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**CLIMATE CHANGE AND PROTECTED PLACES:**

# ADAPTING TO NEW REALITIES

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# Building resilient communities in Belize through climate-smart agricultural practices

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## Abstract

Indigenous communities have always coexisted with nature. Their subsistence has had a dependence on the heightened stewardship of the natural environment, requiring that their farming practices evolve and adapt to today's rapidly changing environment. As the effects of climate change become more obvious in weather pattern alterations influencing agricultural yields, so do the resilient farming practices that are being adapted to strengthen the agricultural sector. Since forests are sources of livelihoods for Mayan communities, agricultural advances promoting forest conservation and good governance are viewed as socially and environmentally responsive approaches to rural development. Cacao-based agroforestry is a long-term solution to improve our forests' health and livelihoods in southern Belize. This system allows for the development of entrepreneurship opportunities through small-scale business models in agrotourism that highlight the cultural and biodiversity richness in these communities. The incorporation of apiculture and Inga alley cropping ensure that traditional crops such as corn, beans, and vegetables can be continuously cultivated, decreasing the deforestation rate, hence conserving our landscape and its ecosystem. These practices involve the growing of staples for the organized communities, who are embracing ecofriendly solutions for a sustainable future. The experience and knowledge developed within the communities have resulted in the development and application of climate-smart solutions and adaptation mechanisms that ensure livelihoods continue to thrive. These local initiatives establish an easy-to-replicate forest governance model, influencing regional and even national solutions to building climate-resilient forest communities in the Maya Golden Landscape.

Keywords: sustainable livelihoods, forest communities, climate-smart agriculture, rights to access, forest governance

## Introduction

Belize is a country in Central America and the Caribbean that is best described as a melting pot of diversity and culture. The biodiversity and natural heritage of the country is safeguarded through a system of terrestrial and marine protected areas under the National Protected Areas System (NPAS) Act (2015) regulating protected areas in Belize. There are 13 categories of protected areas in Belize, each with its own set of policies and procedures regulating permissible socioeconomic activities. The Forest Department manages terrestrial protected areas, while the Fisheries Department manages marine protected areas. Given the very

large number of protected areas—approximately 100 in the NPAS—the aforementioned government departments often enter into comanagement agreements with conservation nongovernmental organizations (NGOs) or community-based organizations to accomplish effective management.

Belize's economy has been based on the exportation of raw products to the European Union and the United States of America. Traditional crops such as sugarcane, banana, and citrus products have been the main foreign exports. As global prices for these products change, so does the focus locally. For example, the number one

foreign exchange earner presently is tourism. For this industry to continue, the protection of the environment has become a top priority. This is because one of the main reasons tourists visit the country is for its rich flora and fauna, much of which still thrives in the mosaic of protected areas all over the country. Consequently, Belize really is prioritized as a system of protected areas maintaining interconnectivity from north to south as a wildlife corridor.

Small but growing, Belize's economy is very susceptible to the changes in global economic trends and since most of its foreign exchange is agriculture-based, climate change exacerbates that reality. This requires that climate-smart agricultural practices be adopted to mitigate the effects of changing weather patterns. This is important for continued local and foreign exchange earnings, but more importantly, for food and water security for the Belize population, as many communities still practice and rely on subsistence farming.

As a response to changing weather patterns and a need to protect natural resources for both tourism and food security, an agroforestry concession system in the Maya Mountain North Forest Reserve (MMNFR) has served as a pilot forest governance model that can be replicated in other forest reserves. Such system allows for greater attention on local communities who rely on granted access in protected areas to enhance their livelihoods. Access to the forest reserve has also created additional opportunities for women farmers of the Trio community, such as incentivizing honey production, an alternative nontimber forest product, as a socioeconomic activity. Apiculture (beekeeping) complements the income generated from the sale of cacao beans and other crops and allows women to take a leading role in income-generation for the family in a traditional Maya community.

### **Community development, outreach, and livelihoods context in southern Belize**

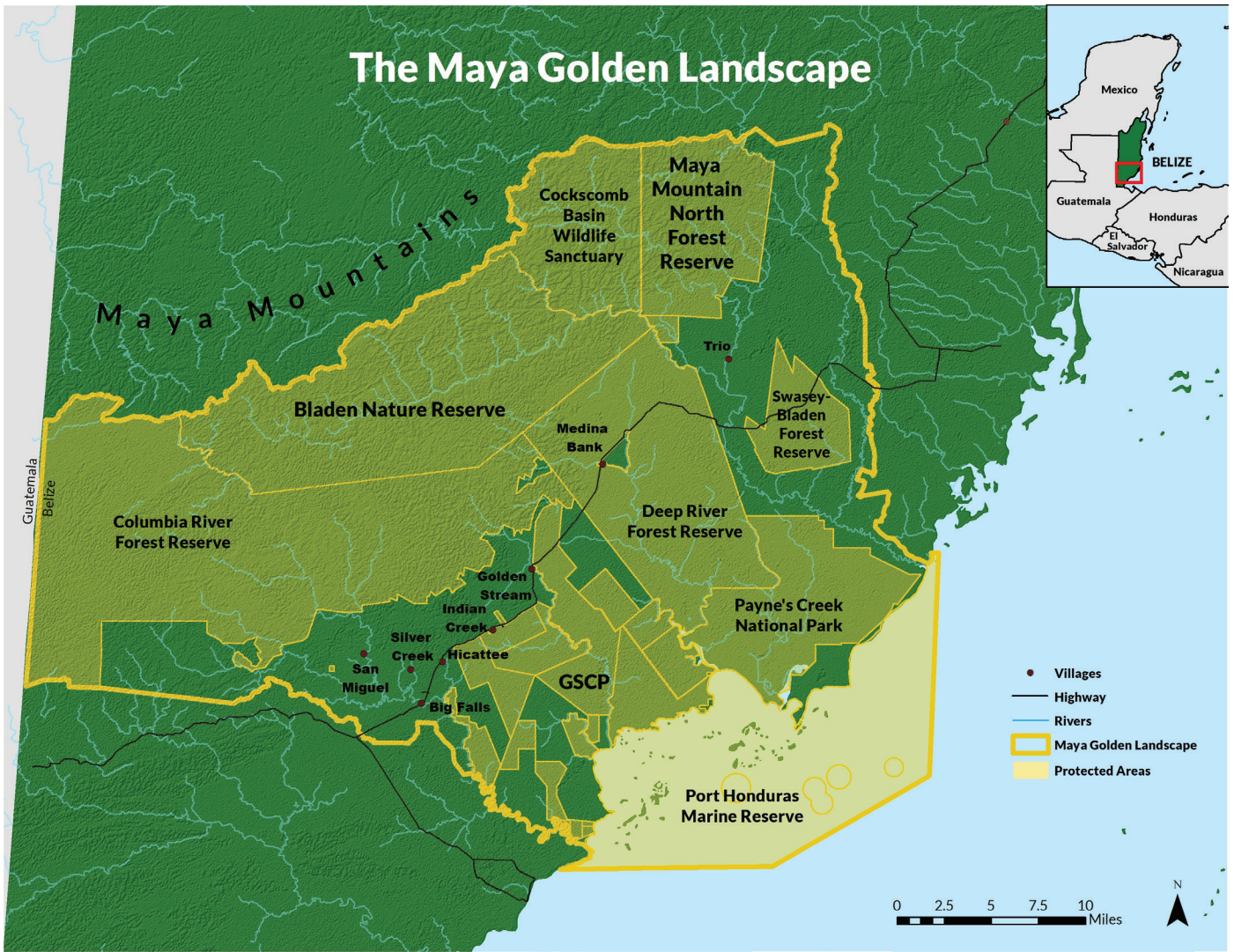
“Forest reserve” is a category of terrestrial protected areas that allows communities to access natural resources in the conserved area. The MMNFR ranks 12th out of 56 protected areas that were evaluated for the National Protected Area Prioritization exercise of 2012, and is recognized as a key biodiversity area (KBA), prioritized for increased management effectiveness, under the Global Environment Facility–World Bank “Key Biodiversity Areas” project from 2015 to 2020 (Agroforestry Concession Management Plan MMNFR 2014). This significant status was a contributing factor in formulating a conservation agreement that allowed for the first agroforestry concession within MMNFR. As a

critical wildlife corridor in the Maya Golden Landscape (MGL; Figure 1)—a large area of protected areas, agricultural and private lands, and communities—access to lands in the form of a concession creates a management presence that requires effective communication and coordination.

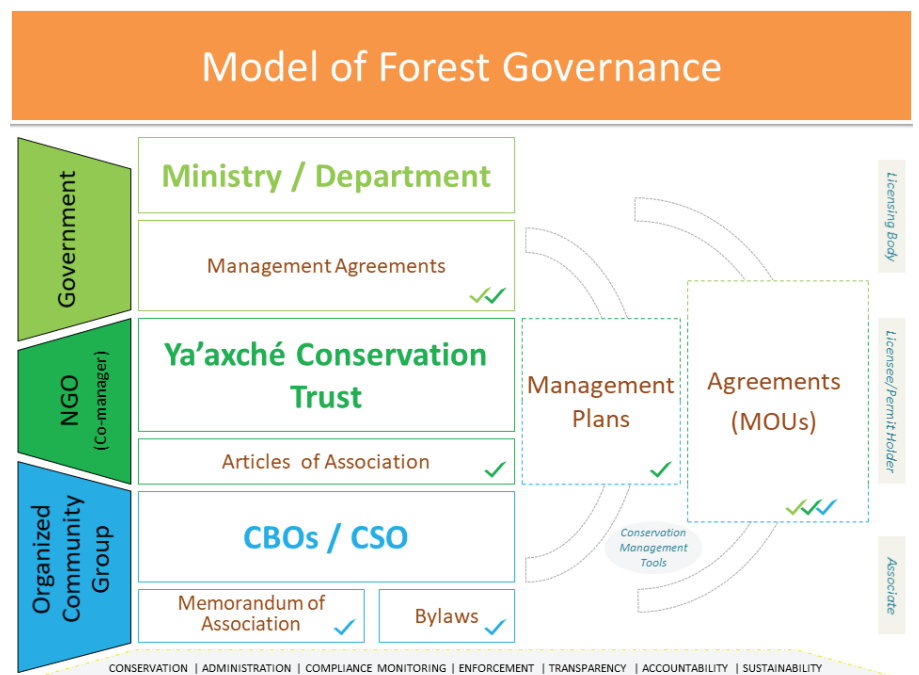
Population increase further adds to the pressures on Belize's natural resources, increasing the priority to develop innovative approaches to provide for Indigenous and local communities who depend on the forest for food, housing materials, (natural) medicine and other necessities for their sustenance. This requires a landscape approach to natural resources management that puts forest-dependent communities at the center of the decisionmaking process to implement adaptive ecofriendly extractive measures to ensure forest and livelihood sustainability.

The community forest concession model is one of the tools that has been used to ensure that these communities become stewards of their surrounding natural resources. The Trio Farmers Cacao Growers Association (TFCGA) from the community of Trio in Belize's Toledo District is pioneering this community forest governance initiative (Figure 2). This local, organized group of 31 Maya farmers is registered under the Belize's Company Registry, under Chapter 250 of the Companies Act (2000). Villagers who were seeking access to farmland to continue their traditional farming practices formed TFCGA. In 2015, they signed the first-ever community forest concession in Belize. This is an agreement between the Forest Department (the regulating authority) and Ya'axché Conservation Trust (the NGO signatory and comanager of MMNFR), on behalf of TFCGA, the associate. The establishment of the conservation agreement grants the group rights to access the MMNFR for cacao-based agroforestry, beekeeping, and cultivation of annual crops, putting into practice sustainable climate-smart measures.

Maya communities have traditionally used slash-and-burn as a method of land clearing for agriculture. With the concession agreement and their access to a forest reserve, the organized group has been encouraged to cease this practice by adapting and practicing sustainable farming methods. The cacao-based agroforestry farming practice enhances the production of cacao beans while protecting standing forests and their biodiversity, and maintaining a healthy vegetation cover. This farming system is a long-term investment, as cacao production does not generate immediate income for the farmer, taking up to 4–5 years for the cacao plots to start to generate economically viable



**FIGURE 1.** The Maya Golden Landscape in southern Belize. © Ya'axché Conservation Trust



**FIGURE 2.** Conceptualizing a basic community forest governance model. © Ya'axché Conservation Trust

yields (Figure 3). This initiative, as part of a Community Outreach and Livelihoods (COL) program, targets socioeconomic challenges faced by a local, Indigenous forest community. The main focus is on food security, water conservation, and agricultural good practices, ensuring that anthropogenic disturbances do not continue to encroach on the remaining natural forests of the wild landscapes sought to be conserved. As a result, an annual crops section was considered and integrated as part of the agroforestry concession model. Crops such as corn, beans, pepper, pumpkin, plantain, and root crops—staples of the Maya culture—are produced and surpluses are marketed locally.

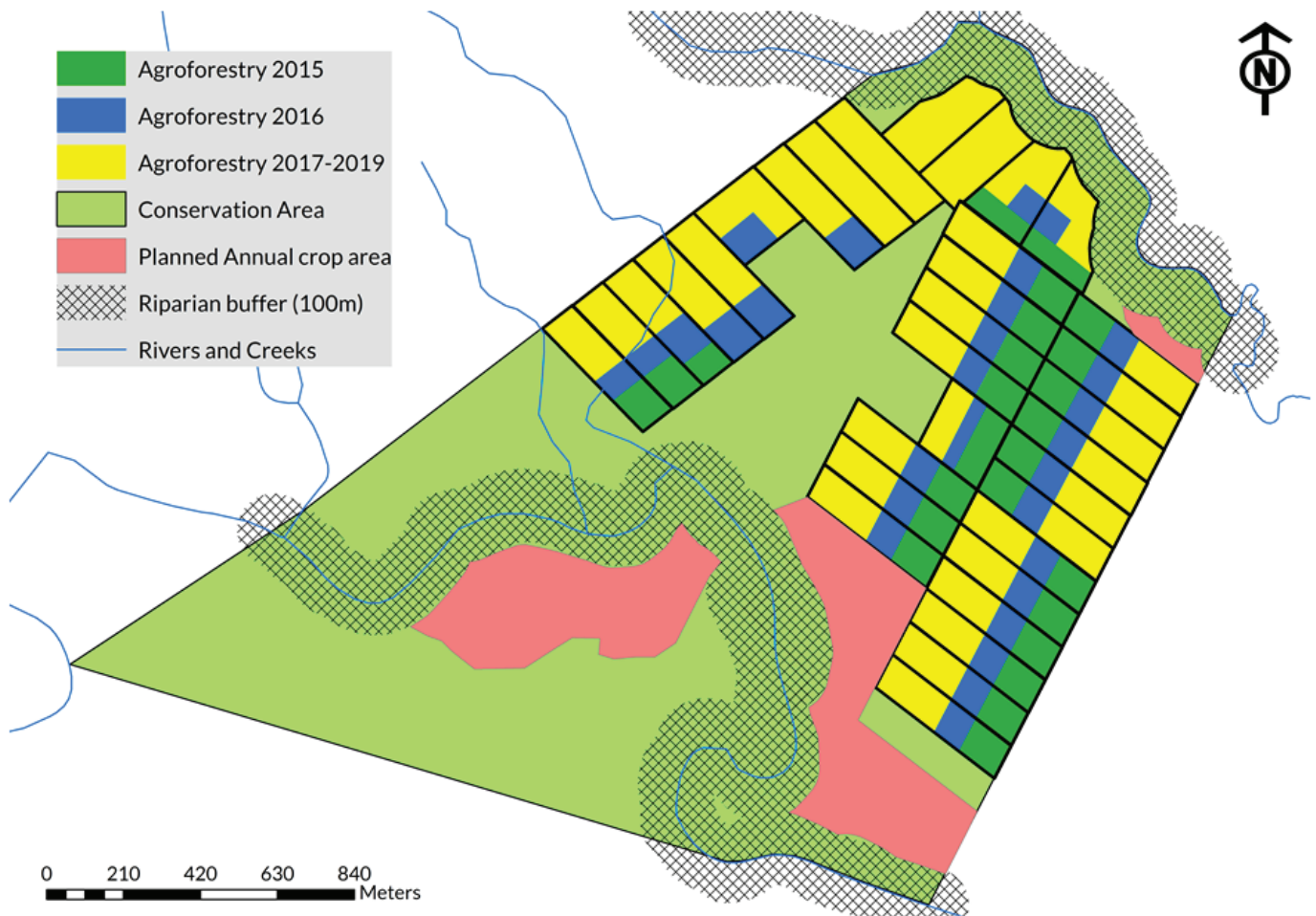
The adaptation of the cacao-based agroforestry system helps to ensure that our forests are managed sustainably. Cacao is emerging as a new foreign exchange earner, as there is a shift in the consumer demand for sustainably produced products. Through local observations, Ya'axché noted that most of the cacao currently

being produced in Belize is within an agroforestry system. This is important since such an approach to production has minimal impact on the environment. This approach to farming curbs deforestation, creating an opportunity to manage natural forests in such a manner that shade-loving crops, like cacao, can be cultivated. Cacao is culturally important as it can be traced back to the ancient Maya civilization, where it played an important role as a currency and drink of the royal class. Although TFCGA has limited experience in growing cacao and farming within an agroforestry system, progress has been made, especially in shifting from the predominantly slash-and-burn farming practices common in many Maya communities.

### Climate-smart agricultural practices

**Inga alley cropping.** Many years of unsustainable use and extraction of resources from MMNFR have led to the degradation of soil. This has resulted in reduced levels of productivity due to weeds, especially in the

**FIGURE 3.** Cacao plots of the community agroforestry concession in MMNFR. © Ya'axché Conservation Trust



annual crops section. The Inga alley cropping (Inga Alley Foundation 2010–2014) technique has been adapted to address this challenge. A climate-smart agricultural method, planting *Inga edulis* in rows forms a canopy as the tree grows, creating shade under the “alley,” the space between the rows of Inga trees, consequently causing a die-off of weeds and preventing further dispersal under the shade. There is also an accumulation of mulch from the leaves that fall on the soil surface. This helps to preserve moisture, which encourages soil microorganisms to flourish, organically enriching the topsoil with nutrients. Additionally, Inga being a legume, it naturally fixes nitrogen into the soil. After two years, the Inga trees are all pruned at five feet in height and the crop of choice can be cultivated in the alley. The use of cover crops, such as Inga—locally known as Bri Bri—ensures that the land recuperates and remains productive.

**Apiculture.** Empowering forest communities in the MGL to effectively manage their own natural resources fosters an innovative culture to learn and adapt best practices from success stories around the globe. Non-timber forest products are an integral part of Indigenous communities’ dependence on the forest, where beekeeping is placed as a high priority in the MGL for honey extraction. MMNFR has been considered as a location where apiaries can be maintained to boost the production of chemical-free “organic” honey. Seven female farmers from Trio have participated in capacity-building workshops, receiving technical assistance and material support from Ya’axché to continue the expansion of their apiaries. There is an opportunity to diversify the number of products that can be harvested, which can include pollen, wax, and royal jelly, among others. This group of women is a great proponent for the conservation of natural forests within MMNFR and other protected areas. Apiculture is complementing forest communities’ income, while fostering the development of a heightened stewardship of natural forests through an integrated management approach.

**Cacao-based agroforestry.** Cacao has been a traditional crop in Maya communities, being used as a local drink for cultural activities such as communal planting and feasts, and as an offering during ritual ceremonies. To retain this traditional livelihood based on the harvesting of cacao, market demands have prompted initiatives to venture into local investments to increase cacao production as a supplement to the incomes of forest communities who continue with this practice. Ever since Ya’axché started to promote cacao-based agroforestry in the MGL, this climate-smart agricul-

tural measure has gained traction as a response to the deforestation that occurred during Hurricane Iris in 2001 and the fires that followed. The Cacao Conservation Agreement of January 2016 was established after a forest concession was granted by Forest Department in June 2014. This led to the drafting of the 2014–2019 Agroforestry Concession Management Plan for the MMNFR, a conservation tool to oversee the cacao-based agroforestry model (Ya’axché Trust 2014). Policies and procedures have been outlined to guide the effective management of the concession in the forest reserve. Compliance, monitoring, and surveillance are prioritized to minimize the environmentally degrading threats to the forests within the MGL, thus contributing to the Reducing Emissions from Deforestation and Forest Degradation (REDD+) initiatives (2014) of Belize.

Thirty-five concession plots were designated and allocated to farmers of the TFCGA. It is expected that the 31 farmers who gained rights to access to individual plots for cacao farming to be accomplished by the fifth year of planting. This has required an investment in materials, supplies, and capacity building for shade management and cacao pruning to enhance the health of trees to gain high-quality yields in a chemical-free environment, using natural agroecological measures.

Cacao and other shade-loving fruit trees are planted in a setting mimicking that of a natural forest. This system addresses food security, as there is a high number of crops being cultivated within the land space where the concession has been granted. Biodiversity conservation is also enhanced since no hunting is allowed and the presence of fauna is being monitored to better understand how the integrity of the forest is maintained in a forest reserve with a management presence and intervention. The implementation of this agroforestry model aims at reducing the need to cut or clear more forested areas to plant crops, thus decreasing the expansion of the agriculture frontier.

### **Adapting best practices in the MGL**

An effective internal governance structure is a key component of successful organized groups. This is perhaps one of the biggest hurdles to be overcome by TFCGA. Through the COL Program, Ya’axché has been able to provide ongoing sessions in decision-making, conflict management, and strategic planning for the eventual autonomy of the forest community group. Great emphasis is being placed on developing the leadership and governance capacity by adapting best-practices measures. There is hope that in the near future

TFCGA will become autonomous with a developed model that is easy to replicate in other forest reserves locally, regionally, and/or nationally.

**A community agroforestry model of forest governance.** Adapting alternative techniques can become challenging, as it requires breaking away from traditional practices—a behavioral change that must occur. In the 20 years of its existence, Ya’axché has built a strong relationship with eight communities in the MGL, based on respect, trust, and mutual understanding. The COL program at Ya’axché serves as the bridge between organized communities. This highlights the time extension officers invest in working closely with farmers to deliver technical support and materials in cacao-based agroforestry, beekeeping, and Inga alley cropping.

Model farms using each of these climate-smart agricultural practices have been established and training sessions are delivered to other community members and groups, like TFCGA, using a farmer field school methodology approach. These model farms within the communities of the MGL are accessible for others to visit, increasing the probability of such models to be replicated. The strengthening of Indigenous communities equips them with the skills and tools to seek long-term investments. This facilitates opportunities in diversification to: (a) access financial support to invest in climate-resilient practices; (b) serve as model for the development of policies that will regulate cacao-based agroforestry; and (c) gain recognition as a system that mitigates climate change impacts on communities and forests.

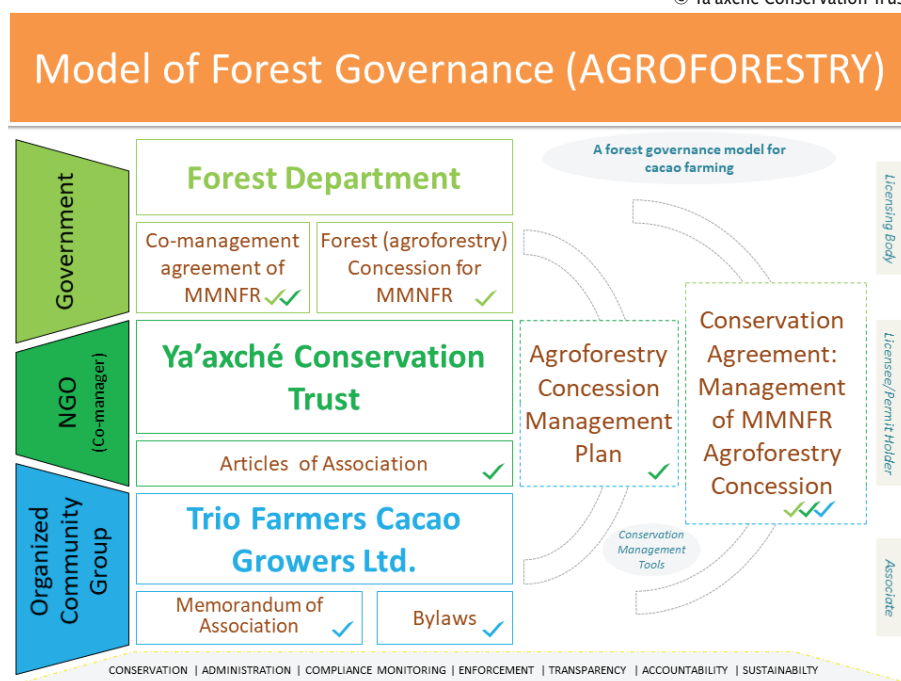
**Lessons learned for ‘good’ governance in organized communities.** Both protected areas and local communities are impacted by climate change and as such, there is always a need to be creative in overcoming this reality in communities where the impact is felt first-hand due to crop failure, flooding events, and drought. Creating alternative farming practices such as Inga alley cropping, a slash-and-mulch method implemented in the community agroforestry concessions, and apiculture will lead to climate-resilient communities that view protected areas as a source for livelihood improvements. A cacao-based agroforestry concession is now seen as a

tool connecting forest communities to protected areas and including them in their sustainable use. Coordination and communication are the elements that have been prioritized at the grassroots level to influence a model of forest governance (Figure 4) that is recognized by the regulating body, the Forest Department.

TFCGA is governed by an executive committee composed of eight members with leadership roles and responsibilities. Having signed an articles and memorandum of association to be a legal community-based business group, capacity-building programs are elemental to strengthen TFCGA’s leadership and governance capacities to become a self-sustainable forest community group. The group does not practice slash-and-burn anymore and has embraced the guidance that Ya’axché continues to provide, in order to improve subsistence farming through guided measures that take into account the health of forested lands.

Members of other communities pose a threat to the agroforestry concession since outside of the concession and forest reserve area there is no regulation of the use of pesticides. This can compromise crop production and its value-added status as being from a chemical-free area where agroecological practices are now prevailing. Inclusive dialogue has been strengthened as a response in conflict resolution to establish a buffer zone that will serve as a barrier between adjacent farmlands and the cacao-based agroforestry plots. The buffer zone is crucial to protect and conserve the integrity of the forest reserve as part of an integral

**FIGURE 4.** Adapting a model of good forest governance for cacao-based agroforestry. © Ya’axché Conservation Trust





block in the system of protected areas.

## Conclusion

The vision of Ya'axché, "Harmony between nature and human development for the benefit of both," requires that the critical balance between conservation through protected areas management and the promotion of sustainable community livelihoods be at the core of the work that is implemented and achieved. Working within fragile ecosystems and with communities who depend on the use of natural resources requires innovation and integration so as not to give higher importance to one than the other. The community agroforestry concession sets a precedent in Belize as a successful model of forest governance: local, Indigenous communities with rights to access a forest reserve in order to improve their livelihoods through an integrated landscape management approach.

As a grassroots community with very limited experience in the intricacies of how associations function, it has been a learning process for both Ya'axché and TFCGA. The fact that this is the first time such a model is being piloted in Belize makes it even more challenging since there are no existing models in the country that can be looked at for guidance. The brainstorming and planning processes have been instrumental in developing the conservation tools that were signed for the establishment of the forest concession and its conservation agreement. As the work of planting and establishing the cacao farms progressed, TFCGA has received technical assistance and material support. Exchange visits to local cacao farms and even visits to other community forest concessions in Petén, Guatemala, have paved a direction to adapt best practices to improve the work being done in the MMNFR.

**The way forward in strengthening forest communities.** With the goal to have completed 336 acres of cacao-based agroforestry, the approach becomes highly significant for TFCGA and Ya'axché Conservation Trust. Creative planning and working as a team has strengthened the organized group for a successful piloting of this model to be replicated with other forest communities. There are several options to choose from when deciding what to do with cacao yields, such as fresh cacao beans being sold to local buyers. Value-added products such as fermented beans, nibs, and liquor, or even chocolate-making, are all options that can be explored. With the KBA designation, the agroforestry concession in MMNFR can also be ideal for ecotourism. These are all viable additional income streams that can be used to improve the livelihoods of TFCGA members. The concept of climate-smart agricultural

practices has evolved into *agroecology*. This now integrates the model of agroforestry at the landscape level, working with all the resilient and willing communities that are a part of the NPAS of southern Belize.

As the ecosystems within MMNFR recover through monitored access and conservation, threatened species such as tapirs, howler monkeys, harpy eagles, scarlet macaws, and even jaguars are being documented within MMNFR. Species such as paca, agouti, armadillo, and even the other wildcat species are now being observed within cacao concession plots. This increase in the presence of biodiversity can boost any ecotourism initiative, thus diversifying and strengthening the current model of forest governance.

*Ed. note:* This article originated as a presentation at the US/ICOMOS (US Committee of the International Council on Monuments and Sites) International Symposium "Forward Together: A Culture–Nature Journey Toward More Effective Conservation in a Changing World," held in November 2018 at The Presidio, San Francisco, California, USA. The symposium explored the understanding that cultural and natural heritage are dynamic and inextricably linked in many landscapes and waterscapes, and that effective and long-lasting conservation of these places depends on better integration of the "entangled dimensions" of culture and nature. The article is republished with permission from US/ICOMOS and the author.

*The complete symposium proceedings are available at: <https://www.usicomos.org/past-symposia/>*

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