INTERNATIONAL TROPICAL TIMBER ORGANIZATION

ITTO

PROJECT DOCUMENT

TITLE:	STRENGTHENING THE RESILIENCE OF INDIGENOUS MAYAN COMMUNITIES IN TROPICAL FORESTS OF THE YUCATAN PENINSULA THROUGH THE SUSTAINABLE USE OF BIODIVERSITY IN THE CONTEXT OF THE MAYA TRAIN PROJECT
SERIAL NUMBER:	**PP-A/60-368**
COMMITTEE:	REFORESTATION AND FOREST MANAGEMENT
SUBMITTED BY:	GOVERNMENT OF MEXICO
ORIGINAL LANGUAGE:	SPANISH

SUMMARY

The Yucatan Peninsula has a great biocultural wealth thanks to the diversity of its ecosystems and the heritage of the Mayan culture. However, the extent of tropical forests, their environmental services and the traditional knowledge associated with these ecosystems have all decreased due to recurrent land use changes in the region. Current threats are related to the expansion of industry, agroindustry, cattle ranching and mass tourism.

The recent introduction of the Maya Train megaproject in the region underscores this concern. Although the Maya Train is a national priority project and seeks to boost employment and economic development, there are potential unforeseen impacts on the environment and local indigenous communities. In this regard, this project seeks to:
1. Safeguard ecosystems and their native and endemic species in anticipation of impending ecological changes, with recommendations based on research findings.
2. Promote sustainable livelihoods of local communities that envisage the conservation and sustainable use of tropical forests, promoting the maintenance of biodiversity and preserving their traditions and knowledge.
3. Create public awareness about the importance of traditional knowledge for the management of biodiversity, as well as the relevance of actions for the preservation of tropical forests.

Proposed outputs and activities include research on flora, fauna, environmental services and traditional knowledge; training on strategies for strengthening the local economy; and dissemination of research topics among target communities and cities, decision-makers and public policy makers.

EXECUTING AGENCY:	NATIONAL SCHOOL OF HIGHER EDUCATION, MERIDA UNIT, NATIONAL AUTONOMOUS UNIVERSITY OF MEXICO
DURATION:	12 MONTHS (from 1 April 2024 to 31 March 2025)
ESTIMATED STARTING DATE	UPON PROJECT APPROVAL

BUDGET AND PROPOSED FUNDING SOURCES:

Source	Contribution in US$
ITTO	**227,097**
Government of Mexico	110,000
TOTAL	**337,097**

Contents

List of abbreviations and acronyms

CONABIO	National Commission for the Knowledge and Use of Biodiversity *(Comisión Nacional para el Conocimiento y Uso de la Biodiversidad)*
CONAFOR	National Forestry Commission *(Comisión Nacional Forestal)*
CONANP	National Commission for Natural Protected Areas *(Comisión Nacional de Áreas Naturales Protegidas)*
EA	Executing Agency: ENES Mérida
ENES Mérida	National School of Higher Education of the UNAM Merida Unit *(Escuela Nacional de Estudios Superiores Unidad Mérida de la UNAM)*
ITTC	International Tropical Timber Agreement
ITTO	International Tropical Timber Organization
SDG	Sustainable Development Goals, United Nations Organization
UNAM	National Autonomous University of Mexico *(Universidad Nacional Autónoma de México)*

Note: The terms "tropical forest" and "rainforest" are used interchangeably throughout this document.

Project brief

The Yucatan Peninsula has a great biocultural wealth thanks to the diversity of its ecosystems and the heritage of the Mayan culture. However, the problem is that the extent of tropical forests, their environmental services and the traditional knowledge associated with these ecosystems have all decreased due to recurrent land use changes in the region. Current threats are related to the expansion of industry, agroindustry, cattle ranching and mass tourism. The recent introduction of the Maya Train megaproject in the region underscores this concern. Although the Maya Train is a national priority project and seeks to boost employment and economic development, there are potential unforeseen impacts on the environment and local indigenous communities.

The development objective of this project is the conservation and sustainable use of tropical forests and the valuation of related traditional knowledge. The specific objective of the project is to promote the sustainable use of forest resources through the strengthening of local enterprises and to increase knowledge about forests and related traditional knowledge among the community members and cities under study, decision-makers and public policy makers.

The proposed project's direct beneficiaries and primary stakeholders are selected indigenous Mayan communities (Tankuché, Campeche; Xcunyá, Yucatán; Punta Laguna, Quintana Roo and Bacalar, Quintana Roo) because they carry out traditional activities that depend on the rainforest to thrive. These communities are located less than 100 km from the most populated cities of the Yucatan Peninsula (Campeche, Campeche; Merida, Yucatan; Cancun and Chetumal, Quintana Roo), which is important for the rural-urban links relevant to this project.

Secondary stakeholders are the local enterprises selected in the target communities, which will benefit from technical assistance to strengthen their value chains. Other beneficiaries of the project at this level are the residents of both rural communities and selected cities, decision-makers and policymakers, since they are the target audience for the project's outreach efforts. Educational and research institutions will also benefit from the possibility of achieving their academic research and outreach objectives, as well as opening up possibilities for collaboration between various stakeholders. Government agencies such as CONAFOR, CONABIO and CONANP will facilitate links among the communities where they have a presence and will be able to provide technical support to the project.

Tertiary stakeholders include the Secretariat of Sustainable Development of Yucatan, the Secretariat of Environment, Biodiversity, Climate Change and Energy of Campeche, the Secretariat of Sustainable Urban Land Development of Quintana Roo, and the municipalities of Calkiní, Solidaridad, Merida and Bacalar where the target communities are located. These institutions will facilitate connections among the population and will benefit from the availability of scientific information for decision making.

The project will be implemented by working together with the target communities and the team of experts. Broadly speaking, for the research component, various methodologies will be used, such as field trips, botanical collections and interviews. For the strengthening of local enterprises, a diagnosis, a business plan and the training needed in each case will be carried out. Outreach efforts will be carried out in conjunction with translators and illustrators. In all cases, the primary stakeholders and other participants will be involved in the proposed activities and gain new skills.

Project results will be sustained even after project completion through:
- The web page and outreach materials in Spanish, Mayan and English, which will remain available for open reference even after the end of the project.
- The training provided to local enterprises on strategies to strengthen their productive chains will have long-term effects.
- The workshops for the dissemination of results, which will include participants from the communities, decision-makers, public policy makers and the academic sector, will seek to strengthen ties between stakeholders that will last beyond the life of the project.

This project is based on the assumption that the target communities will be interested in participating in the research and will continue with their enterprises. To reduce the risk of failure to do so, the project will

work with communities where previous work has already been done; also, local authorities will be approached for their support.

Another assumption is that government agencies will be willing to continue with the work of disseminating the project. To reinforce this, all digital materials will be made available free of charge and free to download.

It is assumed that the target audience will make changes in their actions to strengthen the economy and sustainable use of forests. To this end, the proposed mass communication and outreach campaign and webpage to be developed with materials in Spanish, Mayan and English will seek to maintain the message and recommendations for actions published and accessible even after the end of the project. In addition, part of the strategy to improve the value chains of enterprises aimed at tropical forest sustainability will include increased and more regular promotion and communication with potential responsible consumers.

One of the potential risks during the field work is that the project may be perceived as biased in support of a political party. This may arise because 2024 is an election year and the Maya Train megaproject has created controversy and has had strong partisan overtones. However, care will be taken to maintain a neutral position in the project, without political views. Research instruments such as surveys and interview guides will be generated without biased or leading questions. All field trips and workshops will be carried out wearing visible identification, with clothing bearing ENES Merida labels, using the colours of the university. Official vehicles with school identification plotting will be used.

It is worth mentioning that although the Yucatan Peninsula is considered to be one of the safest areas in the country, all field trips will be conducted in work groups, and road trips will only take place during daylight hours. All field trip participants will be insured by the university.

Indicative budget (in US$)

Description	ITTO	Counterpart	TOTAL
10 Personnel	$ 70,735.00	$ 41,300.00	$ 112,035.00
20 Sub-contracts	$23,280.00	-	$23,280.00
30 Travel and DSA	$ 46,100.00	-	$ 46,100.00
40 Capital items	$ 38,650.00	$ 68,700.00	$107,350.00
50 Consumable items	$ 4,000.00	-	$ 4,000.00
60 Miscellaneous	$ 10,000.00	-	$ 10,000.00
80 Project monitoring and administration	$ 34,332.00	-	$ 34,332.00
TOTAL	$ 227,097.00	$ 110,000.00	$ 337,097.00

PART 1. PROJECT CONTEXT

1.1.   Origin

The loss of forests and wetlands in Mexico has increased in recent decades, diminishing their environmental services and the traditional knowledge associated with their use and management. The Yucatan Peninsula in Mexico has a rich biocultural heritage resulting from the diversity of its ecosystems and centuries of management by indigenous Mayan peoples. However, the east coast of the peninsula (Cancun-Tulum) is a hub of large-scale tourism that has led to a reshaping of the social fabric, land tenure patterns, access to resources and wealth distribution. Given the widespread lack of paid jobs in rural areas, climatic changes affecting agriculture and fishing, industrial and agro-industrial expansion, and the lack of interest in the rural sector by younger generations, tourism attracts labor from the communities, offering jobs that usually do not require traditional knowledge of nature. The operation of the Maya Train megaproject (https://www.trenmaya.gob.mx/) in the region starting in late 2023 is further boosting tourism, increasing the vulnerability of rural livelihoods and traditional knowledge. The expectation of the train's arrival has triggered a real estate boom, promoting accelerated changes in land use and replacing agricultural and grazing areas, as well as fallow areas (*acahuales)*, areas of tropical forests and wetlands, with urban developments around major cities (Merida, Cancun and Campeche). This pressure also extends along the route of the train tracks and along the coast, which is particularly exposed to tourism and real estate developments seeking proximity to the beach and access to land to the detriment of native vegetation. Therefore, it is of utmost importance to anticipate land transformation in the face of the Maya Train in order to reconcile economic development and sustainability.

1.2.   Relevance

1.2.1 Conformity with ITTO's objectives and priorities

This project will help meet the objectives of the International Tropical Timber Agreement (ITTA, 2006) as follows:
- Article 1.c. It will contribute to sustainable development and poverty alleviation through the strengthening of local economies – Related to Sustainable Development Goals (SDGs) 1 & 8.
- Article 1.f. It will promote and support research and development by increasing the capacity to conserve and enhance other forest values in tropical forests – Related to SDGs 13, 15 & 17.
- Article 1.m. It will support the development of public policies aimed at conservation of tropical forests by sharing and disseminating research results – Related to SDGs 15 & 17.
- Article 1.q. It will promote better understanding of the contribution of non-timber forest products and environmental services to the sustainable management of tropical forests – Related to SDGs 11, 13, 15 & 17.
- Article 1.r. It will recognize the role of forest-dependent indigenous and local commuties in achieving sustainable forest harvesting and will enhance their capacities – Related to SDGs 1, 2, 8, 10 &17.

With respect to the ITTO Strategic Action Plan (2022-2026), this proposal is in line with the following priorities: Priority 2 on increasing the contribution of the tropical forest sector to national and local economies and resilient livelihoods, as it considers strengthening the value chain in the responsible consumer market; and Priority 3 on reducing tropical deforestation and forest degradation, enhancing the resilience of forest ecosystems to climate change, and conserving forest biodiversity and ecosystem services, as research will be conducted with local communities, training will be provided on the importance of ensuring the conservation of forests, wetlands, land areas and their ecosystem services, and outreach will be provided to rural communities and urban areas, as well as to decision-makers and policymakers.
The project is also closely related to ITTO Guidelines: 1) for gender equality and 2) for environmental and social management.

1.2.2 Relevance to submitting country's policies

Although there are several government agencies involved in socio-environmental issues, this project is mainly in line with the National Forestry Commission (CONAFOR) as follows: CONAFOR is a decentralized public agency of the Federal Public Administration whose goal is to develop, favor and promote productive activities for protection, conservation, restoration, sustainable use, production, marketing and technical education in order to strengthen production chains and value networks in the forestry field, as well as to participate in the development of plans and programs and in the implementation of the sustainable forest development policy and its instruments. The National Forest Program (*Programa Nacional Forestal*–PNF) 2020-2024 (Official Gazette of the Federation: 12/31/2020) is in place to contribute to and guide the achievement of this goal. This project is mainly focused on the following objectives of the PNF 2020-2024:

1. Promote community forest management for the sustainable and diversified use of forest resources, as well as the integration and development of competitive local value networks that can boost local economies to improve the quality of life of the population living in forest areas.
2. Protect forest ecosystems from damaging factors that deteriorate the vegetation cover to maintain the natural heritage and contribute to climate change mitigation, for the wellbeing of the population living in forest areas and society in general, through land-use management.
3. To conserve and restore the capacity of strategic forest areas to provide ecosystem services, through an inclusive and participatory approach that contributes to guarantee a healthy environment for the development and wellbeing of the population.

This proposal is also consistent with the General Law on Climate Change and the protection of indigenous rights in the states of Campeche, Quintana Roo and Yucatan.

Furthermore, the Maya Train megaproject policy proposes the generation of economic development for the region and the creation of natural protected areas along its route (www.trenmaya.gob.mx/MasInformacion.html).

1.3 Target area

1.3.1 Geographic location

The Yucatan Peninsula covers the states of Campeche, Yucatan and Quintana Roo in southeastern Mexico. Its outer geographic coordinates are 21°36' north and 17°49' south, latitude north, and 86°44' east and 90°59' west, longitude west. It extends over approximately 116,500 km^2. Its karst geology means that it has few surface rivers, and its drainage systems are under ground with caves and *cenotes* (natural wells). The maximum altitudes are in the range of 100 to 150 meters above sea level. It has average annual temperatures between 25 and 28°C and rainfall of less than 2,200 mm per year. Due to its geographic location, the peninsula is prone to extreme weather events such as hurricanes (INEGI 2016, CICY 2024).
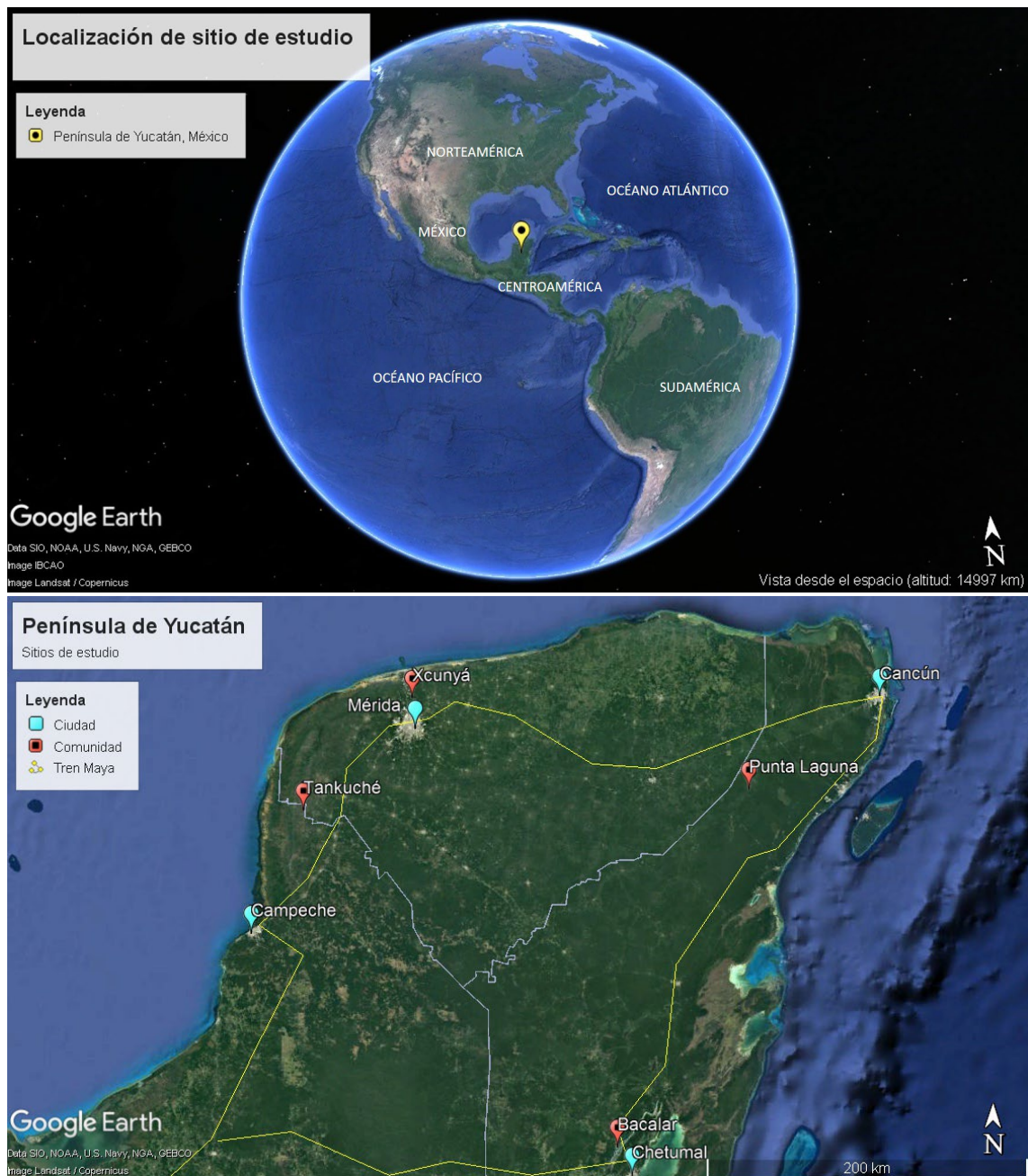
Figure 1. (top) Location of the Yucatan Peninsula in the American continent. (bottom) Study areas in the Yucatan Peninsula. The yellow lines indicate the estimated projected track of the Maya Train; only the Campeche-to-Cancun section is open to date. Source: Prepared by the authors.

1.3.2 Social, cultural, economic and environmental aspects

The Yucatan Peninsula has a rich ecological and cultural wealth (Toledo et al. 2001), resulting in a heritage generated by the millenary relationships of ancient societies that have inhabited the peninsula sharing it with the environment. Because of this, the peninsula has been classified as one of the priority biocultural regions for conservation and development in Mexico (Boege 2008). One of its most outstanding cultural traits is its language. Mayan is the second most spoken indigenous language in Mexico. There are around 765,000 Mayan speakers in the peninsula; of these, more than half a million people are in the state of Yucatán (INEGI 2020a). However, there has been a decrease of about 3% in the Mayan-speaking population in the peninsula between 2010 and 2020 (INEGI 2020a).

The ecological wealth of the region is reflected in the diversity of ecosystems, such as low and medium rainforests, savannas and pasturelands, as well as coastal mangrove vegetation, seagrasses, reef

formations, flood forests and *petenes (islands of varied vegetation)* (Durán and García 2010). Traditional forms of management, mainly Mayan, are related to these ecosystems through *milpas* (food crops), traditional hunting, fishing, diversified production in house farms, honey production, and knowledge about the environment called "monte" (bushland), among others. Some examples of human intervention in the structure of forests are the so-called "Mayan gardens" favouring certain fruit species (Ford and Nigh 2009), or in the secondary forests surrounding the city of Mérida and other urban centers in the region due to the past henequen activity (Mizrahi et al 1997).

There is a vast traditional knowledge about nature that has developed in an empirical way over time. The Mayan cosmovision includes perceptions and relationships with the forests, integrating religious, magical, ecological and utilitarian elements. For example, the forest is understood as a container of multiple animals and plants, all of them live organisms with souls (Bastarrachea 2004). The ceiba is the sacred tree that sustains the world as explained in López-Austin's (1997) cosmic tree. One of the most important books, the Popol Vuh, points out the interactions between plants, animals and humans in the creation of the world, of things and of humanity itself. All this demonstrates the complexity and extent of the biocultural heritage of the region, although it is rapidly deteriorating with deforestation, loss of biodiversity, pollution, and migration from the countryside to the city, especially of young people, among other factors (Red de Etnoecología y Patrimonio Biocultural 2012). It is worth mentioning that in Mexico, the area of tropical forests has drastically decreased; between 1985 and 2014, more than 40% of the moist and dry forest area was lost (INEGI 2020b).

The Yucatan Peninsula has gone through several cycles of economic activities that have changed its forest landscape, such as the harvesting of palo de tinte, gum extraction, henequen plantations, harvesting of precious timber, and more recently tourism, intense agricultural activity, and incipient industrial activity (Pinkus 2016, Ayala et al 2014). These recent activities along with infrastructure construction by the real estate and tourism sectors are considered to be direct causes of deforestation in the peninsula (Proust et al 2015). Figure 2 shows a summary of the states of the peninsula, their population, economic activities, and data from urban and rural communities selected for this initiative.

State	Total population (no. of people)	Main economic activities
Campeche	928,363[a]	Agroindustry, seafood, forestry, mining, petrochemicals, tourism[b]
Quintana Roo	1,857,985[a]	Agroindustry, forestry, fishing, aquaculture, manufacturing, tourism[b]
Yucatán	2,320,898[a]	Trade, construction, food industry, real estate services, logistics, information technology, tourism, agroindustry, etc.[b]

Figure 2. States of the Peninsula, incuding population and main economic activities. Sources: [a]INEGI. *México en Cifras*. 2020 Census. [b] Secretariat of Economics. Economic and state information. https://www.gob.mx/se.

One of the most relevant megaprojects today is what is known as the *Maya Train (Tren Maya)* (www.trenmaya.gob.mx), a railway line that runs through the Yucatan Peninsula, initially for passenger and cargo transportation, inaugurated (but not completed) in December 2023. This train, whose official objective is to boost economic and tourism development in southeastern Mexico, has been the subject of ex-ante studies that support divergent positions (UN Habitat, Flores et al 2019). It is evident that this work entails multiple socio-environmental changes, transcending time and space, and is therefore considered in this study.

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1.4   Expected outcomes at project completion

This project seeks to promote the sustainable use of forest resources through the strengthening of local enterprises and to increase information about forests and associated traditional knowledge by the residents of target communities and cities, decision-makers and public policy makers. In this regard, the expected outcomes at project completion are:

- Generate information on forest resources and traditional knowledge of the region associated with their use and conservation.
- Increase the number of people involved in tropical forest conservation activities.
- Maintain the forest area and avoid deforestation.
- Increase the awareness of rural and urban populations, decision makers and policy makers in the study areas so that they value the environmental services of forests and the importance of traditional knowledge.

PART 2. PROJECT RATIONALE AND OBJECTIVES

2.1. Rationale

2.1.1 Institutional set-up and organizational issues

The Yucatan Peninsula has multiple research institutions that have improved the knowledge on its social and environmental resources, for example the National Autonomous University of Mexico (UNAM - Yucatan Campus), Autonomous University of Yucatan (UADY), University of Quintana Roo, Intercultural Mayan University of Quintana Roo, Autonomous University of Campeche, Center for Scientific Research of Yucatan (CICY), Center for Research and Higher Studies in Social Anthropology (CIESAS Yucatan), Southern Border College (ECOSUR), and Center for Research in Geospatial Information Sciences (Geo Center), among others.

Other public organizations working in the project field in the peninsula include the following: at the federal level, the National Forestry Commission (CONAFOR), the National Commission for the Knowledge of Biodiversity (CONABIO) and the National Commission for Natural Protected Areas (CONANP); at the state level, the secretariats related to sustainable development and culture in each state; at the municipal level, the directorates. One of the points to consider in these governmental bodies is the establishment of priorities and allocation of funds according to the objectives of each administration period.

It should be pointed out that there are many active organizations and associations, such as Pronatura – Yucatan Peninsula; Guardianes de las Semillas; and Centinelas del Agua, among others. Finally, there have been international organizations, such as the United Nations Educational, Scientific and Cultural Organization (UNESCO), that have also been involved in the area.

Each organization pursues its own causes and implements its own projects, which strengthens the institutional fabric in the Yucatan Peninsula. However, there is currently a lack of information integration work as proposed in this project.

2.1.2 Stakeholder analysis

Primary stakeholders
The project's direct beneficiaries and primary stakeholders are Mayan indigenous communities, which have been selected because they carry out traditional activities. These communities are located less than 100 km from the most populated cities of the Yucatan Peninsula, which is important for the rural-urban linkages of relevance to this project.

Figure 3 shows the target rural communities and cities, their population and the type of forest-dependent activity implemented. In particular, the Xcunyá group is mainly made up of women.

State	Target cities and population	Target communities and population	Tropical forest-dependent activites
Campeche	Campeche (c. 250,000 inhab. [a])	Tankuché (c. 1000 inhab.[b])	Beekeeping and meliponiculture
Quintana Roo	Cancún (c. 890,000 inhab. [a]) Chetumal (c. 170,000 inhab. [a])	Punta Laguna (c. 150 inhab.[c]) Bacalar (c. 41,754 inhab[e])	Ecotourism
Yucatán	Mérida (c. 890,000 inhab.[a])	Xcunyá (c.1000 inhab.[d])	Medicinal plants production and meliponiculture

Figure 3. States of the peninsula with their population and main economic activities. Sources: [a] INEGI. *México en Cifras* (2020 Census), [b] INEGI Main results by locality. Campeche. XII General Census of Population and Housing 2000. [c] State Population Council, Government of Quintana Roo. Locality catalog by municipality 2010. [d] MetrópoliMID.*Estudio demográfico y territorial 2023. Crecimiento de la ciudad de Mérida: Cuantificación y dimensionamiento de la periferia urbana.*[e] *Data Mexico*. Bacalar. Available in: https://www.economia.gob.mx/datamexico/es/profile/geo/bacalar?redirect=true

Secondary stakeholders

Local enterprises that are already engaged in activities that support the sustainable use of forests (e.g. meliponiculture, ecotourism) in the target communities will be selected. These enterprises will benefit from advisory services to strengthen their value chains.

Other project beneficiaries will be the residents of both rural communities and selected cities, as well as decision-makers and policymakers, since they are the target audience for the project's outreach efforts. This is because they are the main users of forest ecosystems under study and their actions have a direct impact on them.

Educational and research institutions will also benefit from this project because of the possibility of achieving their academic research and outreach objectives, in addition to opening up possibilities for collaboration between different stakeholders.

Governmental agencies such as CONAFOR, CONABIO and CONANP will facilitate links among the population where they have a presence and will be able to provide technical support to the project.

Tertiary stakeholders

The Secretariat of Sustainable Development of Yucatan, the Secretariat of Environment, Biodiversity, Climate Change and Energy of Campeche, the Secretariat of Sustainable Urban Land Development of Quintana Roo, the municipalities of Calkiní, Solidaridad, Merida and Bacalar where the target communities are located, will facilitate connections among the population and will benefit from the availability of scientific information for decision-making.

Figure 4 shows an analysis of the project's primary and secondary stakeholders.

Stakeholder group	Characteristics	Problems, needs, interests	Potential	Project involvement
Primary stakeholders				
Rural Mayan communities (Bacalar, Punta Laguna, Tankuché, Xcuyá)	They live in and use tropical forests through their traditional practices	They lack the tools to strengthen the local economy and value their traditional knowledge and practices	Local knowledge, access to forest resources	Primary project beneficiaries
Secondary stakeholders				
Local enterprises involved in diverse activities such as meliponiculture, beekeeping and ecotourism	Generate non-timber forest products	They lack tools to strengthen the production chain, advertising and marketing of products to make their business economically viable and sustainable	Local knowledge, and a range of products and services to offer.	Secondary project beneficiaries
Outreach audience, especially in urban areas close to rural communities, decision-makers and public policy makers	They usually live in or visit the ecosystems under study	Lack of knowledge and appreciation of ecosystems, environmental services and the richness of Mayan culture. Their actions impact the ecosystems under study	Access to mass communication media	Secondary project beneficiaries

Stakeholder group	Characteristics	Problems, needs, interests	Potential	Project involvement
Governmental agencies related to the project (CONAFOR, CONABIO, CONANP)	They work in the region on the basis of their responsibilities and functions	Lack of integration of agencies' efforts	Access to their constituents and public spaces, governmental support. They are generators of public policies	They can collaborate in the implementation of project activities, technical support
Education and research institutions (UNAM - Yucatan Campus)	Educational and research goals	Lack of integration and dissemination of their findings	Expertise in research and knowledge of the region	They can collaborate in the implementation of project activities, technical support
Tertiary stakeholders				
State Secretariats, Municipalities	They work in the region on the basis of their responsibilities and functions.	Lack of integration of agencies' efforts	Access to their constituents and public spaces, governmental support and implementation of public policies at the local level.	They can collaborate in the implementation of project activities, technical support

Figure 4. Project stakeholder analysis. Source: prepared by the authors.

2.1.3 Problem analysis

The Yucatan Peninsula has a great biocultural wealth due to the diversity of its ecosystems and the heritage of the Mayan culture. However, the extent of forests and wetlands, along with their environmental services and the traditional knowledge associated with them, has diminished. The region has changed its land uses over time, especially due to the expansion of industry, agroindustry and mass tourism. The construction of infrastructure in the region to promote these sectors includes the mega-project called "Tren Maya" (*Maya Train*), which began operations in December 2023. This situation has generated a great deal of real estate speculation around the towns and along the coast, increasing the vulnerability of the forest and other ecosystems, of rural livelihoods, and has jeopardized the transfer of traditional knowledge. In this context, there is insufficient scientific information on forests, as well as insufficient awareness and education about these ecosystems. There is no large-scale campaign to disseminate information on this issue and the efforts of the work already done need to be integrated. Another cause of the problem is that local economies are not strong, especially because they lack strategic planning, business plans and training. Figure 5 shows a problem tree to help understand in greater detail the causes and problems of the key problem to be addressed.

Figure 5. Problem tree showing the key problem to be addressed (in black), effects (upper levels) and causes and subcauses (lower levels). Source: prepared by the authors.

Against this background, the project aims to: 1. help conserve and maintain traditional knowledge through research and documentation, and strengthen the local economy by valuing the rural way of life and the sustainable use of forest resources, thus reducing the desertion of the countryside; 2. while strengthening the local economy is part of the search for regional economic development, its goal is endogenous development, i.e. development within the communities themselves. By supporting local enterprises that manage to keep the standing forest, economic activities are diversified, without relying solely on tourism, which is growing in the region. It should be pointed out that at the time of the COVID-19 pandemic, the tourism sector was one of the most severely affected and people in rural areas returned to their traditional practices as an alternative.

Figure 6 shows how the problems identified in Figure 5 are turned into objectives to be pursued by the project. Outputs and activities are in line with these objectives as can be seen below.
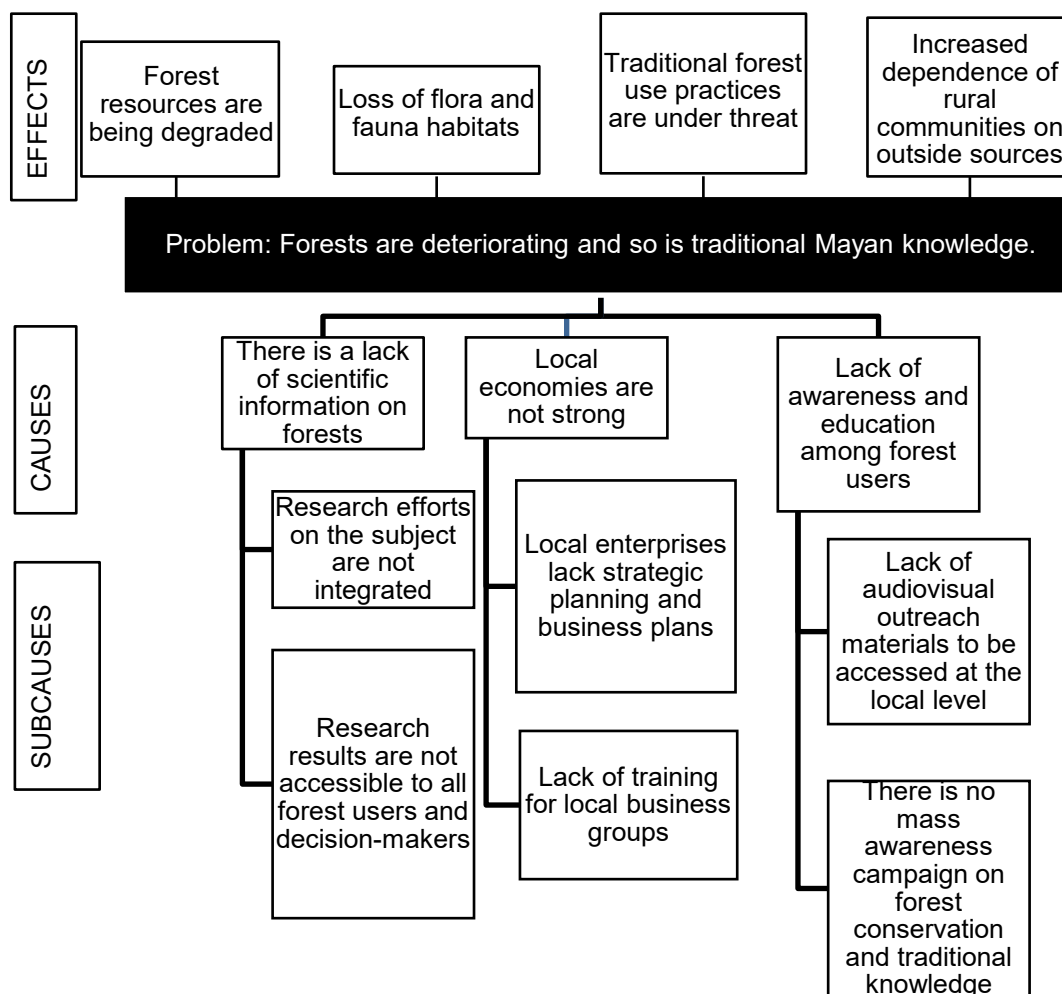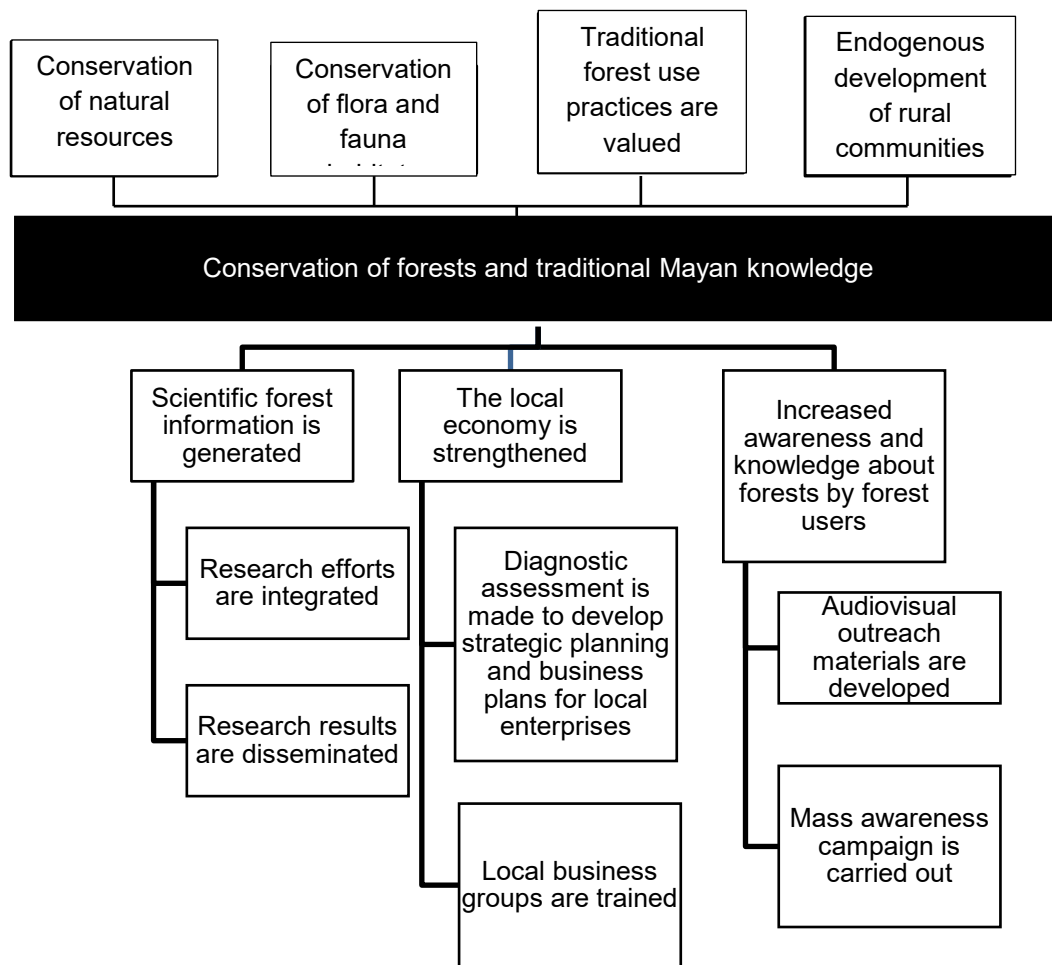
Figure 6. Objectives tree showing the key problem to be addressed (in black), effects (upper levels) and causes and subcauses (lower levels). Source: prepared by the authors.

2.1.4 Logical framework matrix

Intervention strategy	Measurable indicators	Means of verification	Key assumptions
Development objective Ensure the conservation and sustainable use of forests and the valuation of associated traditional knowledge.	*Impact indicators* *Deforestation rate in the Yucatan Peninsula. * Number of local enterprises with tropical forest conservation activities and use of traditional knowledge registered in the Yucatan Peninsula.	Collect quantitative information on indicators. Review reports on the subject	*Sustainability assumptions* * The communities will have an interest in continuing with their enterprises. * Government agencies will be willing to continue disseminating materials generated by the project.
Specific objective Promote the sustainable use of forest resources through the strengthening of local enterprises and increase awareness about the forest and associated traditional knowledge among residents of target communities and cities, decision-makers and public policy makers.	*Outcome indicators* *Number of enterprises supported. *Number of jobs for activities involving tropical forest conservation. *Area of tropical forest used for tropical forest conservation and sustainable use activities. *Number of people reached by outreach materials.	Collect quantitative information on indicators. Project progress reports	*Development scenario linking the specific objective to the development objective* *The communities will be interested in continuing with their enterprises. *Government agencies will be willing to continue with the dissemination of materials generated by the project. *The outreach audience will make changes in their actions that favor the strengthening of the local economy and the conservation and sustainable use of forests.
Outputs 1. Research results 2. Training courses and strategies to strengthen the local economy. 3. Outreach materials	*Output indicators* 1.1 Number of academic papers related to the project. 1.2 Number of decision-makers reached by the publications. 2.1 Number of people working in activities based on the sustainable use of forests. 2.2 Degree of improvement in their operations, quality and marketing of their goods and services. 2.3 Number of hours of training per group and total number of people trained. 3.1. Number of outreach materials produced. 3.2. Number of people reached by outreach materials	Collect quantitative information on indicators	*Operational assumptions linking outputs to the specific objective* *The communities will be interested in continuing with their enterprises. *Government agencies will support actions for the conservation and sustainable use of forests. *The outreach audience will make changes in their actions that favor the strengthening of the local economy and the conservation and sustainable use of forests.

Figure 7. Project logical framework matrix. Source: prepared by the authors.

2.2 Objetives

2.2.1 Development objective and impact indicators

The development objective is to ensure the conservation and sustainable use of forests and the valuation of associated traditional knowledge. This addresses the key problem of the problem tree. In addition, it is in line with the objectives of ITTO and government agencies at the three levels of government (federal, state and municipal) as previously mentioned. It also contributes to moving towards the achievement of the Sustainable Development Goals and targets (SDGs) of the United Nations for the 2030 Agenda as follows: SDG 1) *No poverty*, by strengthening the rural economy of Mayan indigenous communities; SDG 4) *Quality education*, by offering relevant outreach materials for rural and urban communities, decision-makers and public policy makers; SDG 5) *Gender equality*, by promoting the empowerment of businesswomen; SDG 10) *Reduced inequalities,* by strengthening work alternatives where local rural knowledge is valued; SDG 11) *Sustainable cities and communities*, by contributing to education on environmental services of forests in rural and urban areas; SDG 12) *Responsible consumption and production*, by working on strategies to improve the value chain of goods and services; SDG 13) *Climate action*, by promoting the conservation of the forest cover, which helps mitigate climate change; SDG 15) *Life on land*, by promoting the conservation and sustainable use of forests; SDG 17) *Partnerships for the goals*, by supporting collaboration between the academic sector, communities and government agencies.

In addition, this project addresses the proposals of the strategic plan of the United Nations on "Global Forest Goals" by improving the benefits and livelihoods associated with the forest environment, mobilizing resources and promoting cooperation across various sectors. All of these actions will also contribute to Mexico's COP26 commitments on climate change mitigation and adaptation.

The long-term impact indicators for this objective are:
- Deforestation in the Yucatan Peninsula is reduced.
- More jobs are generated in activities involving tropical forest conservation.
- Increased area of tropical forest used for conservation activities and sustainable tropical forest use.

2.2.2 Specific objective and outcome indicators

Promote the sustainable use of forest resources through the strengthening of local enterprises and increase awareness about the forest and associated traditional knowledge among residents of target communities and cities, decision-makers and public policy makers.

Outcome indicators are:
- Number of local enterprises supported.
- Number of jobs for activities involving tropical forest conservation.
- Area of tropical forest used for tropical forest conservation and sustainable use activities.
- Number of people reached by outreach materials.
- Number of people trained.

PART 3. DESCRIPTION OF PROJECT INTERVENTIONS

3.1   Outputs and activities

3.1.1 Outputs

During the term of the project, the following outputs will be produced and measured using the proposed indicators:

Output 1. Research results have been published and made available to decision-makers.
Indicators
1.1. Number of academic papers completed.
1.2. Number of decision-makers reached by the publications.

Output 2. Target communities have been trained in strategies to strengthen their local economy.
Indicators
2.1. Number of people working in activities based on the sustainable use of forests.
2.2. Degree of improvement of operations, quality and marketing of goods and services of enterprises in selected communities.
2.3 Number of hours of training per group and total number of people trained.

Output 3. The populations of target communities and cities have become more aware of and value the importance of the conservation and sustainable use of forests and associated traditional knowledge.
Indicators
3.1. Number of outreach materials produced.
3.2. Number of people reached by outreach materials.

3.1.2 Activities

Output 1. Research results have been published and made available to decision-makers.
Activities
A1.1. Development of interactive map on biocultural heritage initiatives associated with the sustainable use of tropical forests in the Yucatan Peninsula.
A1.2. Collection of information on flora and fauna species, environmental services, and traditional knowledge.
A1.3. Workshop for the dissemination of results among communities and decision-makers.

Output 2. Target communities have been trained in strategies to strengthen their local economy.
Activities
A2.1. Diagnostic assessment of local enterprises in accordance with the indicators of the Green Rural Enterprise model (Lazos et al. 2016).
A2.2. Development of a business plan for each selected local enterprise.
A2.3. Training courses and strategies to strengthen the production chain based on the needs identified in the business plan and in the assessment.

Output 3. The populations of target communities and cities have become more aware of and value the importance of the conservation and sustainable use of forests and associated traditional knowledge.
Activities
A3.1. Development of an illustrated guide of flora and fauna species in Mayan, Spanish and English.
A3.2. Production of audiovisual clips in Mayan, Spanish and English on the topics of environmental services of forests and traditional knowledge.
A3.3. Outreach campaign and development and implementation of a web page with materials in Spanish, Mayan and English, for selected rural and urban areas, including decision-makers and public policy makers.

Figure 8 shows the links between project outputs and activities and the key problem to be addressed.
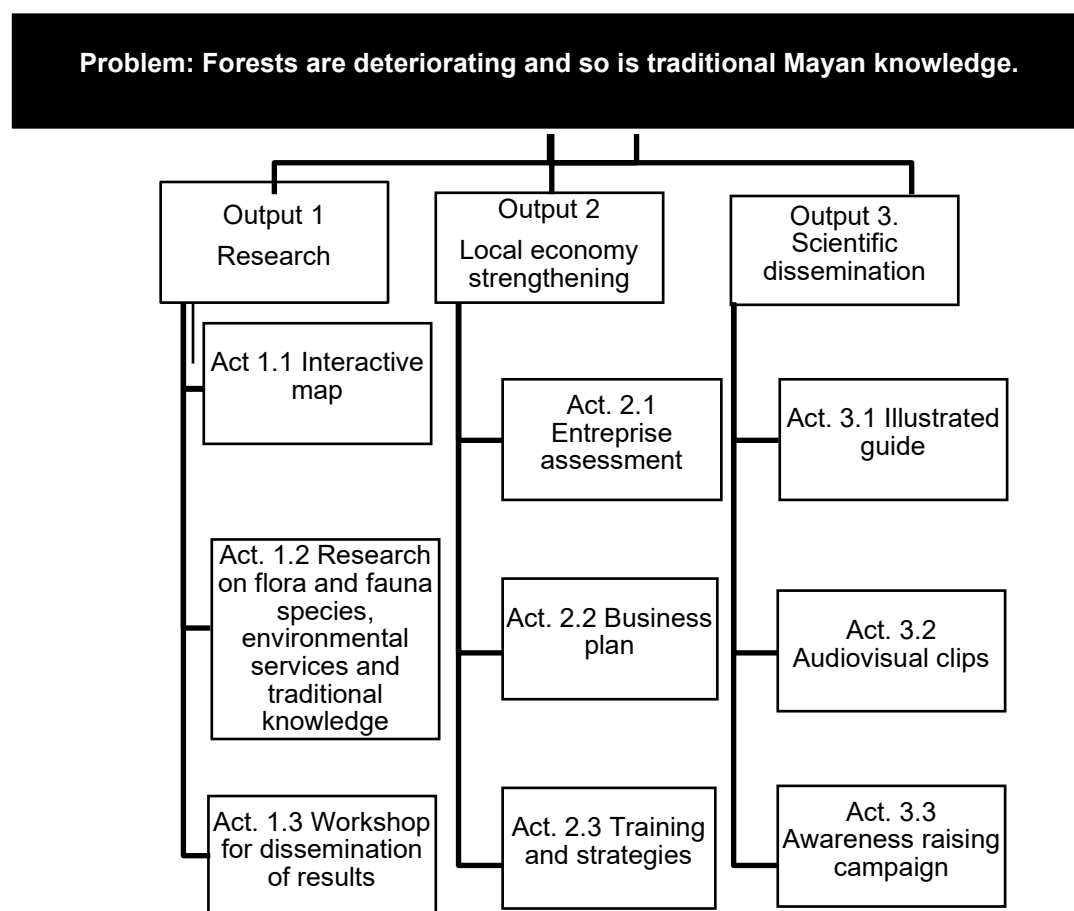

Figure 8. Relationship between the key problem and project outputs and activities as proposals to contribute to its resolution. Source: Prepared by the authors.

3.2   Implementation approaches and methods

The project will work in collaboration with all direct and indirect stakeholders/beneficiaries in the target communities and cities. A participatory approach will be used, allowing for endogenous development that can be sustained over time, even after project completion. At all times, a professional and academic stance will be maintained, away from partisan or political controversy. This is especially sensitive given that presidential, state and municipal elections will be held in 2024 in almost the entire country. The main methods to be used to carry out the activities and achieve the proposed objectives are:

- **Field trips:** to gain an in-depth knowledge of the areas and their stakeholders and obtain photographic material.
- **Interviews:** to investigate the traditional knowledge on forests, as well as on local flora and fauna. Interviews will also be conducted to supplement information for business plans.
- **Participatory mapping:** for the drafting of community maps so as to help the community to understand its land and the location of local forest resources.
- **Botanical collection:** for the identification of tree species in study areas, which will be combined with the information on their uses obtained through the interviews.
- **Use of Geographic Information Systems:** for the development of the interactive map.
- **Participatory workshops:** for the dissemination of results.
- **Outreach activities:** for dissemination of materials.
- **Training courses:** to further address the specific needs of each enterprise.

3.3 Work plan (2024/2025)

Outputs/ Activities	Responsible Party	Apr24	May24	Jun24	Jul24	Aug24	Sep24	Oct24	Nov24	Dec24	Jan25	Feb25	Mar25
Output 1. Research													
A1.1. Development of interactive map on biocultural heritage initiatives associated with the sustainable use of tropical forests in the Yucatan Peninsula	Dr David Romero	X	X	X	X								
A1.2. Collection of information on flora and fauna species, environmental services, and traditional knowledge	Dr Adi Lazos and Dr Luis Salinas	X	X	X	X								
A1.3. Workshop for the dissemination of results among communities and decision-makers	Dr Bertha Hernández					X						X	
Output 2. Local economy													
A2.1. Diagnostic assessment of local enterprises in accordance with the indicators of the Green Rural Enterprise model	Dr Adi Lazos	X	X	X	X								
A2.2. Development of a business plan for each selected local enterprise	Dr Adi Lazos and Marketing Expert	X	X	X	X								
A2.3. Training courses and strategies to strengthen the production chain based on the needs identified in the business plan and in the assessment	Dr Adi Lazos and Marketing Expert						X	X	X	X			
Output 3. Outreach													
A3.1. Development of an illustrated guide of flora and fauna species in Mayan, Spanish and English	Dr Adi Lazos and Dr Luis Salinas						X	X	X	X			
A3.2. Production of audiovisual clips in Mayan, Spanish and English on the topics of environmental services of forests and traditional knowledge	Dr Adi Lazos						X	X	X	X			
A3.3. Outreach campaign and development and implementation of a web page with materials in Spanish, Mayan and English, for selected rural and urban areas, including decision-makers and public policy makers	Dr Adi Lazos										X	X	
Completion report													X

3.4 Budget

3.4.1 Master budget schedule (in USD)
Exchange rate as of 14.01.24: USD1=MX$16.50 (average between buying and selling values)

Outputs/Activities	10. Personnel	20. Sub-contracts	30. Duty travel	40. Capital items	50. Consumable items	60. Miscellaneous	80. Project monitoring & administration	TOTAL
Output 1. Research								
A.1.1 Interactive map	$12,394.00	$222.00	$5,122.00	$11,828.00	$444.00	$556.00		**$30,566.00**
A.1.2 Research on flora and fauna species, environmental services & traditional knowledge	$10,894.00	$222.00	$5,122.00	$12,278.00	$444.00	$556.00		**$29,516.00**
A.1.3 Results dissemination workshop	$12,094.00	$222.00	$5,122.00	$11,828.00	$444.00	$556.00		**$30,266.00**
Output 2. Local economy strengthening								
A.2.1 Diagnostic assessment of enterprises	$14,658.00	$222.00	$5,122.00	$11,828.00	$444.00	$556.00		**$32,830.00**
A.2.2 Business plan	$14,658.00	$222.00	$5,122.00	$11,828.00	$444.00	$556.00		**$32,830.00**
A.2.3 Training and strategies to strengthen local economy	$14,658.00	$222.00	$5,122.00	$11,828.00	$444.00	$556.00		**$32,830.00**
Output 3. Outreach								
A.3.1 Illustrated guide	$11,294.00	$13,982.00	$5,122.00	$12,278.00	$444.00	$2,223.00		**$45,343.00**
A.3.2 Audiovisual clips	$10,694.00	$3,982.00	$5,122.00	$11,828.00	$444.00	$2,223.00		**$34,293.00**
A.3.3 Outreach campaign	$10,691.00	$3,984.00	$5,124.00	$11,826.00	$448.00	$2,218.00		**$34,291.00**
Sub-total	**112,035.00**	**$23,280.00**	**$46,100.00**	**$107,350.00**	**$4,000.00**	**$10,000.00**		**$302,765.00**
ITTO monitoring and evaluation							$10,000.00	**$10,000.00**
ITTO programme support costs							$24,332.00	**$24,332.00**
GRAND TOTAL								**$337,097.00**

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3.4.2 Consolidated budget by component (in USD)
Exchange rate as of 14.01.24: USD1=MX$16.50 (average between buying and selling values)

Item	Description	Total
10 Project personnel		
11.1	Project Coordinator	$ 35,000.00
11.2	1 Expert in Geography	$ 1,200.00
11.2	1 Expert in Botany	$ 1,200.00
11.2	1 Expert in Public Policy	$ 900.00
11.2	1 Expert in Qualitative Methodologies	$ 900.00
11.2	1 Expert in Mapping	$ 900.00
11.2	1 Expert in Scientific Dissemination	$ 1,200.00
11.3	1 Expert in Marketing	$ 13,091.00
12.1	1 Assistant	$ 8,000.00
12.2	150 Workers	$ 2,735.00
13.1	1 Designer	$ 13,091.00
13.1	2 Field technicians	$ 26,182.00
15.1	6 Fellows	$ 7,636.00
19	**Component total**	**$112,035.00**
20 Sub-contracts		
21	Sub-contract – Mayan translator	$ 3,640.00
22	Sub-contract – English translator	$ 3,640.00
23	Illustrations	$ 4,000.00
24	Web page	$ 2,000.00
25	Printing of Guide	$ 10,000.00
29	**Component total**	**$ 23,280.00**
30 Duty travel		
31.1	DSA – Field work	$ 40,000.00
31.1	DSA – Attendance to on-site workshops	$ 6,100.00
39	**Component total**	**$ 46,100.00**

Item	Description	Total
40 Capital items		
41	Facilities	$ 50,300.00
44.1	Computers (5 units)	$ 7,000.00
44.2	GPS (1 unit)	$ 700.00
44.1	Printer (1 unit)	$ 300.00
44.2	Plant stove	$ 300.00
44.1	Hard disks (2 units)	$ 300.00
44.3	Recorder (2 units)	$ 450.00
44.3	Camera (2 units)	$ 1,000.00
44.3	Sample collection cabinet	$ 600.00
43	Vehicle for exclusive use by the project	$ 28,000.00
44	EA's vehicle – Non-exclusive use	$ 12,100.00
44	EA´s equipment	$ 6,300.00
49	**Component total**	**$ 107,350.00**
50 Consumable items		
54	Stationery and supplies	$ 2,000.00
54	Software	$ 2,000.00
59	**Component total**	**$ 4,000.00**
Miscellaneous		
61	Various outreach materials	$ 5,000.00
62	Auditing	$ 5,000.00
69	**Component total**	**$ 10,000.00**
80 Project monitoring and administration		
81	ITTO monitoring and evaluation	$ 10,000.00
82	ITTO Programme Support costs – 12%	$ 24,332.00
89	**Component total**	**$ 34,332.00**
100	**GRAND TOTAL**	**$337,097.00**

3.4.3 ITTO budget by component (in USD)
Exchange rate as of 14.01.24: USD1=MX$16.50 (average between buying and selling values)

Item	Description	Total
10 Project personnel		
11.3	1 Expert in Marketing	$ 13,091.00
12.1	1 Assistant	$ 8,000.00
12.2	150 Workers	$ 2,735.00
13.1	1 Designer	$ 13,091.00
13.1	2 Field technicians	$ 26,182.00
15.1	6 Fellows	$ 7,636.00
19	**Component total**	**$ 70,735.00**
20 Sub-contracts		
21	Sub-contract – Mayan translator	$ 3,640.00
22	Sub-contract – English translator	$ 3,640.00
23	Illustrations	$ 4,000.00
24	Web page	$ 2,000.00
25	Printing of Guide	$ 10,000.00
29	**Component total**	**$ 23,280.00**
30 Duty travel		
31.1	DSA – Field work	$ 40,000.00
31.1	DSA – Attendance to on-site workshops	$ 6,100.00
39	**Component total**	**$ 46,100.00**
40 Capital items		
44.1	Computers (5)	$ 7,000.00
44.2	GPS	$ 700.00
44.1	Printer	$ 300.00
44.2	Plant stove	$ 300.00
44.1	Hard disks	$ 300.00
44.3	Recorder (2)	$ 450.00
44.3	Camera (2)	$ 1,000.00
44.3	Sample collection cabinet	$ 600.00
43	Vehicle for exclusive use by the project	$ 28,000.00
49	**Component total**	**$ 38,650.00**

Item	Description	Total
50 Consumable items		
54	Stationery and supplies	$ 2,000.00
54	Software	$ 2,000.00
59	**Component total**	**$ 4,000.00**
Miscellaneous		
61	Various outreach materials	$ 5,000.00
62	Auditing	$ 5,000.00
69	**Component total**	**$ 10,000.00**
80 Project monitoring and administration		
81	ITTO monitoring and evaluation	$ 10,000.00
82	ITTO Programme Support costs – 12%	$ 24,332.00
89	**Component total**	**$ 34,332.00**
100	**GRAND TOTAL**	**$227,097.00**

3.4.4 Executing agency budget by component (in USD)
Exchange rate as of 14.01.24: USD1=MX$16.50 (average between buying and selling values)

Item	Description	Total
10 Project personnel		
11.1	Project Coordinator	$ 35,000.00
11.2	1 Expert in Geography	$ 1,200.00
11.2	1 Expert in Botany	$ 1,200.00
11.2	1 Expert in Participatory Methodologies	$ 900.00
11.2	1 Expert in Public Policy	$ 900.00
11.2	1 Expert in Mapping	$ 900.00
11.2	1 Expert in Scientific Dissemination	$ 1,200.00
19	**Component total**	**$ 41,300.00**
40 Capital items		
41	Facilities	$ 50,300.00
44	EA's vehicle – Non-exclusive use	$ 12,100.00
44	EA´s equipment	$ 6,300.00
49	**Component total**	**$ 68,700.00**
100	**GRAND TOTAL**	**$110,000.00**

3.5   Assumptions, risks and sustainability

3.5.1 Assumptions and risks

The project's development objective (*Ensure the conservation and sustainable use of forests and the valuation of associated traditional knowledge*) assumes that the target communities will be interested in participating in the research work and will continue with their enterprises. To avoid the risk of this not happening, we have selected communities where people involved in the project have already done previous work; also, local authorities will be approached for their support.

Another assumption is that government agencies will be willing to continue with the work of disseminating materials generated by the project. To reinforce this willingness, all digital materials will be made available free of charge and free to download.

It is assumed that the outreach audience will make changes in their actions that will favor the strengthening of the economy and sustainable use of forests. To this end, the mass communication and outreach campaign as well as the web page with Spanish, Mayan and English resources are expected to leave the message and recommendations for actions published and accessible even after the end of the project. In addition, part of the strategy to improve the value chains of enterprises seeking forest sustainability will include greater and more constant promotion and communication with potential responsible consumers.

One of the potential risks that could affect the project is that it could be mistaken or misinterpreted as an initiative in support of a political party. This may occur because 2024 is an election year and the Maya Train megaproject has created controversy and has had strong partisan overtones. However, care will be taken to maintain a neutral position on the project, without political bias. Research instruments such as surveys and interview guides will be generated without biased questions or questions leading to any position. All field trips and workshops will be carried out wearing visible identification; with clothes showing ENES Merida labels, using the colors of the university. Official vehicles with university stickers will be used.

It is worth mentioning that although the Yucatan Peninsula is considered to be one of the safest areas in the country, project staff will go to the field in working groups and road trips will only take place during daylight hours. All field trip participants will be insured by the university.

3.5.2 Sustainability

All interventions proposed by the project are intended to have an effect even after project completion. The publication of research findings will allow the information to be available in the future. The project's web page, with the interactive map and the rest of the outreach and research materials, will be posted on a site linked to the ENES Mérida web page. Thus, it will be possible to maintain it over time in a stable site that does not require too much maintenance.

The training on strengthening the local economy is designed to promote the idea of self-managed sustainability. Communities will be given strategic planning tools to show them the importance of maintaining their enterprises over time.

Communication with government agencies is designed to maintain a relationship with the community and with the academic group. Although there may be changes in priorities during different government terms, we will try to locate key people who will continue their work despite changes in administration.

The project's outreach work will pay special attention to young people, who will be the economically active population and will be in decision-making positions for several years to come.

PART 4. IMPLEMENTATION ARRANGEMENTS

4.1   Organizational structure and stakeholder involvement mechanisms

4.1.1 Executing agency and partners

The executing agency will be ENES Mérida, which will have technical and administrative responsibility for the project. Figure 9 shows the organizational chart outlining the organizational structure of the project.
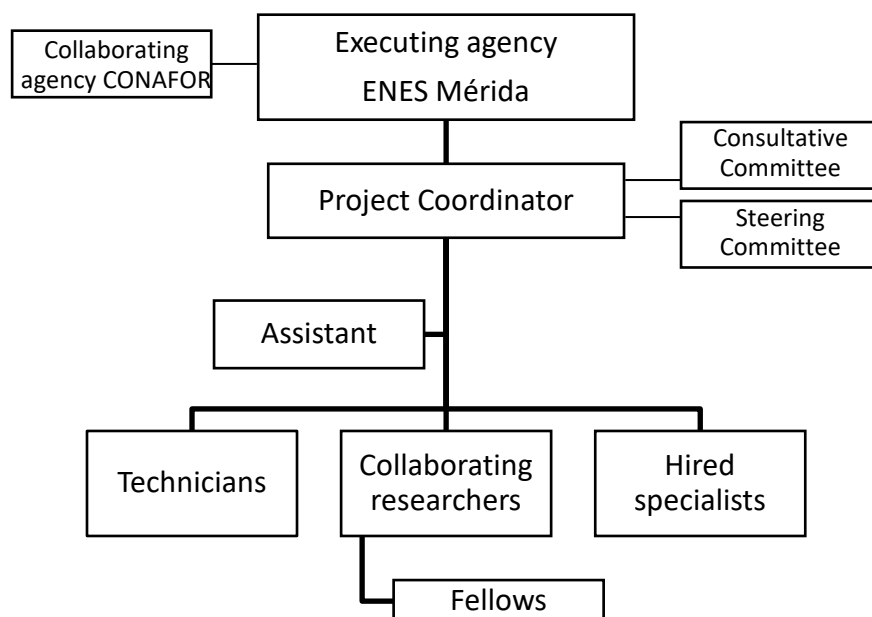

Figure 9. Project organizational structure. Source: prepared by the authors.

4.1.2 Project management team

The project coordinator will be Adi Estela Lazos Ruíz, Researcher of the National Council of Humanities, Science and Technology, attached to the Department of Humanities and Social Systems of ENES Mérida. Three researchers, a technician and a professor from ENES Mérida, as well as undergraduate fellowship students guided by ENES Mérida researchers, will assist and collaborate in the project. Two field technicians, a marketing specialist, a designer and an assistant will be hired. In addition, experts will be hired to translate into Mayan and English, develop the website and carry out illustrations for the guide. The collaborating entity will be CONAFOR, which is ITTO's focal point in Mexico.

4.1.3 Project steering committee

The establishment of a Steering Committee is proposed to oversee the implementation of the project, ensure efficient progress, approve expenditures within budget, review activities being carried out and review budgets and scheduled activities to propose changes as appropriate, as instructed by the ITTO Project Formulation Manual. The committee will be made up of:

- a chairperson appointed by the executing agency
- a representative of ITTO
- a representative of CONAFOR
- representatives of the state secretariats related to the environment
- a representative of natural protected areas located at the project sites
- representatives of ENES Mérida
- donor representatives,
- the project coordinator (observer and secretary of the project steering committee).

4.1.4 Stakeholder involvement mechanisms

The establishment of a Consultative Committee is proposed as a mechanism for the participation of various stakeholders and beneficiaries so that they can contribute to the project. This committee will be made up of:

- a representative of the local authority of the communities
- a representative of research and education institutions
- independent experts.

The Consultative Committee may participate with its recommendations and ideas, but will have no official responsibility for the project.

4.2 Reporting, review, monitoring and evaluation

A partial progress and financial report will be submitted halfway through the project year and the final report at the end of the project. The Steering Committee will also have access to the reports for feedback. The coordinator will be in charge of contacting the team members, and regular meetings will be held with the team at ENES Merida's facilities.

The two dissemination workshops will also be used to share the results of all participating partners with the communities; these workshops will include an instrument for project evaluation by stakeholders.

4.3 Dissemination and mainstreaming of project learning

Dissemination of results is a fundamental pillar of this project. There is an output with its activities specifically associated with the dissemination of results by different means, including the publication of materials such as an illustrated guide and audiovisual clips in Mayan, Spanish and English, as well as a mass communication campaign and a web page containing materials to be worked on together with the designer. All materials in digital format will be posted on the project's web page.

The workshops for disseminating results, as mentioned in the previous section, will also provide the opportunity to meet the participants from different communities and strengthen the link between people and institutions and decision-makers promoting the conservation and sustainable use of forests.

ANNEX 1. Profile of the executing agency and collaborating agencies

ENES Merida is part of the Yucatan Campus of UNAM. It has three departments: Humanities and Social Systems; Natural Systems and Processes; and Applied Mathematics and Computer Science. It offers degrees in Environmental Sciences, Earth Sciences, Applied Geography, Ecology, Sustainable Management of Coastal Zones, Intercultural Development and Management, and Applied Sociology. Thus, it has a team of research and teaching professionals, both tenured and course-based, related to socio-environmental issues relevant to the project. It also has a Research and Teaching Ethics Committee (CEID) that evaluates and issues recommendations on ethical considerations to be taken into account in the implementation of projects.

ENES Merida's objectives include the following:

- Expand and diversify the coverage of higher education (at both the undergraduate and graduate levels) in the state of Yucatan and southeastern Mexico, for the university and interdisciplinary training of professionals, with regional and national relevance, geared towards the application of knowledge for the understanding and solution of complex scientific, environmental, social and cultural phenomena, through flexible and relevant curricula in accordance with local needs and disciplinary developments.

- Conduct cutting-edge disciplinary and interdisciplinary research, with regional and national relevance, through knowledge generating activities organized around a research agenda based on the characteristics and challenges of the environmental and social systems of the region and on the human capital and infrastructure of UNAM in Yucatan.

- Disseminate knowledge through different strategies and actions that promote the understanding, appreciation and appropriation of scientific, humanistic and social learning for different audiences in the region.

- Generate the necessary relationship that allows permanent interaction with the public and private sectors and social groups for the development of projects and initiatives that favor economic and social development processes. (Source: www.enesmerida.unam.mx)

ENES Merida has academic buildings, a library, laboratories and vehicles for shared use by all university researchers and professors. It is currently in the process of constructing a new building that will house more office cubicles for teachers, laboratories and spaces for graduate students. UNAM is ranked among the top 100 universities in the world according to the QS World University Rankings 2024.

ANNEX 2. Tasks and responsibilities of key experts provided by the executing agency

General Project Coordinator
Dr. Adi Estela Lazos Ruíz
Mexico CONACYT researcher attached to ENES Mérida.
She graduated as an Agricultural Engineer in Production at the Institute of Technology and Higher Education of Monterrey - Queretaro Campus, completed an International Masters in Rural Development in the Erasmus Mundus program at the University of Cordoba in Spain and the Humboldt University of Berlin. She completed her PhD at the University of Alicante and obtained a Cum Laude mention for her thesis on the participation of rural communities in conservation actions. She worked as a technician for an ITTO project coordinated by Dr. Patricia Moreno at the Instituto de Ecología, A.C. in Xalapa. She completed a technical internship at the Botanical Garden of Rio de Janeiro in Brazil through the ITTO Fellowship Program. She began her career as a researcher in the field of environmental history with a postdoctoral degree at the Department of Geography and Environment of the Pontifical Catholic University of Rio de Janeiro, then at the Center for Research in Environmental Geography and at the Peninsular Center for Humanities and Social Sciences of UNAM - Yucatan.

Collaborator in Activity 1.1 – Interactive map, activity leader
Dr. David Romero
He is an associate professor in Physical Geography and coordinator of the Bachelor's Degree in Applied Geography at ENES Merida. He holds a B.A. and M.A. in Geography from the University of Limoges, France, and a Ph.D. in the same field from the National Autonomous University of Mexico (UNAM). His work has covered various aspects of university work: teaching, outreach, research, and services to the business sector, mainly in the oil industry. He specializes in climatic geography and climatology with particular interest in the study of hydro-climatological externalities such as droughts and tropical cyclones. Also, his knowledge in physical geography of the Yucatan Peninsula and his practice of geographic information systems have enabled him to participate in interdisciplinary collaborations on different topics such as tourism, pollution of aquifers or the Gulf of Mexico, as well as in the development of land use planning.

Collaborator in Activity 1.3 – Results dissemination workshop, activity leader
Dr. Bertha Hernández Aguilar
She is an academic technician at ENES Merida. She is a geographer and holds a PhD in Sustainability Sciences from the National Autonomous University of Mexico (UNAM). Her doctoral thesis focused on the processes of collective action and management in the face of water scarcity in marginal areas of Mexico City. Her lines of research are related to sustainable water management, vulnerability, urbanization and environmental conflicts. She has employed methods of analysis such as mental models, networks, and multi-criteria analysis. She has collaborated in national and international projects related to socio-hydrological risk, flooding and water stress; land use change; informal sector; and urbanization in Mexico City.

Collaborator in Output 3-related activities, advising on outreach materials and facilitating liaison with the media.
Ms. Daniela Tarhuni Navarro, MSc
She holds a master's degree in social communication of scientific research from the International University of Valencia, with a specialization in cultural policies and cultural management from the Autonomous Metropolitan University and a degree in communication sciences from UNAM. Her areas of interest are related to scientific culture, communication and public perception of science and technology, as well as the promotion of professional training in the STEAM (science, technology, engineering, art and mathematics) fields. She has had professional experience in communication areas of several public institutions such as the National Transplant Center (CENATRA); the National Council for Science and Technology (CONACYT) and the Center for Scientific Research of Yucatan (CICY). In the academic field, she has worked as a teacher at the undergraduate level and collaborates on an ongoing basis with different institutions delivering

courses, lectures, workshops and diploma programs related to the areas of scientific communication and dissemination of science. She is a member of the Coalition for the Public Understanding of Science (COPUS) and the American Association for the Advancement of Science (AAAS) aimed at the understanding and enjoyment of scientific knowledge and its applications. Since 2017, she has been working at the National Autonomous University of Mexico, first as the head of Academic Outreach at the Peninsular Center in Humanities and Social Sciences and currently as the head of Science Outreach at ENES-Merida.

Collaborator in activities A.1.2 and A1.3, advising on the analysis of results for decision-makers
Dr. Yassir Rodríguez Martínez
He is a full time Associate Professor at ENES Merida. He holds a PhD in Anthropology with Honors from the National Autonomous University of Mexico (UNAM), as well as a Master's Degree in Anthropological Sciences and a Bachelor's degree in Social Anthropology from the Autonomous University of Yucatan (UADY), where he also completed two postdoctoral internships on development policies, ecotourism and Mayan identity in Yucatan. In his most recent research, he has addressed the social vulnerability and welfare of the Mayan people and the development of intercultural public policies. He has taught a variety of courses at UNAM in Intercultural Development and Management, Environmental Sciences, Applied Geography and Ecology. He is the author of several book chapters and peer-reviewed articles and currently holds the distinction of Candidate (2020-2022) in the National System of Researchers (SNI).

Collaborator in Activity 1.1 to assist in field work as requested for the developmen of the proposed map
Dr. Gustavo Martin Morales
Trained as an engineer in phototopography at the Faculty of Geodesy and Cartography, Havana, Cuba, 1990. He studied geography, environment and land use planning at the Faculty of Geography of the University of Havana, Cuba in 1997. He has a PhD in technical sciences, from the Polytechnic Institute of Havana, Cuba in 2001. He worked in Cuba first at the Research Center of Geodesy, Cartography and Remote Sensing of ICGC and GEOCUBA IC, then at the National Center of Protected Areas and finally at the Institute of Tropical Geography of CITMA. He has a postdoctoral degree in geography from the Federal Fluminense University of Niteroi, Brazil and a postdoctoral degree in geography from the Centro de Investigaciones en Geografía Ambiental (CIGA), UNAM Campus, Morelia, Michoacán, Mexico. Since 2019 he has worked for UNAM as a professor at ENES Morelia and ENES Merida. Since August 2023, he has served as a full-time Level C professor. He is a member of the National System of Researchers, Level C, Area 5, Social Sciences.

Collaborator in Activity 1.2 and Activity 3.1, supporting studies that require identification and herborization of botanical collections
Dr. Luis Higinio Salinas Peba
His line of research is the identification and floristic characteristics of vegetation types in the Yucatan Peninsula. He has participated in two postdoctoral internships at the Yucatan Academic Unit in Sisal within the Faculty of Sciences of UNAM, as part of the project "Conservation of coastal systems through the use of biological indicators". He has developed an environmental diagnosis, through the description and analysis of the structure and composition of vegetation units and their relationship with resident and migratory birds in the coastal lagoon system "La Carbonera", Yucatan, which is part of the corridor for the protection of coastal biodiversity known as"Reserva Estatal Cienegas y Manglares" on the north coast of Yucatan. He has participated as head of vegetation for the project "Plant and fungal diversity of the lagoon system of La Carbonera, Reserva Estatal de Ciénegas y Manglares on the north coast of Yucatán", funded by CONABIO. He is a birdwatcher and belongs to the Network of Birdwatchers of the Yucatan Peninsula, endorsed by CONABIO. He is currently a lecturer, teaching courses in the programs of Sustainable Management of Coastal Areas, Environmental Sciences and Earth Sciences at ENES, Merida Unit, UNAM. He has participated in national and international congresses of ecology and botany. He has published approximately 20 articles on ecology, botany and floristics of the Yucatan Peninsula in indexed journals.

ANNEX 3. Terms of reference for ITTO-funded technicians

Field technician
Graduate or intern student in careers related to socio-environmental issues, with field experience in the Yucatan Peninsula. Knowledge in the application of research tools such as surveys and interviews and analysis of results. Expertise in working in rural communities and organizing workshops. Availability to travel and leave for several days for field work. Preferably able to drive. Will be in charge of field work, database generation and data analysis, in conjunction with the project coordinator.

Designer/visual communicator
Graduate or intern student in design, visual communication or related fields, with experience in the use of design software, in the design of logos and brand identity. Must have a creative and interesting portfolio and enjoy working with rural communities. Will be in charge of doing design work, infographics, and audiovisual materials. Given the short time frame for the project, he/she will be hired for the whole year due to the amount of work to be completed and the possibility of working on the information as it is generated in the field.

Marketing Specialist
Graduate or intern student in marketing, business or related fields, with experience in developing business plans and providing training to community groups. He/she will be in charge of preparing business plans for all selected local enterprises in the target areas, as well as providing training to each of them. Given the short time frame for the project, he/she will be hired for the whole year due to the amount of work to be completed and the possibility of benefiting from field visits.

Illustrator
Graduate or intern student in design, art or related fields, or self-taught professional with proven experience. Must have a creative and interesting portfolio. Will be in charge of illustrations for the Illustrated Guide to Flora and Fauna.

Mayan language translator
Graduate or intern student with a degree in languages, translation or related fields, or self-taught professional with proven experience in translating, drafting and recording documents in the Mayan language using the Latin alphabet. He/she will be in charge of translating all outreach materials into Mayan.

English Translator
Graduate or intern student with a degree in languages, translation or related fields, or self-taught professional with proven experience in translating, drafting and recording documents in English. He/she will be in charge of translating all outreach materials into English.

Assistant
Graduated or intern student in administration or related field, or self-taught professional with proven experience in the organization, drafting and delivery of documents and paperwork. He/she will be in charge of handling invoices, processing paperwork and assisting with financial reporting for the project.