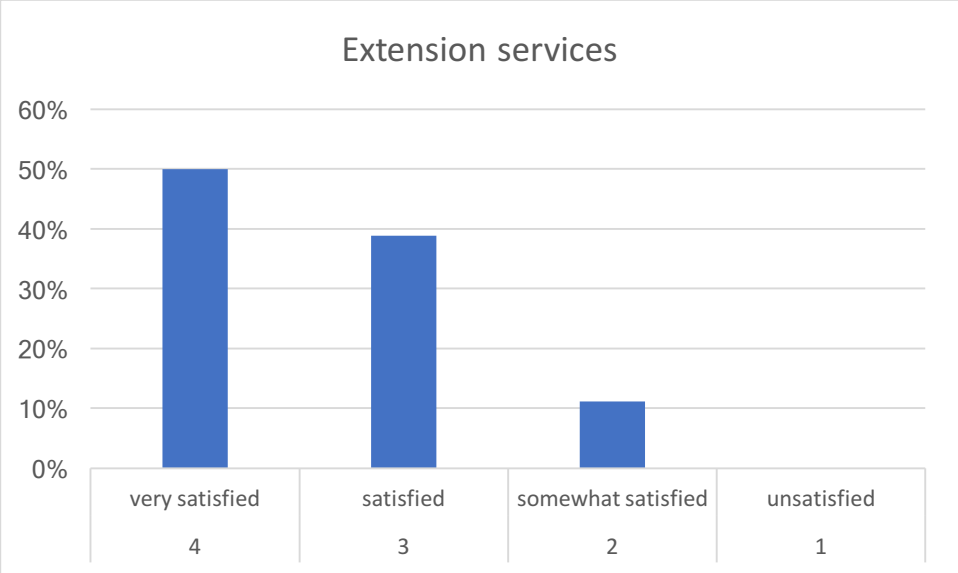
	4	3	2	1
Extension services	9	7	2	0
cash from cacao	10	8	0	0
confidence in future earnings	16	2	0	0
overall satisfaction	10	5	3	0

Better off than before	
15	YES
3	NO

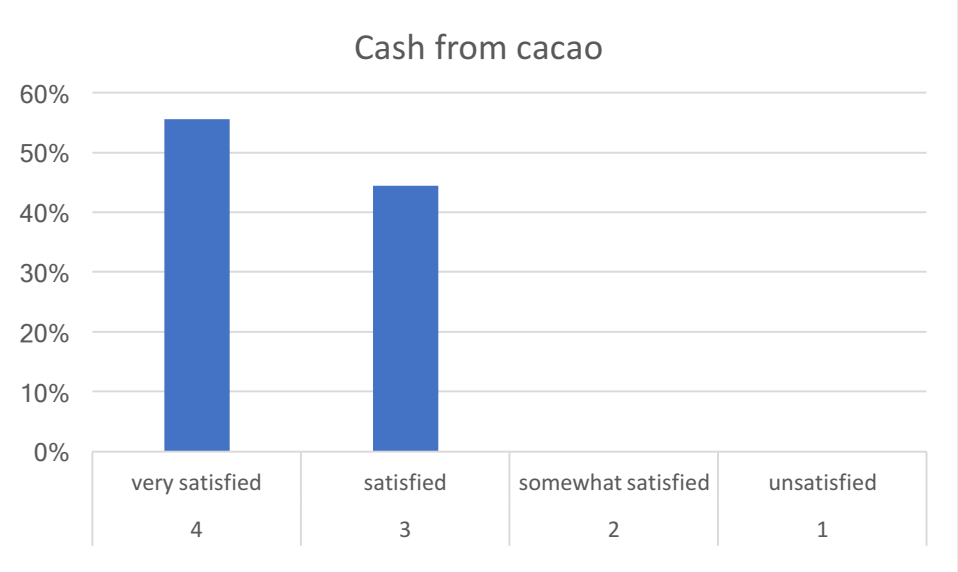
Better off than before		
15	YES	83%
3	NO	17%



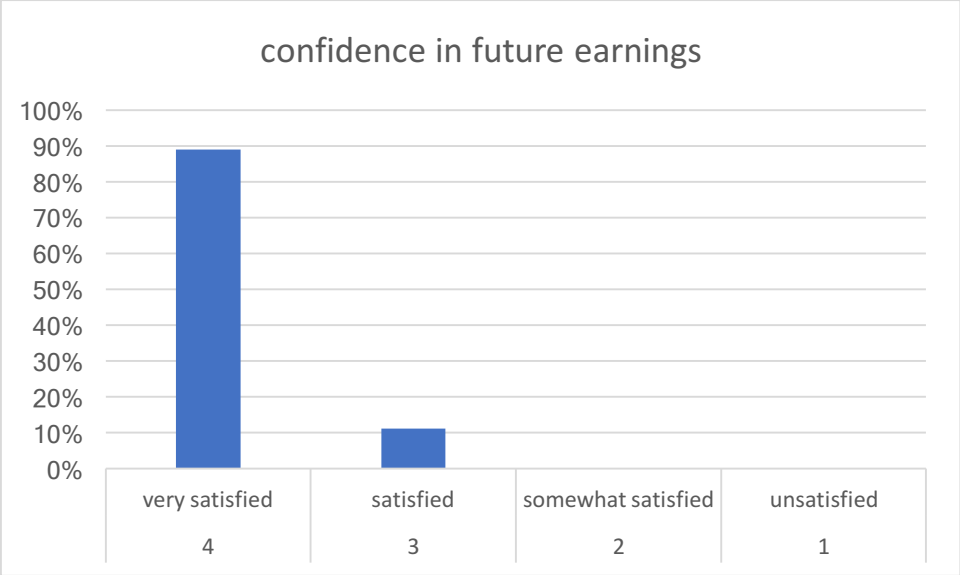
Extension services		
4	very satisfied	50.0%
3	satisfied	38.9%
2	somewhat satisfied	11.1%
1	unsatisfied	0.0%



cash from cacao		
4	very satisfied	55.6%
3	satisfied	44.4%
2	somewhat satisfied	0.0%
1	unsatisfied	0.0%



confidence in future earnings		
4	very satisfied	88.9%
3	satisfied	11.1%
2	somewhat satisfied	0.0%
1	unsatisfied	0.0%



overall satisfaction with concession		
4	very satisfied	55.6%
3	satisfied	27.8%
2	somewhat satisfied	16.7%
1	unsatisfied	0.0%