

# Strengthening of Climate Change Adaptation Capacities for the Mayan Milpa Farming, in Rural Communities of the Biocultural Region of the PUUC

## Case Study Database

A compilation of good practices and lessons learned to bring innovative subnational solutions to global problems.



## Introduction

The milpa is one of the most important productive activities carried out in Mexico by rural communities. In the south of Yucatan this is no exception, and in municipalities of the Biocultural Region of the PUUC, it is a predominant activity for Mayan families.

Although the milpa generates many benefits for the families who practice it, today it is a system that is highly vulnerable to climate change, which is further aggravated by the implementation of malpractices. These factors have led to the deterioration of the milpa, the degradation of ecosystems and a loss of the biocultural environment.

This situation has motivated the transition towards improved Mayan milpa proposals, through the generation of initiatives that adapt to current conditions, and incorporating the essential experiences and knowledge of farmers, both men and women, into the construction of these proposals.

## Project Summary

This initiative aims to enhance the resilience of the Mayan milpa by advocating for sustainable agricultural practices across eight municipalities within the Biocultural Region of the PUUC. This region holds significant historical, cultural, and environmental importance for the state. The approach was based on strengthening the adaptive capacities of communities to cope with the impacts of climate change in the territory.

The project is developed through activities for the promotion of the Mayan milpa, inclusive training, exchange of experiences, linkage and alliances with actors from different levels and sectors. The project includes a series of activities that promote the Mayan milpa, provide inclusive training, facilitate the exchange of experiences, and foster partnerships with stakeholders across various levels and sectors.

Its goal is to promote food security, biodiversity conservation and to strengthen farming communities.

## Key Information

**Location:** Biocultural Region of the PUUC, Yucatan, Mexico

**Focus Areas:**

Agricultural Biodiversity;  
Protected areas;  
Capacity building;  
Climate change and biodiversity;  
Gender and biodiversity;  
Participatory processes;  
Zero deforestation.

**Founded:** 2021

**Aichi Biodiversity Targets addressed:**

Targets 7, 11, 13, 15, 18 and 19

**Sustainable Development Goals addressed:**

SDGs 1, 2, 3, 5, 10, 12, 13, 15 and 17

**Targets of the Kunming-Montreal Global Biodiversity Framework addressed:**

Targets 1, 3, 8, 10, 22 and 23

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## BACKGROUND AND CONTEXT

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According to the National Forestry Commission (2022), at the national level the gross deforestation rate was 0.22% of the total forested area (period 2001 – 2019). According to the information on deforestation by region, critical areas are identified, among which the Yucatan Peninsula stands out.

For the period 2001-2021, 266,613 hectares were deforested in the state of Yucatán, which is equivalent to a loss of forest cover of 12,696 hectares/year. Of the total deforested area, 69% was for grasslands for livestock purposes, 27% for agricultural use, 3% for human settlements, and 1% for other uses (National Forest Monitoring System).

The State of Yucatan, being one of the five states that implements REDD+ Early Actions (ATREDD+, for its acronym in Spanish), has been recognized at the national level for its importance in the conservation of forest carbon pools. Since 2010, the state government has actively taken part in generating decisive initiatives for the development and implementation of climate policy instruments and has generated mechanisms for intersectoral coordination on adaptation and mitigation through the Inter-Ministerial Commission on Climate Change in Yucatan.

Within the framework of the REDD+ mechanism, the Yucatán State Strategy for Emissions Reduction from Deforestation and Forest Degradation (EEREDD+YUC) was developed in 2015. It has undergone multiple participatory feedback processes involving the three levels of government, academics, civil society organizations, and representatives from rural and indigenous communities, especially in key municipalities for Yucatan rainforest conservation. The most recent of these processes occurred in 2023. This strategy aligns with the scope of the Emissions Reduction Initiative (IRE) goals due to the role of the federal entities in achieving them. The implementation route is outlined in the Investment Program (Pdel)

of the Biocultural Region of the PUUC, a long-term territorial planning instrument that aims to identify the types of activities necessary to reduce deforestation and degradation, to promote local development and the appropriate use of natural resources, through the Public Agent for Territorial Development (APDT) called the Intermunicipal Biocultural Board of the Puuc (JIBIOPUUC).

This resulted in the coordination for the implementation of a state policy focused on “low-emission rural development” as a mechanism aimed at reducing deforestation and forest degradation in the State of Yucatán, with particular attention to the goals of the Pdel in the Biocultural Region of the Puuc.

These advances provided an important context for the design and implementation of a project called “Window A ‘Improved Mayan Milpa, Beekeeping, Family Gardens and Innovative Biocultural PES in Concurrent Funds’”. This project took place from 2018 to 2020 and its outcomes served as a precedent for gathering information and gaining a more comprehensive understanding of the territory. It shed light on the dynamics of land use change, the requirements for agrobiodiversity conservation, and the necessity for intervention in priority biocultural territories and in areas experiencing significant socioeconomic pressure of deforestation.

In order to give continuity to the outcomes from the Window A project, a new project was conceived under Financing Window B, which was called “Implementation Actions of the State REDD+ Strategy (EEREDD+) of the State of Yucatán for public-private investment in sustainable rural development: sustainable entrepreneurship in Mayan milpa, beekeeping, backyard gardens and Payment for Biocultural and innovative Environmental Services (PES)”. This was promoted as part of the Governors’ Task Force for Climate and Forests (GCF Task Force) and the United



Nations Development Programme (UNDP). In this initiative, the Government of the State of Yucatan, led by the Secretariat of Sustainable Development, worked in coordination with the World Wide Fund for Nature (WWF-Mexico) and the Intermunicipal Biocultural Board of the Puuc (JIBIOPUUC).; generating synergy with other organizations such as Pronatura Sur, federal and state agencies, municipal and local governments, academia and civil society.

On the other hand, the Peninsular Mayan milpa has been developed for more than 3,500 years, favoring the flourishing of the Mayan culture and the survival of peasants in the state, being an engine of learning, conservation of practices, culture and gastronomy, based on the planting of a great diversity of food plants (varieties of corn, beans, squash, ibes, aromatics, among others).

The milpera activity involves the cultivation of some plant species and a series of silvoagricultural activities that revolve around this activity, such as forestry, faunal, beekeeping, and the family garden (Mijangos, etc. Al, 2019).

Today, diversification is also being explored through the inclusion of tourism (agrotourism and gastronomy) (FAO, 2022), among other complementary activities.

The Globally Important Agricultural Heritage Systems (GIAHS) is an initiative of the Food and Agriculture Organization of the United Nations (FAO) which, to date, has designated 72 agricultural heritage systems in 23 countries. In Mexico, the chinampa agriculture of Xochimilco, Tláhuac and Milpa Alta (which received the designation in 2018) has been recognized as GIAHS, and recently the Mayan milpa of the Yucatan Peninsula or Ich Kool in Maya was included (International Maize and Wheat Improvement Center [CIMMYT], 2022).



**Figure 1. On the left side, a milpa to which good agroecological practices were applied, and on the right side, one to which they were not.**

## KEY ACTIVITIES AND INNOVATIONS

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Through the Financing Window B project, the following lines of work were developed in a comprehensive manner: **Mayan Milpa, Beekeeping and Meliponiculture, Concurrent Funds, Intersectoral and Inter-Ministerial Alliances, Community Monitoring of Biodiversity, Promotion of Agrarian Property in Women and Youth, among others.**

The implementation area was delimited by the 8 municipalities associated with the Emission Reduction Initiative (IRE): **Muna, Santa Elena, Ticul, Oxkutzcab, Tekax, Tzucacab, Peto and Yaxcabá.**

The project identified the Mayan milpa as an opportunity to stagger results in the promotion of actions for mitigation and adaptation to climate change, recognizing and valuing ancestral production techniques and enhancing them through science; always seeking the incorporation and permanent respect of the decisions of the indigenous peoples with respect to this traditional production technique.

The criteria defined for the characterization of best milpera practices, an input of the Mexico REDD+ Alliance, were taken as a basis, including the contribution to restoration, diversification and preservation for the better management of the forest; as well as for the increase and/or improvement of the plant genetic resources used in the milpa, and therefore their contribution to food security; and the strengthening of collective forms of productive organization, rituals or cultural manifestations linked to this productive system.

This was approached from a Community-Based Adaptation (AbaC) approach, with a community intervention methodology, accompanied by a strategy based on theory of change. EbC is a theoretical-practical approach to adaptation to climate change. Through this, multiple conceptual frameworks have been developed that almost always involve elements such as the strengthening of local capacities, access to resources, services and information, and institutional and governance strengthening (Schipper et. al., 2014). The common idea behind it is that communities acquire the ability to make changes and adjustments, or respond to unfavorable events, under changing environmental conditions (including climate) and reduce their vulnerability. The aim is for the capacities acquired by the communities to allow them to continue making adjustments even after carrying out an EbC process, that is, to continue adapting autonomously after the end of a project (Paniagua et. al., 2022).

Experts point out that high-impact and sustainable interventions require a clear understanding of all the elements, relationships, and dynamics that exist within a given reality. In line with the above, Theory of Change is an approach to designing, implementing, monitoring, and evaluating interventions that address complex issues. It is based on systems thinking, under the premise that there are multiple levels of intermediate results that contribute to the process of positive change, and on the recognition of the action of other actors to achieve the objective (Ortiz et. al., 2007). Thus, it starts from the recognition and appreciation of ancestral production techniques, enhancing them through science and new technologies, with the incorporation and respect of the decisions of the communities regarding this traditional production technique.

The proposal prioritized attention to the areas identified by the PDEL that have the highest risk of deforestation derived from the change of land use for agricultural production and the growth of rainfed agricultural activity that has the greatest forest cover, located mainly in the municipalities of Tekax and Yaxcabá, which together protect 53% of the forest area of the IRE zone. equivalent to 382,634 ha of medium deciduous forest, setting a target of avoided emissions of 570,760.7 tCO<sub>2</sub>.



Likewise, it seeks to make market insertion mechanisms more flexible that favor the production and marketing of products made under traditional practices and techniques used historically, which are part of the local agri-food worldview and culture. For this reason, we sought to compose this vision through the integration of agroecological innovation proposals and technology to migrate to the improved Mayan milpa.

The period of action included **July 2021 to June 2023** developing through the following activities:

- *Good agroecological practices: integrated fire management, agroforestry (reforestation with native, forest or fruit species and increased fallow time), soil improvement (vegetation cover and incorporation of organic matter, improvement of soil fertility parameters, establishment of milpa in degraded or deforested areas, permanence of nitrogen-fixing species, incorporation of intermediate technology), governance and legal framework, diversification of production (promotion of the presence of pollinators and development and application of organic inputs) and germplasm (implementation of seed selection procedures, seed banks and mother gardens, exchange of seeds and genetic materials).*
- *Installation of 18 biofactories and 32 demonstration modules under the Utopia Consulting Group model (Utopia methodology).*
- *Training and follow-up with the inclusion of women and youth and people from local and indigenous communities.*
- *Linkages generated between key actors from the government, scientific and business sectors that encouraged the promotion of best practices in the Mayan milpa and value chains in the agricultural sector, with attention to vulnerable groups, indigenous peoples, women and youth.*
- *Exchange of knowledge and experiences between milperos and milperas.*





## ENVIRONMENTAL IMPACTS

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Excessive uses of conventional chemical fertilizers and pesticides in the Mexican countryside not only deteriorate soil quality, but also greatly degrade the quality of subsoil water and thus available nutrients and minerals, causing negative effects such as financial losses, food quality, environmental pollution, agricultural soil infertility, and even the development of diseases in both animals and humans found on the land where agrochemicals are used.

Among the main positive impacts of the project are the promotion of agro-sustainable production, free of contamination with fertilizers and pesticides; the production of healthier, better-performing food; and the promotion of food sovereignty and security.

In addition, work in the Mayan milpa in previously degraded or deforested areas (without causing further deforestation) was encouraged, providing adequate work tools through good agroecological practices, to guarantee the necessary nutrients in the soil and optimal yield.

All this with the aim of reversing and improving production conditions, which is why it was necessary to include biofertilizers in traditional contexts such as the Mayan milpa, along with the implementation of good agro-sustainable practices.

Biofertilizers are considered an innovative product, since any type of change oriented to innovation must be based on knowledge, supported by information and data, and the use of biofertilizers entails knowledge of both the crop and the environment, specifically the historical conditions of production, the quality of the soil and the requirements of the plant, as well as the use and storage of the same.

The project's environmental achievements were:

- *There are 1,413 hectares of milpa in the eight municipalities where best production practices are implemented, in collaboration with the Ministry of Agriculture and Rural Development (SADER) and the Autonomous University of Yucatan (UADY)*
- *18 active groups working together to preserve the Mayan milpa*
- *They are stopping using agrochemicals that harm their health*
- *Organic inputs are being applied to all crops*





## SOCIO-ECONOMIC IMPACTS

A scheme on the proposed value chain for a milpa system with agroecological practices was designed and compared with the current value chain (conventional system), integrating information on maize planting management costs (evaluated for a production of 15 ha). The results showed that while for the proposed methodology (Utopia methodology that was accompanied by agroecological practices) it was \$842.87/ha MX, for the conventional it was \$10,364.00/ha MX.

In line with the above, before applying the proposed methodology, there was a yield of 600-800 kilos of corn/ha in the milpa, while at the end of the first production cycle, integrating the new knowledge, it reached between 3-4 tons per hectare.

Other socio-economic achievements of the project were:

- Synergies were generated with other Secretariats of State, Federal and Municipal Government.
- Collaborations with other actors in the territory were strengthened to generate concurrence in material, economic and social capacity resources, such as with the Production for Welfare Program (PPB) of the Ministry of Agriculture and Rural Development (SADER), the National Commission for Knowledge and Use of Biodiversity (CONABIO), the Autonomous University of Yucatán (UADY), among others.
- 18 groups of milperos and milperas were initiated, strengthening community leadership.
- Seeds and other varieties of products were identified to be exchanged or purchased among the milpa project groups.
- Some groups have set up other biofactories and purchased inputs with their own resources.
- Approaches were initiated for the commercialization and generation of proposals for products from the countryside (milpa maya).
- Food self-sufficiency was promoted for participating producers.
- 4 Mayan milpa meetings were held in the Biocultural Region of the PUUC to strengthen the exchange of knowledge and the promotion and sale of local products from participating producers.
- 1 Corn and Honey Meeting was held to strengthen the exchange of knowledge and the promotion and sale of local products from participating producers.



## GENDER IMPACTS

The project integrated the gender perspective and respect for the bioculturality of the participating Mayan producer groups. An important synergy was promoted with the Secretariat of Women (SEMUJERES) of the State of Yucatan, who accompanied at different stages of the process.

***Efforts were made to ensure the effective participation of women, especially indigenous women, with 310 trained women (22 per cent).***

It was also possible to make visible the important participation of women within the milpa system, commonly related to the planting, harvesting, selection and protection of seeds, as well as to the preparation of food and the care of the plots and orchards; ensuring channels of participation and free expression, as well as spaces for reflection. This is due to the fact that milpera women still encounter obstacles to fully exercise their capacities, for example, due to the lack of access to land tenure and various situations that make their active participation in decision-making in public settings complex.

The achievements of the project in terms of gender perspective were:

- 18 workshops on governance were held where proposals were generated to promote the participation of women in this sector.
- Realization of 1 “Workshop women in the Mayan milpa, meliponiculture and beekeeping” with the participation of 84 women from 19 localities, whose objective was to strengthen and make visible the importance of women within the milpa productive system.
- 26 ejidos participated through operations carried out together with the Agrarian Prosecutor’s Office (PA) and the National Agrarian Registry (RAN), with special emphasis on disseminating and generating accessibility for the transfer of ejido property to women and youth.
- 7 trainings were provided to state officials and key actors on gender perspective and sustainable rural development.

## POLICY IMPACTS

The project is in addition to the national policies promoted by the Ministries of Agriculture and Rural Development and the Ministry of Environment and Natural Resources for collaboration through actions and measures aimed at guaranteeing a healthy environment in Mexico and strengthening the sustainable development of the countryside.

It also contributes to the fulfilment of the objectives of the Sustainable

Rural Development, the General Sustainable Forestry Development Law and the General Climate Change Law, and the Sustainable Development Goals of the 2030 Agenda.

It also contributes to the objectives of the State Development Program 2018-2024 and the initiative of the 2040 Agenda of the State of Yucatan, articulating the implementation of a State policy for “low-emission

rural development” as a mechanism aimed at reducing deforestation and forest degradation in the State of Yucatan, with particular attention to the goals of the Pdel of the Biocultural Region of the PUUC.

On the other hand, the milpa is a traditional system with high value, one of the main objectives of the State Government being that the **Mayan milpa** be **recognized as GIAHS, satisfactorily achieved in November 2022.**



## SUSTAINABILITY

The success factors of the project included linkages, collaborations and alliances managed with other institutions and communities in the territory to increase impacts; articulated, committed and coordinated work between the executing institutions of the project; the relationship of trust that was generated with local and indigenous communities that fostered the commitment and involvement of the participants; as well as the support of the municipalities.

In the 18 groups formed, community leadership was promoted in each one in order to generate collective and organizational strategies after the exit of the project. On the other hand, both the Government of the State of Yucatán and JIBIPUUC, together with other actors, endorsed their commitment in the area to continue the actions and continue strengthening the Mayan milpa and good agroecological practices in favor of the Yucatecan countryside.

## ASSOCIATIONS

Several alliances have been made both in the community, with civil organizations, collectives, local, municipal, state and federal government, as well as with international organizations:

- *International Cooperation Organizations: GCF-Mexico, PRONATURA Sur, UNDP, PPD.*
- *Federal Agencies: SADER (Production for Welfare), CONAFOR, CONABIO, CONANP, INCA RURAL, SEMARNAT, INAH, PROFEPA, PA, RAN.*
- *State agencies: SEMUJERES, SEDECULTA, SEDER, Sub Secretariat of Agrarian Affairs, SEPLAN, INDERM, CESVY, IYEM.*
- *Municipalities: Muna, Oxkutzcab, Santa Elena, Peto, Tekax, Ticul, Tzucacab and Yaxcabá.*
- *Allied organizations: Kaxil Kiuk A.C., EDUCAMPO, PRONATURA.*
- *Local governments: Ejido commissioners, community project leaders.*
- *Allied local universities: Universidad Tecnológica Regional del Sur (Tekax), Instituto Tecnológico Superior del del Southern Yucatan (ITSY Oxkutzcab), Technological University of Mayab (Peto), Autonomous University of Yucatan (UADY).*
- *Other allies.*



## REPLICATION AND APPLICABILITY

This project can serve as an inspiration for adaptation and replicability in subnational governments seeking to deal with challenges such as food security, biodiversity conservation, natural resource degradation, climate change and the pursuit of increased resilience, the preservation of traditional knowledge, the strengthening of farming communities and the promotion of sustainable agricultural systems. In order to achieve a more sustainable, equitable and resilient agriculture, which benefits both local communities and the environment.

For the replicability of this project in other regions with similar realities, the following elements would need to be taken into account:

**Natural environment and main crops of the region:** It is necessary to adapt the project to the local needs, the natural environment, the main crops and cultivation methods of the region.

**Legal and cultural framework:** This project is based on traditional practices and ancestral knowledge of the Mayan community. Therefore, it is essential to consider the legal and cultural framework of the region to ensure that these aspects are respected and valued. In addition, any legal barriers that may arise in relation to the use of native seeds, traditional agricultural practices, or intellectual property rights of indigenous knowledge must be addressed.

**Community-Based Adaptation (AbaC) Approach:** It is important to adopt a theoretical-practical approach to climate change adaptation that strengthens local capacities, provides access to resources, services and information, and promotes institutional strengthening and governance. This approach will allow communities to gain the ability to make adjustments and respond to unfavorable events, reducing their vulnerability and being able to adapt autonomously even after a project ends.

**Theory of Change:** A theory-of-change approach should

be used to design, execute, monitor, and evaluate interventions that address the complexities of the challenge within the territory. This approach recognises the existence of multiple levels of intermediate results that contribute to the process of positive change and considers the action of other actors involved in achieving the objective. This will help to understand the elements, relationships, and dynamics within the specific reality of the target region.

**Valuation of ancestral production techniques:** It will be essential to start from the respect, recognition and appreciation of the traditional scientific knowledge and ancestral production techniques of local communities and to enhance them through science and new technologies. This involves combining traditional scientific knowledge with new advances to strengthen traditional agricultural practices in the face of new climate challenges; incorporating and ensuring active participation as well as harmonization with the culture and respect for the decisions of the community.

**Prioritization of areas at high risk of deforestation:** It is recommended to identify and prioritize areas that present a high risk of deforestation, especially those related to land-use change for agricultural production. These areas should receive special attention to mitigate negative impacts and promote sustainable agricultural production practices.

**Flexibilization of market insertion mechanisms:** The aim is to facilitate the participation in the markets of products made under traditional practices and techniques, which are part of the local worldview and culture. To this end, it is necessary to explore the integration of agroecological innovation proposals and technology that allow migrating towards improved approaches to traditional production technique, such as the improved Mayan Milpa.

**Community involvement:** The Mayan Milpa project is developed in close collaboration with the local community. To replicate it in other regions, it would



be essential to establish strong partnerships with local communities and encourage the active participation of farmers as well as leaders at all stages of the project. This could include training, workshops, dialogue, and participatory decision-making processes.

**Financial resources:** To replicate the project, financial resources are required to provide support to farmers, train technical staff, set up necessary infrastructure, and cover other related expenses. It would be important to explore appropriate sources of funding, such as government funds, development organizations, grants or international cooperation programmes.

**Knowledge transfer:** The Mayan milpa is based on traditional agricultural knowledge and practices passed down from generation to generation. To replicate the project in other contexts and with other communities and crops, it would be necessary to develop strategies for knowledge transfer between local communities and new contexts. This could involve training programs, exchange of experiences, technical accompaniment, and promotion of the conservation of ancestral knowledge.

**Partnerships and collaborations:** establish strong partnerships with other relevant actors, such as non-governmental organizations, research institutions, private companies, other government sectors, and local communities. Collaboration between different stakeholders can bring additional resources, expertise, and capabilities to the successful implementation of the project.

**Focus on equity and inclusion:** Ensure equity and inclusion at all stages of the project, considering the needs and aspirations of different stakeholders, including smallholder farmers, indigenous communities, women, youth and children. This may involve participatory approaches, the promotion of gender equality, the incorporation of traditional knowledge and equitable benefit-sharing.

**Long-term sustainability:** It is essential to ensure the long-term sustainability of the project in the replicated regions. This involves considering aspects such as proper management of natural resources, resilience to climate change, crop diversification, and the promotion of sustainable agricultural systems. Consideration should also be given to establishing monitoring and evaluation mechanisms to ensure the continued success of the project.

By considering these factors and adapting the Mayan milpa project to the specific realities of other similar regions, it is possible to successfully replicate this initiative and promote food security, biodiversity conservation, and the strengthening of farming communities.

In addition, it is very important to highlight that the producers were trained and as a result, materials and field notebooks were generated to provide support afterwards. It is essential to highlight that the project has allowed the participants to replicate it, becoming themselves the trainers of new producers who are integrated with this agroecological methodology.



## FOR MORE INFORMATION

For more information about this project, to schedule an informative meeting, address any queries, and/or obtain support in the execution of similar projects, please contact us via: [info@regions4.org](mailto:info@regions4.org).



Case  
Study  
Database



RegionsWithNature

### ABOUT REGIONS4

Regions4 (formerly known as the nrg4SD) is a global network that solely represents regional governments (states, regions and provinces) before UN processes, European Union initiatives and global discussions in the fields of climate change, biodiversity and sustainable development. Regions4 was established in 2002 at the World Summit in Johannesburg and currently represents over 40 members from 20 countries in 4 continents. Through advocacy, cooperation and capacity building, Regions4 empowers regional governments to accelerate global action.

For more information visit: [www.regions4.org](http://www.regions4.org)  
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