FAO/GLOBAL ENVIRONMENT FACILITY

PROJECT DOCUMENT

PROJECT TITLE: Securing the Future of Global Agriculture in the face of climate change by conserving the Genetic Diversity of the Traditional Agroecosystems of Mexico **PROJECT CODE: GCP/MEX305/GFF**	
COUNTRY: MEXICO	
FINANCING PARTNER: GEF Trust Fund	
FAO Project ID: 640631	**GEF/LDCF/SCCF Project ID: 9380**
EXECUTING PARTNERS: National Commission for the Knowledge and Use of Biodiversity (CONABIO)	
Expected EOD (Starting Date): May 2018	
Expected NTE (End Date): April 2023	
CONTRIBUTION TO FAO's STRATEGIC FRAMEWORK:	**a. Strategic Objective/Organizational Result: Indicators of Outcomes OUTCOME 2.1: Producers and natural resource managers adopt practices that increase and improve agricultural sector production in a sustainable manner. OUTCOME 2.2 Stakeholders in member countries strengthen governance – the policies, laws, management frameworks and institutions that are needed to support producers and resource managers –in the transition to sustainable agricultural sector production systems. OUTCOME 4.2 Agribusinesses and agrifood chains that are more inclusive and efficient are developed and implemented by the public and private sectors.** **b. OUTCOMES 5.3 Countries reduce risks and vulnerability at household and community level.** **b. Regional Result/Priority Areas: RI3 "Sustainable use of Natural Resources, Climate Change Adaptation and Disaster Risk Management"** **c. Country Programming Framework Outcome:**
GEF/LDCF/SCCF Focal Area: Biodiversity	

GEF/LDCF/SCCF strategic objectives: Programme 7, Objective 3 of the GEF Biodiversity Focal Area: Securing Agriculture's Future: Sustainable Use of Plant and Animal Genetic Resources	
Environmental and social risk classification (insert √): Low risk √ Moderate risk High risk	
Financing Plan: GEF/LDCF/SCCF allocation:	**USD 5,329,452**
Co-financing:	
CONABIO	**USD 4,812,629**
SAGARPA	**USD 4,166,667**
CDI	**USD 1,944,444**
SEMARNAT	**USD 1,688,200**
SEDESOL	**USD 1,500,000**
INAES	**USD 1,500,000**
SEDUMA (YUCATAN)	**USD 6,000,000**
AZP (MEXICO CITY)	**USD 5,700,000**
INIFAP	**USD 565,745**
IDESMAC	**USD 1,875,000**
SEMA (COAHUILA)	**USD 228,050**
INCMNSZ	**USD 6,004,444**
FA0	**USD 200,000**
Sub-total cofinancing:	**USD 36,185,188**
Total Budget:	**USD 41,514,640**

Executive Summary

The aim of this project is to build and strengthen mechanisms that help to conserve agroecosystems where traditional agriculture is practiced in Mexico, a country that is the centre of origin and diversity of more than 130 plant species important to agriculture. These agroecosystems contain wild and domesticated species adapted to a host of agroecological conditions. Here, several processes are carried out with human invention, allowing the species to evolve in response to decisions taken over selection, management and utilization as well as in response to environmental conditions.

Traditional agriculture is therefore the driving force behind the evolution of species that are already domesticated or due for domestication in Mexico (together with other natural forces affecting their wild relatives). It is necessary to protect, showcase and enhance the potential service that this offers to the future of agriculture through the various strategies presented in this project.

The unavoidable consequence of the loss of these genetic resources is that many sources of the traits that could be used to develop the resilient and nutritious crop varieties needed to feed an over-increasing population in the face of climate change are going extinct. This type of agroecosystem and the associated agrobiodiversity are threatened by several factors such as climate change, the expansion of monoculture-based production systems, changing social dynamics in rural areas that undermine the survival of knowledge and traditional farming practices, existence of perverse incentives, lack of care and coordination in interinstitutional conservation efforts, lack of systematized scientific information on the subject as well as failure to appreciate the value of these systems and the use of the agrobiodiversity they harbour.

The project objective is to develop policies and mechanisms that support agrobiodiversity conservation, sustainable use and resilience, by promoting the knowledge of traditional agro-ecosystems and the cultural methods that maintain that agrobiodiversity in Mexico.

However, this project is not meant to address the comparative differences between traditional and large-scale intensive and monocrop production systems.

The project will be implemented through 4 **components**:

Component 1: Information and knowledge management; Component 2: Strengthening of local capacities; Component 3: Improvement of public policies; and Component 4: Valuation of agrobiodiversity and market linkages.

Each component has one expected **outcome**:

Outcome 1.1 Comprehensive knowledge about globally-important agrobiodiversity, its values, the traditional practices, the scientific and technological research and development activities, associated knowledge base and capacities that maintain the diversity in Mexico, has been generated, communicated and made available for its use: Indicators: i) N° of existing data bases for agroBD species converted / transformed according to a Comprehensive Agrobiodiversity Information System (SIAgroBD) (Baseline: 0, Target: 12 databases included in the Information System; ii) N° of analysis and synthesis based on the SIAgroBD and on results of research projects to guide decision making (Baseline 0, Target: 3 analysis and synthesis published); iii) Increased level of awareness of the economic and cultural values of agroBD among key stakeholders.

Outcome 2.1 Local capacities have been strengthened to support long-term plans and actions for agroBD conservation and sustainable use, to develop strategies for revaluating traditional knowledge, and to support continuous adaptation to climate change. Indicators: i) Area in hectares where the knowledge, practices and/or management derived from capacity-building projects for agroBD conservation are applied (Baseline: 604 has, Target: 2,180 has); ii) Number of producers having received different benefits for conserving and sustainably using agroBD (Baseline: 2,268; Target: 4,100); iii) Number of globally significant species (cultivated and wild) maintained (Baseline: 168 species, Taregt: the number is maintained).

Outcome 3.1 The protection and promotion of traditional knowledge, practices and production systems have been mainstreamed into public policies and planning, generating effective partnerships with the communities, and disseminating values associated with agroBD and local cultures. Indicators: No of plans and programmes (National Development Plan, 4 sectoral programmes and 9 budget programmes) incorporating agroBD (Baseline 0, 0, 2, Target: 1, 4, 9).

Outcome 4.1 The marketing and consumption of agroBD products have been enhanced through new strategies of agroBD valuation and market incentives, with a short value chain approach. Indicator 1: Strategy for agroBD product promotion and marketing campaigns designed and implemented (Baseline: 0, Target: 1 strategy). Indicator 2: Accessibility of agroBD products to local and regional markets, measured through a compound index of 7 indicators of marketing facilities (Baseline: 2, Target: 58).

The project will work at different scales - national, regional, local. Component 1 and 3 consider both a national and regional/local scale implementation. Components 2 and 4 will be implemented at regional/local levels. The selected states are: Chiapas, Chihuahua, Mexico City, Michoacán, Oaxaca, and Yucatán, as well as a twinned project in Coahuila State, which will work on native walnut resources *Juglans spp.*

The project focuses on 12 types of native crops in their centre of origin. Their genetic diversity (present in local strains and varieties managed in traditional crop systems as well as in the wild relatives of those crops) is mainly expressed within Mexico but has not, in the main, been properly described and studied.

With regard to Project funding, the GEF will donate USD 5,329,452 and various national and international bodies will contribute with a cofinancing of approximately USD 36 million.

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[1] Please consult available corporate guidelines and training for information on how to complete the risk log on the ERM website.
[2] Consultants' Terms of Reference will be revised and validated during the project's inception.

Acronyms

ABS	Access and Benefit Sharing
ADR	Agencia de Desarrollo Rural (Rural Development Agencies)
AgroBD, agroBD	Agrobiodiversity
ANEC	National Association of Marketing Companies of Field Producers
ASHOKA	ASHOKA Mexico, Central America and the Caribbean (means: The Active Absence of Sorrow)
AWP/B	Annual Workplan and Budget
AZP	Authority of the Patrimony of the Humanity Zone (Mexico City)
BD	Biodiversity
BH	Budget Holder
BOC	Budget and Operations Officer
CASFA	Centre for Agroecology Francis of Assisi
CBD	Convention on Biological Diversity
CDMX	Ciudad de México
CDP	Comité Directivo del Proyecto (Project Steering Committee)
CEPCO	State Coordination of Coffee Producers in Oaxaca
CDI	National Commission for the Development of Indigenous Peoples
CIBIOGEM	Intersecretarial Commission on Biosafety of Genetically Modified Organisms
CICC	Intersecretarial Commission on Climate Change
CIDRS	Intersecretarial Commission for Sustainable Rural Development
CIGA-UNAM	Research Centre for Environmental Geography
CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
COLPOS	Postgraduates College
CONABIO	National Commission for the Knowledge and Use of Biodiversity
CONACyT	National Council *of* Science and Technology
CONANP	National Commission of Natural Protected Areas
CONTEC	Community Technical Consultancy
COR	Comités Operativos Regionales (Regional Operational Committees)
CP	Postgraduates College (same as COLPOS)
CR	Critically endangered
CR	Coordinadores Regionales (Regional Coordinators)
CWR	Crop wild relatives
DESMI	Economic and Social Development of Mexican Indigenous Peoples
DGPDT	General Directorate of Productivity and Technological Development
DGSPRNR	General Directorate of Renewable Primary Sector and Natural Renewable Resources
DO	Designation of Origin
EAC	External Advisor Council
ECOSUR	Southern Frontier College
EDUCE	Education, Culture and Ecology
EN	Endangered
ENAAEN	National Survey of Food and Nutritional Status in Rural Areas
EOD	Entry on Duty Date
FAO	Food and Agriculture Organization of the United Nations

FAO-EOD	FAO Office of Evaluation (OED)
FAO-HQ	FAO Headquarter
FAO-MX	FAO Mexico
FLO	Funding Liaison Officer
FMO	Financial Monitoring Officer
FPMIS	Field Programme Management Information System
EP	Equipo del Proyecto (Project Team)
GAIA	Autonomous Group for Environmental Research
GEBs	Global Environmental Benefits
GEF	Global Environment Facility
GI	Geographical Indications
GIAHS	Globally Important Agricultural Heritage Systems
GIRA	Interdisciplinary Group for Appropriate Rural Technology
GIZ	German Society for International Cooperation
GMOs	Genetically Modified Organisms
IBA	Inclusion of biodiversity in agriculture
IFOAM	International Federation of Organic Agriculture Movements
IMPI	Mexican Institute of Industrial Property
INAES	National Institute of Social Economy
INCA Rural	National Institute *for* Capacity-Building in the Rural Sector
INCMNSZ	Salvador Zubirán National Institute of Medical Sciences and Nutrition]
INDESOL	National Institute of Social Development
INIFAP	National Institute of Forestry, Agriculture, and Livestock Research
IPR	Intellectual Property Right
IUCN	International Union for Conservation of Nature
IYFF	International Year of Family Farming
LD	Land Degradation
LTO	Lead Technical Officer
LPC	Local Project Coordinator
MCMA	Mexico City Metropolitan Area
M&E	Monitoring and Evaluation
MoAS	Milpa and other agroforestry systems
MTE	Mid-Term Evaluation
MTR	Mid-Term Review
NDP	National Development Plan
NPD	National Project Director
NOM	Official Mexican Norm
NPC	National Project Coordinator
NTE	Not to Exceed Date
NUUP	Unify, gather (in Mayan language)
OECD	Organization for Economic Co-operation and Development
OP	Operational Partner
ONG	Non-governmental Organization (NGO)
OSC	Civil Society Organization (CSO)
PCU	Project Coordination Unit
PESA	Strategic Project for Food Security
PGRFA	Plant Genetic Resources for Food and Agriculture
PGS	Participative Guarantee Systems
PIR	Project Implementation Review
POPs	Persistent Organic Pollutants

PPR	Project Progress Report
PROCODES	Conservation Programme for Sustainable Development
ProDoc	Project Document
PROFOR	Pro-Forest Programme
PROMAC	Maizes Landraces Conservation Programme
PSC	Project Steering Committee
PT	Project Team
PTF	Project Task Force
REDAC	Red Mexicana de Tianguis y Mercados Orgánicos A.C. [Mexican Network of "tiangui" and organic markets, civil association]
ROC	Regional Operational Committees
SAGARPA	Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food
SCC	Short circuits of commercialization
SE	Secretariat of Economy
SECTUR	Secretariat of Tourism
SEDESOL	Secretariat of Social Development
SEDUMA	Secretariat of Urban Development and Environment (Yucatán State)
SEMARNAT	Secretariat of Environment and Natural Resources
SEMAC	Secretariat Environment of Coahuila State
SENACATRI	National Service of Rural Training and Technical Assistance
SENASICA	National Service for Agroalimentary Public Health
SIAgroBD	Comprehensive Agrobiodiversity Information System
SINAREFI	National System of Plant Genetic Resources for Food and Agriculture
SIPAM	Globally Important Ingenious Agricultural Heritage Systems
SNICS	National Seed Inspection and Certification Service
SNITT	National System of Research and Technology Transfer
SLM	Sustainable Land Management
SO	Strategic Objective
TCP	FAO´s Technical Cooperation Programme
TEEP	The Economics of Ecosystems and Biodiversity
TORs	Terms of reference
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UACh	Chapingo Autonomous University
UCP	Unidad de Coordinación del Proyecto (Project Coordination Unit)
UNAM	Autonomous National University of Mexico
UNEP	United Nations Environment Programme
VC	Value Chain
VU	Vulnerable
WTO	World Trade Organization
WWF	World Wide Fund for Nature

SECTION 1 – PROJECT RATIONALE

1.1 PROJECT CONTEXT

1.1. The national context

Agrobiodiversity in Mexico and the importance of Mexico as a Vavilov Centre

Mexico, with its complex topography, variety of climates and cultural richness, is a megadiverse country. Mexico is considered the centre of origin and genetic diversity of a large number of species of great importance for food, agriculture and human development. The country – and its potential role in harnessing the traits inherent in this diversity – is therefore critically important in the quest for the sustainable food systems and nutrition required for addressing the unprecedented challenge of producing significantly more food without further damaging the environment for current and future generations of the inhabitants of planet Earth.

In 1935, Vavilov proposed eight **centres of origin** of cultivated plants corresponding to fundamental and ancient centres of agriculture in the world. One of these centres covers the region of Mesoamerica, which includes a large part of the territory of Mexico. Mexico is the centre of origin, domestication and/or genetic diversity of more than 130 plant species, of which 25 are the most used commercially at the global level[3]: agave, amaranto (*Amaranthus spp*.), chili, squashes, cotton, beans, chayote (*Sechium spp*.), vanilla, maize, papaya, dahlias, poinsettia, sunflower, sweet potato, nettlespurge (*Jatropha spp*.), sapodilla (*Manilkara zapota*), tobacco, nopales and tunas (*Opuntia spp*.), avocado, tomatillo (*Physalis philadelphica*), mamey sapote (*Pouteria sapota*), guava, Mexican marigold or cempasúchil (*Tagetes erecta*), cocoa and jicama (*Pachyrhizus erosus*), many of which form the basis of human and animal nutrition. Natural distribution of the wild ancestors of these cultivated plants has also been documented in Mexico.

The country is also the centre of secondary diversification of other species of global economic importance[4]. Among these are *Solanum spp*., *Ipomoea spp*., *Quercus spp*., *Bursera spp*., *Pinus spp*.[5]

The evolution of these crops has taken place continuously through processes of **domestication and diversification** mediated by farmers using traditional production practices in many areas of Mexico. Many *domesticated* crop species have wild relatives with which genetic exchange can occur, enabling the existence of intermediates between the completely domesticated species and the wild form, thus constituting a genetic continuum. By selecting forms that present characteristics of interest from among these intermediates, traditional farmers contribute to the furtherance of domestication and diversification of these crops. Participatory approaches – between these farmers enabled with their traditional knowledge, their practices and the different phytogenetic makeups they manage in their fields and plant breeders and scientists leveraging powerful scientific tools and methods – can mimic this ongoing domestication and diversification process, but in a concerted and focused manner. This has a positive impact on the subsistence of smallholders and ensures the maintenance and development of locally adapted, diverse and nutritious crop varieties that will underpin sustainable food systems and nutrition. The absences of data, incentives, enabling policy environments and collaborative platforms prevent this all important paradigm from taking root.

The **genetic diversity** of agricultural biodiversity in Mexico provides a basis for food supply, is a repository for traits needed for adaptations to specific agroecological conditions and resistance to

[3] Acevedo Gasman, F. et al, 2009. *La bioseguridad en México y los organismos genéticamente modificados: cómo enfrentar un nuevo desafío [Biosecurity in Mexico and genetically modified organisms: how to face a new challenge]*, in Capital natural de México, vol. II: Estado de conservación y tendencias de cambio [Conservation status and changing trends]. Conabio, México, pp. 319-353.

[4] See: http://www.biodiversidad.gob.mx/genes/otrosCentros.html

[5] Kindly see Annex I for a list of plant species addressed by this project proposal.

pests, diseases and particular abiotic conditions. The **continuing erosion** of the genetic diversity in Mexico prevents the international community from having access to unique sources of traits for improving crops that, though originated in Mexico, have become fundamental elements of food security and nutrition and sources of livelihoods worldwide. Maize, for instance, is either a major food security crop or a vital component of livestock feeds, or substrate for bioenergy in almost every nation on Earth.

There are 220 botanical families present in Mexico, of which only 33 per cent have been explored for ***in situ*** **conservation**. In terms of projects, the situation is even more critical given that only 99 species have been reported without repetition in the last decade, representing only 0.33 per cent of the total number of vascular and non-vascular species estimated to be found in Mexico. Few *in situ*[6] conservation projects have concentrated on crop breeding: only 24.8 per cent developed participatory plant breeding, mostly involving edible species. Many projects did not consider any plant breeding activities.

At farm level

Agrobiodiversity in Mexico is mainly composed of local agricultural varieties managed by traditional methods by small-scale farmers[7], as well as crop wild relatives (CWR) and associated species that grow together within the *milpa* and other agroforestry cultivation systems. CWR not only grow within these cultivation systems but in most cases far distances away. Agrobiodiversity also includes the elements that interact with these plant species, such as insects, microorganisms, birds, which are crucial to the functioning of agroecosystems.

The ***milpa*** is a traditional agroforestry system of pre-Hispanic origin whose principal crop is maize, which is cultivated alongside with other utilized plants as beans, squash, and chili. Other wild species of high food importance (e.g. *quelites*) are tolerated and promoted. The *milpa* is a complex agroecosystem that favours beneficial ecological interactions. Multi-cropping management and composition may change depending on the geographical areas. *Milpa* system crops are well adapted to local climatic conditions.

This production system has been the basis for food security[8] in Mesoamerica since old times. The three levels of agroBD - genes, species and ecosystems - are essential **to achieve food and nutritional security for the small producers who conserve them as well as for the population in general** because they encourage constant development of these crops. AgroBD is reflected in more diverse diets, which benefit the nutrition and health of farming families. The most diverse agroecosystems also generally have higher productivity levels than more simple systems in a wide range of growing conditions, including land that is suboptimal for farming (arid, mountainous and so on), and also perform more consistently. They are more resilient to climatic disturbances, maintain and increase soil fertility, mitigate the impact of diseases and pests and provide food and habitat for pollinators. All these agroBD services are of great value to the food security of agricultural smallholders and their families[9]. Traditional varieties also contribute to this, because they can form the basis for the development of new products with high market potential, thus improving family income.

Crop varieties or breeds are usually variants that have been generated by farmers through traditional management of their plots. This includes crop seed selection and improvement, as well as

[6] In the scope of this project proposal, *in situ* conservation refers to both on farm level conservation of crop landraces as well as efforts in natural settings (mostly directed towards crop wild relatives).

[7] Mexico considers *small-scale farmers* (Unidades de Economía Rural de agricultura familiar) those who have 4.7 hectares of land, on the average. SAGARPA-FAO (2011). Family farming with productive potential in Mexico.

[8] "Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life "(FAO, 1996). Within the framework of this project, food security also considers the intrinsic cultural values of the various communities involved.

[9] Frison et al. 2011. Agricultural Biodiversity Is Essential for a Sustainable Improvement in Food and Nutrition Security. *Sustainability*, 3, 238-253

experimentation through the exchange of seeds among farmers, and the interaction with wild relatives[10]. *Germplasm* or genetic material is exchanged among human communities, and has led over the centuries to the development of local varieties in Mexico, as the ones mentioned above and detailed in Appendix 8. More so, agriculture in general depends on the genetic combinations small scale traditional agriculture constantly generates, in order to positively cope with the future challenges ahead ("Ecosystems and agro-biodiversity across small and large-scale maize production systems" (2016), report developed by CONABIO and under revision by TEEB).

The role of **local and indigenous communities** has been fundamental in holding the ancestral knowledge for the management of these species, and has been responsible for their conservation, evolution and domestication. To maintain this knowledge, both *in situ* and *ex situ* conservation could be strengthened through the promotion of seed banks for community use, with a view to their exchange at local and regional levels as a further benefit of their promotion as well as a safeguard in case of climatic disasters.

The rich process of generating and conserving agrobiodiversity corresponds to an ***in situ* conservation** modality. The majority of current *in situ* agrobiodiversity sites is present in traditional plots and domestic gardens, and natural areas where wild crop relatives live. *In situ* conservation is based on the relationship man/plant, traditional farmer/native crops. In Mexico it is practiced in rural and sub-urban areas[11]: approximately 2.5 million traditional farmers in 7.2 million hectares add to *in situ* conservation of agrobiodiversity. In addition, some disperse efforts in Mexico promote *in situ* conservation of cultivated species and wild relatives. Appendix 9 of the present document illustrates the map of some *In situ* conservation activities and their geographical location.

Institutional framework

With regard to agrobiodiversity in Mexico, the institutional framework comprises three spheres: environmental, agricultural and social.

In the **environmental sphere**, the federal agency responsible for regulating the sustainable use, protection and preservation of biodiversity is the Ministry of Environment and Natural Resources (**SEMARNAT**). This Ministry, acting through the Underministry for Development and Regulation, runs the Directorate General for the Primary Sector and Renewable Natural Resources (DGSPRNR) – and the National Commission of Protected Natural Areas (CONANP). The **DGSPRNR** is responsible for designing and promoting development instruments and environmental standards for sustainable development of primary sector activities, including agriculture, preservation of biodiversity and genetic resources and biosafety of genetically modified organisms. It is also the National Focal Point for the Nagoya Protocol in Mexico. **CONANP**, on the other hand, runs subsidy programmes for rural and indigenous communities living in protected areas in order to ensure conservation of ecosystems and their biodiversity.

Three interministerial commissions also have an impact on this subject: the National Commission for Knowledge and Use of Biodiversity (**CONABIO**), the Interministerial Commission on the Biosafety of Genetically Modified Organisms (**CIBIOGEM**) and the Interministerial Commission on Climate Change (**CICC**).

CONABIO is chaired by the President of the Republic and comprises nine ministries, including SEDESOL, SE, SEMARNAT and SAGARPA; its main functions are: (1) to compile, summarize, generate and manage information on biodiversity present within Mexico, (2) to promote the development of projects for the conservation and sustainable use of biodiversity, (3) to advise government agencies as well as social and private sectors on technical aspects of biodiversity and (4) to promote the dissemination of knowledge, conservation and sustainable use of biodiversity at national and regional level. CONABIO

[10] Altieri et al, 2012; Benitez et al, 2014; Moreno Calles et al, 2014
[11] Sub-urban areas are transition areas bordering urban settlements.

helps to generate information on agrobiodiversity, initially based on its responsibilities arising out of the Law on the Biosafety of Genetically Modified Organisms (LBOGM), Articles 86, 90 and 121.

Meanwhile; *CIBIOGEM* is responsible for formulating and coordinating national policies on the biosafety of genetically modified organisms and calling on competent agencies to incorporate these policies into sectoral programmes. In the field of agrobiodiversity, it financed part of the global maize project that yielded data used for the Agreement determining Centres of Origin and Centres of Genetic Diversity of Maize, with the aim of establishing measures for their protection, care and monitoring.

The *CICC* is made up of 14 ministries and their main responsibilities are: (1) to formulate and implement national policies to mitigate and adapt to climate change and (2) to promote the actions required to fulfil the goals and commitments set out in the United Nations Framework Convention on Climate Change.

Within the **agricultural sphere**, the federal agency responsible for formulating policies and strategies for regulating and promoting seed research, production quality, health, registration, certification and marketing is the Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (**SAGARPA**). To achieve this, *SAGARPA* runs two decentralized agencies through the Directorate General for Productivity and Technological Development (DGPDT): The National Service for Seed Inspection and Certification (**SNICS**) and the National Agrifood Health, Safety and Quality Service (**SENASICA**), an advisory body: the National System for Research and Technology Transfer (**SNITT**) and the National Institute of Forestry, Agricultural and Livestock Research (**INIFAP**). *SNICS* is one of SAGARPA's operational bodies and is responsible for three fundamental activities: (1) verifying and certifying seed origin and quality, (2) protecting the rights of plant breeders and (3) coordinating actions with regard to phytogenetic resources for food and agriculture; one prominent area of SNICS related to this project is the National System of Phytogenetic Resources for Food and Agriculture (*SINAREFI*). This was a coordination mechanism that sought to integrate the actions and efforts of the various bodies concerned with phytogenetic resources for food and agriculture with the aim of ensuring their conservation and sustainable use. These activities are being carried forward by the Mexican Thematic Network of Phytogenetic Resources (Remefi), which was supported by CONACYT in 2016. *SENASICA* is a body that seeks to protect agricultural, aquaculture and livestock resources from pests and diseases. SNITT, on the other hand, coordinates and brings together the actions of public institutions as well as private and social organizations conducting and fostering scientific research, technological development and knowledge validation and transfer in the farming sector. *INIFAP*'s mandate is to generate scientific knowledge and technological innovation in the field of livestock and forestry. In addition to these institutions supporting production, other institutions promote knowledge management. These include the Autonomous University of Chapingo (**UACh**), the Postgraduate College (**COLPOS**), the Autonomous National University of Mexico (**UNAM**), state universities, the Colegio de la Frontera Sur (**ECOSUR**) and others whose activities follow research and teaching approaches aimed at studying agricultural biodiversity in Mexico.

Other entities within the sector also encourage links between smallholders and the market. The mission of the Interministerial Commission on Sustainable Rural Development (**CIDRS**) is to disseminate, coordinate and monitor sectoral and special programmes that aim to promote sustainable rural development.

In the **social sphere**, the responsible federal agency is the Ministry of Social Development (**SEDESOL**), whose policies and programmes focus attention on the most vulnerable social sectors. Programmes such as Opciones Productivas [Productive Options], 3x1 para Migrantes [3x1 for Migrants] or Prospera [Prosper] have an impact on areas of high agrobiodiversity. Two decentralized social sector bodies, the National Institute of Social Economy *(***INAES**) and the National Institute of Social Development (**INDESOL**) also implement programmes that can have a positive impact on partnership, entrepreneurship and a direct link with markets local to the rural population producing food through traditional agroecosystems.

The social sphere also covers the National Commission for the Development of Indigenous Peoples (**CDI**). This is a non-sectoral decentralized body with a significant presence in indigenous areas through infrastructure, food and housing programmes, health services, community canteens and production and ecotourism projects. At local government level, the "Consume Local" initiative promoted by the Mexico City Ministry of Rural Development and Fair Communities (Sederec) incorporated a marketing component to boost the consumption of agricultural produce from Mexico City.

Lastly, numerous market-related initiatives have been introduced at civil society level. These are set out in Table 5 of this document.

Legal and political framework of agroBD in Mexico

The Articles 86 and 87 of the *Law of Biosafety of Genetically Modified Organisms*[12] (2005) set the need of generating information for national authorities regarding the plant species whose centre of origin and centre of genetic diversity is Mexico, as well as the geographical areas where these species are located. In addition, the Law mandated elaborating proposals of species protection measures. However, there is no specific legislation that regulates the use of agricultural biological diversity in Mexico.

Mexico has signed and ratified the *Nagoya Protocol*, in 2011 and 2012 respectively. At present, a working group in Mexico is designing the normative framework and instruments for its application at national level. Mexico has signed but not ratified the International Treaty of Genetic Resources for Food and Agriculture, and participates in the Commission on Genetic Resources for Food and Agriculture and Biodiversity, hosted by FAO.

In Mexico, the *National Development Plan (NDP)* is the guiding document in which national objectives, strategies and sustainable development priorities are determined. The NPD is developed during the first half of each government administration (6 years) and follows the recommendations of the National System of Democratic Planning, the state governments, social groups, indigenous peoples and communities, including a gender perspective. Although in the NDP 2013-2018 agrobiodiversity is not mentioned explicitly, there are some objectives and lines of action related to biodiversity and small agricultural producers that affect the use and conservation of agrobiodiversity. In terms of biodiversity, the NDP states that in order to conserve and use it sustainably, the federal government will promote (1) the strengthening of social capital and management capacities of ejidos and communities, (2) the adequate targeting of public programs to generate benefits for this ejidos and communities, (3) the promotion of knowledge and use of traditional knowledge, and (4) the exercise of good productive practices and regulated management of the natural heritage, asserting that only in this way Mexico can move towards an equitable society (Objective 2.2) and promote inclusive green growth that preserves the natural heritage while generating wealth, competitiveness and employment (Objective 4.4).

For small agricultural producers, the NPD states that the federal government will seek to improve the income of the poorest small agricultural producers through (1) the promotion of productive and creative capacities, (2) the generation of alternatives for these small producers to enter the economy more productively, and (3) the development of agribusiness clusters that link them with integrating companies, which will help to build a productive agricultural sector that guarantees the country's food security (Objective 4.10).

But in reality the implementation of the lines of action related to small agricultural producers - aimed at integrating them into the chains of value or develop productive capacities in other activities - , have

[12] See: http://www.diputados.gob.mx/LeyesBiblio/pdf/LBOGM.pdf

not had the desired impact, because the resources allocated at the beginning of the present administration were scarce and the current programs still present problems of coherence and integration. On the other hand, the subsidies directed towards intensive agriculture have shown to be not only regressive, but also have encouraged the abandonment of traditional crops and practices. This set of signals implicitly shapes a vision of agriculture where small producers do not play a relevant role, while not considering that this endangers the agrobiodiversity of the country and, thus, the food security of Mexico and the world.

However, there are two important efforts in positioning biodiversity and integrating it into public policies in other sectors with a medium-term vision that transcends the current administration. These two efforts are the *National Strategy on Biodiversity of Mexico and Plan of Action 2016-2030* and the *Integration Strategy for the Conservation and Sustainable Use of Biodiversity*.

The first is an effort coordinated by CONABIO involving more than 130 governmental, academic and civil society organizations, which seeks to "establish the bases for promoting, guiding, coordinating and harmonizing the efforts of government and society for the conservation, sustainable use and fair and equitable sharing of benefits arising from the use of components of biological diversity and their integration into the sectoral priorities of the country". This strategy not only explicitly addresses agrobiodiversity in three lines of action: (1) the incorporation of sustainable agricultural practices that include traditional knowledge and good practices, in particular those associated with the use of agrobiodiversity (Action line 3.2.4), (2) adaptation to climate change through *in situ* and *ex situ* conservation of genetic reserves of agrobiodiversity present in the country (Action line 4.6.1), and (3) the establishment and updating of training programs for capacity-building of decision-makers that include issues associated with agrobiodiversity and their link to human rights (Action Line 5.2.4).

In line with this strategy and under the framework of the CBD (Art. 10, section a), the German Agency for International Cooperation (**GIZ)** in conjunction with SEMARNAT, promoted the formulation of an *Integration Strategy for the Conservation and Sustainable Use of Biodiversity* with four sectors: agriculture, forestry, fishing and tourism. Regarding the agricultural sector, although the Integration Strategy does not explicitly address agrobiodiversity, it contains strategic lines that directly affect it, since it contemplates that: (1) government actions will seek to take into account the traditional knowledge of indigenous peoples and local communities, (2) government will promote schemes like seals, certifications, collective marks, among others that consider criteria for the sustainable use of agrobiodiversity, (3) the valuation and payment of ecosystemic services generated within the Units of Rural Production, (4) the concept of biodiversity and principles, criteria and incentives for sustainable management and use will be incorporated into sectoral planning instruments, (5) education and awareness campaigns will be promoted for both producers and technicians as well as public officials, (6) financial resources will be allocated to the sustainable use and management of biodiversity, (7) a national system of genetic resources for food and agriculture will be created and (8) a law on agricultural genetic resources will be proposed in line with the Nagoya Protocol.

These two strategies will serve as a basis for the next NDP 2019-2024 to incorporate objectives, strategies and lines of action that integrate agrobiodiversity into the country's development and, consequently, into sectoral programs of the federal public administration.

Aditionally, an agreement on the Policy for the Encouragement of the National Gastronomy[13] was published in 2015, with the aim of developing and promoting the gastronomic offer, encourage tourism, generating economic development and reinforcing the value chains of the Mexican gastronomy in the traditional kitchens/cuisines, which strongly depend on agrobiodiversity products.

[13] See https://www.gob.mx/productividad/articulos/politica-de-fomento-a-la-gastronomia-nacional-14077?idiom=es

1.1.2 Areas of intervention

Geographical scope: the project will work at different scales - national, regional, local. Components 1 and 3 consider both a national and regional/local scale implementation. Components 2 and 4 will be implemented at regional/local levels. The selected states following representative criteria (presence of native species, agroecological system) are: Chiapas, Chihuahua, Mexico City Valley, Michoacán, Oaxaca, and Yucatán.

Target areas have been identified in regions where ongoing projects are already carried out. Potential stakeholders have been identified as well. Species have been selected according to their importance in the agro-forestry systems of traditional agriculture of Mexico, as native species which have originated and/or have diversified in Mexico and for which crop wild relatives are still present in its territory, and which are relevant for food and nutrition security in Mexico and worldwide. The axis of these agro-forestry systems is maize. That's why maize is included along with other important species that are part of the multi-cropping systems of Mexico. Kindly note that there are many information gaps in Mexico regarding mostly-known crops as maize and its crop wild relatives, as indicated under subsection 1.2.3 Remaining barriers.

The following table shows the distribution of project activities over six Mexican states.

Table 1. Grid showing areas of intervention and locations covered by the project

Item	Mexico City	Chiapas	Chihuahua	Michoacán	Oaxaca	Yucatan	Total
Name of intervention areas	Mexico City chinampa farming system	Selva El Ocote-Sumidero canyon complex; *Los Altos* Region	Sierra Tarahumara	*Purépecha* Plateau	Oaxaca communities	Region of milpas in Yucatan	6
Municipalities	Xochimilco and Tlahuac	Ocozocuautla, Cintalapa, Tecpatán, Jiquipilas, Berriozábal, San Fernando, Osumacinta, San Juan Cancuc, Pantelhó and Santiago El Pinar	Guachochi	Pátzcuaro, Erongarícuaro, Tingambato, Uruapan, Paracho, Cherán and Nahuatzen	San Juan Bautista Valle Nacional, Villa de Tututepec, Santa Catarina Juquila, Santiago Yaitepec and Silacayoapam,	Chacsinkin, Peto, Tixmehuac, Tahdziu, Yaxcaba, Tinum and Valladolid	29
Direct institutional partners (Primary stakeholders)	Authority of the World Natural and Cultural Heritage Zone in Xochimilco, Tláhuac and Milpa Alta, UAMX, UNAM, UNESCO, ICOMOS Méx	Selva El Ocote Biosphere Reserve Management. CONANP, ECOSUR, AMBIO, INIFAP; IDESMAC, COFEMO	UNAM Botanical Gardens, UTM, Tarahumara Sustentable, Fundación Tarahumara A.C	CIGA UNAM, UIIM, GIRA A. C., Marku Anchekoren Cooperative	INIFAP, ECOSTA A.C., CONANP Oaxaca	SEDUMA	24
Baseline information (existing or ongoing actions)							
Number of locations	5	13	1	6	15	14	54

Item	Mexico City	Chiapas	Chihuahua	Michoacán	Oaxaca	Yucatan	Total
Total population in communities	109,500	4566	934	10,833	33,467	16,203	175,503
Species present (see table 2 below)[14]	Cultivated: 16 *Quelites*: 11 Wild and managed: 23	Cultivated: 15 *Quelites*: 9 Wild and managed: 50	Cultivated: 10 *Quelites*: 11 Wild and managed: 30	Cultivated: 12 *Quelites*: 7 Wild and managed: 29	Cultivated: 10 *Quelites*: 3 Wild and managed: 21	Cultivated: 14 *Quelites*: 7 Wild and managed: 19	Cultivated: 26 Quelites:22 Wild and managed 120
Agroecosystems covered	Chinampas	*Milpa*, Garden, Shade-grown coffee	*Milpa*, Garden	*Milpa*, Garden	*Milpa*, Garden, Cocoa Farm	*Milpa*, Garden	5
Existing initiatives and projects	1	2	1	1	1	1	7
Hectares covered by existing projects	250	136	75	8	120	15	604
No of participating farmers	1700	305	60	8	120	75	2268
% of participating women	21%	20%/50%	55%	50%	40%	47%	25%
% of participating young people	26%	4%/33%	15%	6%	10%	27%	24%
Local and regional markets[15]	-Potential local market: 4 -Regional market: Supply centre, Jamaica market; 4 organic "tiangui" markets; 1 trueque market	Local markets in: municipalities of the Selva El Ocote-Sumidero canyon complex; San Cristóbal de Las Casas and Yochib en San Juan Cancuc, San Fernando	Local market: 1 self-service store	Local markets, alternative produce fairs in Morelia, export of native organic maize	Agrobiodiversity fair	Mayan *milpa* fairs incorporating Mayan seed fairs; meetings for the exchange of knowledge between Mayan cabañuelas [weather forecasters] –	

[14] Note: A full list of the selected species names is given in Appendix 8. The counted species have database records inside the intervention area polygon plus a 5 km buffer. The information was obtained from the National Biodiversity Information System (SNIB). In this list the *Agave* species are considered inside the wild and managed group.

[15] Local and regional markets refer to geographical, social and institutional proximity that encourages interchange between producers and consumers. The table shows the most common trade channels and experience in marketing agroBD products.

Item	Mexico City	Chiapas	Chihuahua	Michoacán	Oaxaca	Yucatan	Total
		en Pantelhó, and San Andrés Larrainzar.				and municipal markets.	
	Mexico City	**Chiapas**	**Chihuahua**	**Michoacán**	**Oaxaca**	**Yucatan**	

Table 2. Cultivated and wild species present in the different intervention areas and locations

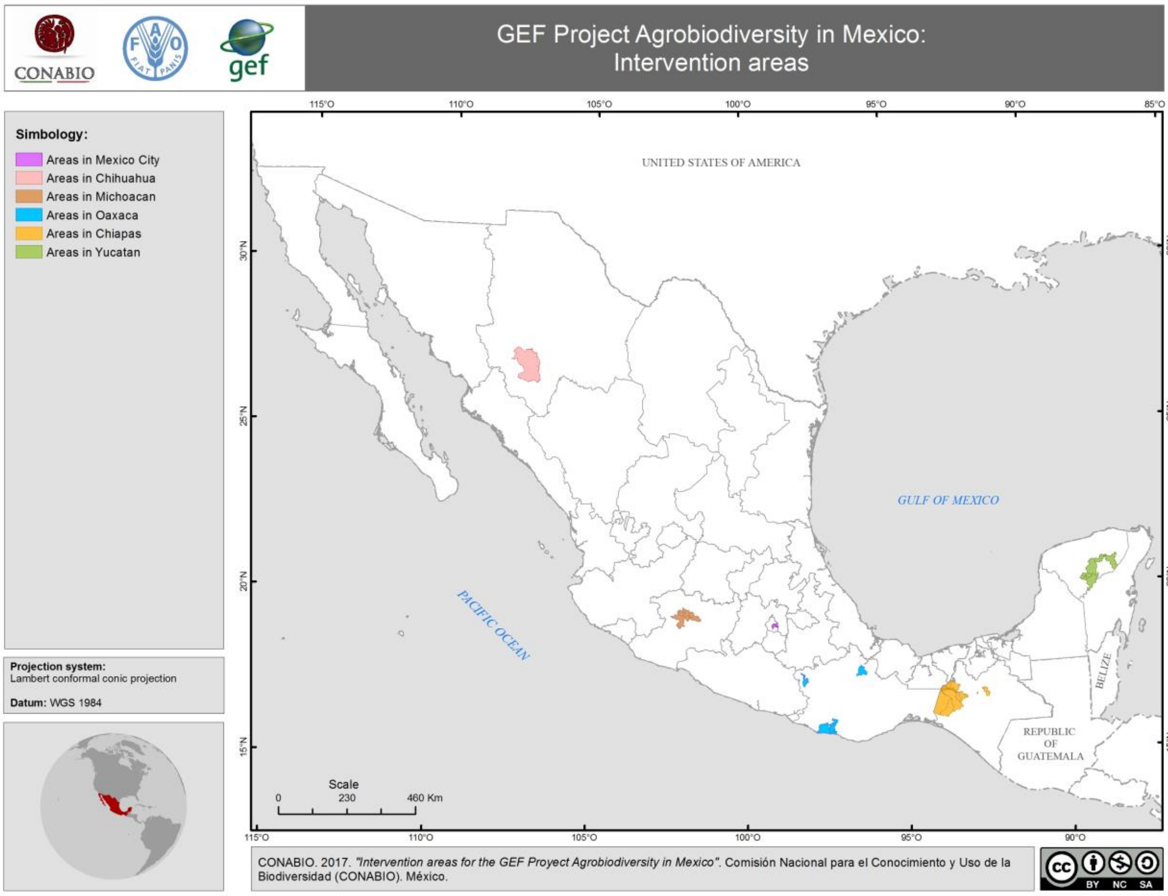
Number	Genus / group of species	Mexico City (Cultivated)	Mexico City (CWR)	Chiapas (Cultivated)	Chiapas (CWR)	Chihuahua (Cultivated)	Chihuahua (CWR)	Michoacán (Cultivated)	Michoacán (CWR)	Oaxaca (Cultivated)	Oaxaca (CWR)	Yucatán (Cultivated)	Yucatán (CWR)
1	*Agave*	X	X	X	X	X	X	X	X	X	X	X	X
2	*Amaranthus*	X	X		X		X	X	X				X
3	*Capsicum*	X		X	X	X		X		X		X	
4	*Cucurbita*	X	X	X	X	X	X	X	X	X	X	X	
5	*Opuntia*	X	X	X	X	X	X		X		X		X
6	*Persea*			X	X			X		X	X	X	
7	*Phaseolus*	X	X	X	X	X	X	X	X	X		X	
8	*Physalis*	X	X	X	X	X	X	X	X	X	X		X
9	*Sechium*			X		X		X		X	X	X	
10	*Theobroma*									X		X	
11	*Zea*	X	X	X	X	X	X	X	X	X	X	X	
12	Quelites	At least 11 species		At least 9 species		At least 11 species		At least 7 species		At least 3 species		At least 7 species	

Cultivated

Crop Wild Relatives

The following map shows the distribution of the six project regions over the country. Detailed maps for each project region are presented in Appendix 7.

Map 1. Location of project regions in the country



Coahuila State, through its State Regional Ministry of the Environment (SEMAC), will launch a twinned and parallel project (see appendix 10). The Coahuila State project will follow the methodologies set by this project to document the presence of wild walnuts (Juglans spp.) populations in riparian sites. The twinned project will be funded and operationally and financially managed by SEMAC, while the information collected will be stored as part of the Agrobiodiversity Information System to be built through this GEF project.

1.2 THE CURRENT SITUATION

1.2.1 Threats to Global Environmental Benefits

The global context of loss of plant genetic resources

The confluence of climate change, modern agricultural practices characterized by monocultures, urbanization, grazing and development projects have narrowed the diversity of crops and their varieties on which our food systems depend. They have also led to the abolishment of the natural habitats of crop wild relatives and wild plants that are harvested for food. The *ex situ* conservation of the genetic diversity of crops and their wild relatives has not kept up with the pace of this erosion of genetic diversity while *in situ* conservation practices remain underfunded. In fact, in many countries, including Mexico, the conservation of plant genetic resources for food and agriculture (PGRFA) in their natural habitats, where they could continue to evolve adaptive traits, receives at best disjointed attention from disparate public institutions and civil society entities that intervene in concerted manners although not in a sufficient regular basis. The inevitable consequence, therefore, is that many sources of the traits that could be used to develop the resilient and nutritious crop varieties needed to feed an over-increasing population in the face of climate change are going extinct. Equally worrisome, the loss of these natural habitats and the PGRFA that populate them, rob our agricultural and food systems of the very vital ecosystem services that are needed to develop production systems that have minimal environmental footprints.

An important extinction of species has been predicted by the year 2050, within which the loss of worldwide agricultural diversity or *agrobiodiversity* is implied. Climate change represents an unprecedented and immediate threat to subsistence and food security and is an important obstacle to achieving the 60 per cent growth in world food production that will be necessary by the year 2050 (FAO, 2011). The trend can be reversed but not without a documentation of the extent of the problem; the mapping of the hotspots; the identification of stakeholders and the fostering of linkages between them; the definition of priority activities and the mainstreaming of validated practices as this project proposes.

Regarding the **threat level** faced by the studied species[16], the majority of the studies conducted in natural habitats have focused on species identified by the researchers as *abundant* or *stable* (19.6 and 70.3 per cent respectively), while little attention was paid to those *in decline* or *in danger of extinction* (10.1 per cent). In contrast, studies conducted on traditional agricultural systems have showed a higher percentage of species that were under some category of *threat* (47.1 per cent in total)[17].

The conservation status of agrobiodiversity species, associated species and wild relatives

<u>Current status</u>

The status of species identified in Appendix 8 may be variable, depending on factors as: i) if it is a cultivated species (and the features of the agricultural system where the species is cultivated, including management practices) or a wild relative of a crop; ii) if the species has wild or weedy forms; iii) the reproductive features and gene flux of the considered crop with the wild relatives; iv) the conditions in which the wild relatives inhabit.

Although some crops covered by this project are produced at world level and are not apparently threatened, this project focuses on native crops and species in their centre of origin. Their genetic diversity (present in local strains or varieties managed in traditional crop systems as well as in the wild relatives of those crops) is mainly expressed within Mexico but has not, in the main, been properly described and studied.

In Appendix 8 a list of cultivated species is detailed. The genetic pool represented by local landraces of these species is threatened by intensive agricultural production systems that have been widely adopted and promoted, which tend to uniformize crops through the establishment of large cropping areas with low genetic diversity. On the opposite side, there is a tendency towards a larger inter- and intra-specific diversity of those cultivated crops within the traditional production systems (such as milpas), which have existed and evolved at least during 6000 years in Mesoamerica. Therefore, once the traditional systems are under pressure, their agroBD endurance is threatened as well.

With regard to wild relatives of the crops considered, little effort has generally been made to describe them and even less effort has been made to conserve them. Some of these species have been included in risk categories according to national regulatory frameworks or international lists. The status of conservation of a number of the wild relatives of important crops that are native to Mesoamerica and to Mexico are being evaluated currently under IUCN guidance through a specific project called "Safeguarding Mesoamerican Crop Wild Relatives" which is taking place under a "Darwin Initiative" effort. These evaluations will be published shortly during project implementation (http://www.darwininitiative.org.uk/project/23007/).

[16] CONABIO, 2015
[17] CONABIO, 2015

Table 3 shows a list of wild relatives, which have been included in risk categories according to national normative frameworks or international lists, as follows:

Table 3. Risk categories of wild relatives of species considered by the present project

Species	Risk category	Normative framework or source
Agave bracteosa, A. dasylirioides, A. guiengola, A. impressa, A. parviflora, A. polianthiflora	Threatened	NOM-059-SEMARNAT-2010
Agave lurida, A. nizandensis, A. victoriae-reginae	In danger of extinction	NOM-059-SEMARNAT-2010
Agave chiapensis, A. congesta, A. gypsophila, A. kewensis, A. ornithobroma, A. parrasana, A. peacockii, A. titanota, A. vizcainoensis	Subjected to special protection	NOM-059-SEMARNAT-2010
Opuntia bravoana, O. excelsa, O. arenaria	Subjected to special protection	NOM-059-SEMARNAT-2010
Opuntia. chaffeyi	Critically endangered (CR)	IUCN
Opuntia megarhiza	Endangered (EN)	IUCN
Opuntia sp.		Many species of the genus are included in the Appendix II of CITES[18]
Persea schiedeana, P. floccosa, P. liebmanni	Vulnerable (VU)	IUCN
Tripsacum maizar	Threatened	NOM-059-SEMARNAT-2010
Tripsacum zopilotense	Subjected to special protection	NOM-059-SEMARNAT-2010
Zea diploperennis	Threatened	NOM-059-SEMARNAT-2010
Zea perennis	In danger of extinction	NOM-059-SEMARNAT-2010

Baseline scenario: Agrobiodiversity and Food and Nutrition Security in Mexico

AgroBD provides valuable services for food and nutritional security. Firstly, the *provision service,* or different foods with special qualities that make up more varied and better-quality diets, according to the preferences of different communities; *regulation services*, including natural control of pests and diseases in a cost-effective manner and maintenance of soil fertility; agroBD also contributes to the regulation of water and its purification, and erosion control. *Support services* provided by agroBD are necessary for the production of other ecosystem services such as the provision of habitat and food for various species including pollinators, photosynthesis and the hydrological and nutrient cycle.

Another important benefit of agroBD in terms of food safety is represented by the *cultural services* for the communities that conserve and consume the species and society in general. Traditional knowledge and culture are often based on the diversity of local species and their use, including specific ways of presenting and sharing food among the community on a daily basis as well as during spiritual and religious celebrations. The intangible benefits that society in general derives from agroBD include a local cuisine, sense of belonging and maintenance and future development of local knowledge.

[18] Conservation of International Trade of Endangered Species of Wild Fauna and Flora

AgroBD has fallen at an alarming rate in recent decades and this is reflected in the standardization of diets between regions and countries[19] and the reduction of available nutrients. Despite the accelerated loss of agroBD, evidence shows that farmland continues to maintain significant genetic diversity in the form of traditional varieties[20]. *In situ* conservation of these varieties is due largely to small producers who encourage crop adaptation to local conditions by keeping up their native seed selection, research and improvement activities, thus enabling an ongoing service.

Small producers decide to grow native species as part of their livelihood strategy. In the case of maize, key crop of the milpa system, Mexican rural households value, produce and process native varieties for the reasons indicated above, but also because their crops give them prestige, allow them to forge social ties and use their own seeds instead of relying on an external provider each year[21]. The qualities of specific native maize varieties can meet the culinary needs of the communities that cultivate them[22]. And yet agricultural programmes and policies continue to focus on productivity and yield despite the importance of agroBD attributes to producers.

There are clear examples that the benefits offered by agroBD are recognized in some of the project working areas. In the Yucatan Peninsula, Mayan producers cultivate different maize varieties that are more resilient to climatic disturbances such as drought. The same is true of producers from Tultepec, Oaxaca, who cultivate different varieties that are valued because they ripen at different times or because their qualities are optimum for various reasons, including food quality or because they are resistant to pests. Studies supported by CONABIO in Oaxaca have also shown that native varieties are more productive than hybrid varieties when good farming practices are implemented in sub-optimal agricultural areas[23].

One of the main challenges facing Mexico is the health crisis due to alarming rates of obesity and weight gain and associated non-communicable diseases such as diabetes and cardiovascular disease. This goes hand-in-hand with a severe micronutrient deficiency in the population.

Diverse farming systems, reflected in more diverse diets, bring benefits for nutrition and health[24]. Small producers are the key to providing high-quality food and a variety of nutrients. As an example, the seeds, shoots, flowers and fruit of the pumpkin alone provide carbohydrates, fats, vitamins and fibre. Quelites provide riboflavin, niacin and ascorbic acid.[25] It is estimated that, on a global level, farmers who own under 2 hectares generate between 20 and 25 per cent of foods containing key nutrients for human health such as zinc, vitamin A, proteins, iron, calcium and phosphate[26].

Indigenous areas have greater *de facto* incentives to maintain their native varieties. For indigenous communities, the value of the attributes of native maize that is not sold on the market, or the shadow

[19] Khoury et al 2014

[20] Jarvis et al. 2011. Supporting the Conservation and Use of Traditional Crop Varieties within the Agricultural Production System. *Critical Review in Plant Sciences*, 30:125-176

[21] Keleman, A., Hellin, J., & Bellon, M. R. 2009. Maize diversity, rural development policy, and farmers' practices: lessons from Chiapas, Mexico. *The Geographical Journal*, *175*(1), 52-70.

[22] For farming families, particularly if they are indigenous, a good tortilla is always handmade, produced using grains grown by the family or a known source. They have their own special flavour, aroma, texture, flexibility and durability and can be reheated without breaking. Food quality may be as relevant to high-income households as to low-income rural peoples; even so this is ignored and programmes and policies focus their efforts on quantity and yield (Appendini, Kirsten, and Ma Guadalupe Quijada. 2015. 'Consumption Strategies in Mexican Rural Households: Pursuing Food Security with Quality'. *Agriculture and Human Values* 33 (2): 439–54. doi:10.1007/s10460-015-9614-y)

[23] Aragón, F., Astier, M., Bye, R., Linares, E., Perales, H. 2016. *In situ* conservation and participative improvement of native maizes and their wild relatives in Oaxaca. Report of 31 December 2015. CONABIO

[24] Frison et al. 2006. Food and Nutrition Bullet, vol 27, no 2. The United Nations University

25 Kato, T.A., C. Mapes, L.M. Mera, J.A. Serratos, R.A. Bye. 2009. Origen y diversificación del maíz: una revisión analítica [origin and diversification of maize: an analytical review]. National Autonomous University of Mexico, National Commission for the Knowledge and Use of Biodiversity. 116 pp. Mexico, D.F.

26 Herrero et al (forthcoming)

price, is greater than its market price[27]. Even though the conservation actions of small producers create benefits for society, they generate individual costs and producers are not acknowledged or rewarded. These benefits are therefore not taken into consideration when stakeholders make decisions and agroBD is under constant risk of erosion.

It is urgent and relevant to be aware of and acknowledge the value of the work and management practices of small producers protecting agroBD, as well as the value of their products to food and nutritional security in the face of the national health crisis and with climate change encroaching. The generation of more detailed information on the value of agroBD, the reasons for its conservation in the context of family economy and the design of a plan for appropriate dissemination of this information should a) help place value on traditional knowledge for conservation and sustainable use of agroBD by small producers and their families, b) raise awareness among policymakers of the value and importance of agroBD and traditional agroecosystems that conserve it to ensure an improvement in public policies – and c) provide incentives to recognize the value of agroBD in the marketplace through consumer awareness.

While market mechanisms for conserving agroBD are useful, they alone are not sufficient because they only consider certain varieties that have a potential niche value, while many other threatened agroBD resources have low or zero market value. One example of this is the case of quinoa, where high prices due to increased demand for white varieties led to a reduction in species diversity in the high Andes.[28]

Baseline scenario: marketing of agrobiodiversity products in Mexico

It is difficult to find appropriate market incentives to promote the conservation of agroBD in conventional agrifood chains with large-scale marketing. When faced with the challenge of feeding a growing population in large urban centres, such chains have focused on standardized production to reduce production and transaction costs. By doing so, they neglect the development of added-value attributes and the quality of local production or manufacturing processes. Because they do not meet these standardization and price levels, they are not properly valued and accepted by the large chains. This has led producers and consumers to move away from local products and diets are increasingly less dependent on the agrobiodiversity of areas close to consumers.

Mexican initiatives that effectively market local agricultural products, including those of interest to native agrobiodiversity, use market mechanisms that involve geographical, organizational or social proximity between mainly urban producers and consumers and a minimal level of intermediation in their exchanges. These mechanisms, known as Short Food Chains (SFCs), are actually the most traditional way of selling agricultural products and were in existence before the major food chains were set up. They generally offer products grown and raised through sustainable farming practices. They also encourage the building of relationships of trust between producers and consumers based on honest communication, which is a necessary condition for agrobiodiversity products to be valued and acknowledged.

Most products that conserve native biodiversity are consumed in their areas of production by rural communities that greatly value them. However, this is not necessarily reflected in a competitive price that allows for greater production and conservation because many such communities have very low incomes and need to buy inexpensive products to feed their families. These are usually the result of

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[27] Arslan and Taylor. 2009. 'Farmers' Subjective Valuation of Subsistence Crops: The Case of Traditional Maize in Mexico'. *American Journal of Agricultural Economics* 91 (4): 956–72.

27 FAO, El impacto del auge de la quinua en los agricultores bolivianos [Impact of the quinoa boom on Bolivian farmers]. http://www.fao.org/assets/infographics/Quinoa_Infographic_es.pdf; Bioversity International, Harvesting quinoa diversity with Payment for Agrobiodiversity Conservation Services http://www.bioversityinternational.org/uploads/tx_news/Harvesting_quinoa_diversity_with_Payment_for_Agrobiodiversity_Conservation_Services_1664_03.pdf

high-tech farming conducted outside the region, with some exceptions, especially in indigenous communities, as mentioned above.

Thus, for example, the PESA baseline surveys showed that between 60 and 70 per cent of families in marginal rural areas continue to produce seasonal native maize for self-consumption, but local production has practically stopped for other foods.

In order to achieve a far-reaching appreciation of agrobiodiversity, we need to bring these products to local urban consumers who have the resources to buy them. Many people in urban areas recognize the value of eating biodiverse food and products and their nutritional characteristics and so on. Such products are not, however, always available in sufficient quantity or variety within the movement range of consumers. In any case, we need to put forward a strategy to promote and disseminate the products of agroBD and encourage Short Food Chains (SFCs). Fairs, food shows and other alternative marketing channels promoted by civil society are mechanisms that have been used to bring such "alternative" products to urban consumers.

In Mexico, the following SFC mechanisms have become established in recent years:

a) **Sales at local fairs:** where the producer sells fresh and processed foods directly to consumers, such as the Feria Consume Local [Eat Local Fair] in Mexico City.

b) **Sales at producers' markets:** there are currently several of these, particularly for organic and alternative products. In particular, six producers' markets have been identified in Mexico City (CDMX). These markets are typically selling and meeting spaces located in urban areas where producers and small-scale food manufacturers offer a range of products whose attributes of quality, identity and tradition differentiate them from industrial produce, applying principles of fair trade. Their customers are urban consumers committed to their health, protecting the environment and strengthening local economies. Some traders are itinerant, others work every weekend or every fortnight. They are not very large: on average there are between 20 and 40 pitches. Many of the products come from states bordering Mexico City: Morelos, Estado de México, Tlaxcala, Michoacán, Querétaro, Hidalgo, Chiapas, Oaxaca, Guerrero and Puebla. They are mostly producers and there are few intermediaries. Previously, the only markets were in Texcoco and Xalapa but now there is an entire network of agroecological "tiangui" markets in Mexico and more consumers.

c) **Sales at the production site (*in situ*):** This type of direct marketing between producer and consumer has always existed between neighbours, family, friends and people from the same area. Importantly, it is a source of income that does not require significant investment and saves on transportation costs.

d) **Sales in established stores and collective sales outlets:** specialized stores can be distinguished from supermarkets and traditional retail stores because they sell a different type of product. They are usually organic and alternative stores, but they may also sell local or family farming products.

e) **Direct sales to restaurants and hotels:** this form of marketing is coordinated by networks linking an SFC to local development. In this case, local cuisine is the driving force behind development and forging new links between production and consumption.

f) **Online sales with home delivery:** Direct online sales is a method that is on the increase due to technological advances and increased coverage. It can take various forms. One of these is private initiative, where producers offer their products online and send them to customers on request (home delivery). The initiative may also be run by an organization or group of organizations. Direct sales do not go through intermediaries or brokers and the producing families deliver or send the orders themselves.

g) **Sales with prepayment:** this is a form of direct marketing between producer and consumer, but with the difference that the consumer pre-pays for the order, i.e. pays in advance. This method can be carried out in a market, *in situ*, and so on.

h) **Sales to the public sector**: in this form of SFC, the consumer is the State, which carries out public food purchases for social programmes.

Due to the food purchasing habits of urban consumers, in order for SFCs to be efficient, the supply of products must be varied and comprehensive and may include the products of native agrobiodiversity. The following products have been identified: market garden products (vegetables and legumes); eggs, fruit, dairy products, prepared foods and beverages (sauces, jams, tortillas, *mole* sauces, *nieves* [fruit ice cream], *romeritos* [dish made from romerito quelites] and meat); bread and pastries; meat (chicken, beef and fish); chocolate and coffee; bee products (honey) and *cajetas* [caramel topping]; mushrooms and fungi, oils (olive and sesame); herbs and cereals.

One key condition for generating an SFC is that of strengthening the organizational, cooperative and entrepreneurial capacities of small-scale producers as well as the awareness and organization of agroBD product consumers.

Geographical indication (GI) and participatory guarantee systems (PGS)

Practices, such as differentiation of products through organic or fair-trade certification, certificate of origin and brand building help in accessing local and international niche markets and realizing better prices for producers.

A geographical indication (GI) is a sign used in products that have specific qualities associated to geographical location due to traditional methods or natural resources, or a certain reputation, as a consequence of the link to origin[29]. Defined internationally as an Intellectual Property Right (IPR), once specific quality or reputation linked to geographical origin can be demonstrated, a GI has to be protected. This protection is often based on official registration that confers exclusive rights of use to GI producers. GI is therefore primarily a market tool with economic benefits originating from the differentiation process and IP protection.

Although not included in the GI definition as an intellectual property right by the TRIPS agreement, the preservation of biodiversity can often be an important support of a GI strategy. But it depends on the aims and actions of local actors. Specifying a local variety or breed as a requirement of the GI, ensures the continuous use – and thus *in situ* conservation – of local biodiversity, as has been observed in many cases[30]. Urban markets, which include niche markets for high quality products, can therefore represent an opportunity for GI producers, and supply specific products for urban consumers in search of typicality. To achieve a GI for a product or process, the official recognition linked to the IPR is required which implies building a shared GI strategy (establishment of the code of practice, quality assurance, possible official recognition, marketing strategy, etc.). Collective action of a large number of small scale producers is needed to reduce transaction costs in providing vital inputs as well as policy support to apply for international IPR recognition. Risks of exclusion of small scale producers in the same or different location should be carefully prevented through broad consultations processes and supported by the recognition of GI producers as quality product providers to a *national food heritage.*

Organic and FairTrade certification are also alternatives widely used for product differentiation and a source of competitive advantage for special products such as those from agrobiodiversity. The rise of consumer demand for “sustainable” products has created market outlets for sustainable food, textiles and energy in developed word.

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[29] In particular, Article 22 of the World Trade Organization (WTO) Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) (1994) defines GIs as “*indications which identify a good as originating in the territory of a Member, or a region or locality in that territory, where a given quality, reputation or other characteristic of the good is essentially attributable to its geographical origin.”*

[30] Larson 2007, Thevenot-Mottet, 2010

As many studies show, organic and Fairtrade third party certification provides a credible guarantee for consumers seeking organic products (FAO, 2014). Nevertheless, the scheme is restrictive to small-scale farmers due mainly to burdensome certification costs. Participatory guarantee systems (PGSs) provide an alternative tool to third-party certification. PGSs are based on appreciation of local products and capacity and mutual education between producers, processors, traders and consumers with the aim of establishing product attributes and their ecological management, based on bonds of trust due to geographical, social and institutional closeness. According to the International Federation of Organic Agriculture Movements IFOAM, "Participatory Guarantee Systems are locally focused quality assurance systems. They certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange"[31]. Article 24 of the Law on Organic Products recognizes the promotion of this type of certification for family production and small organized producers.

The participation of producers, traders and consumers is essential to PGSs; their marketing strategies revolve around local brands and short food chains.[32]

Direct and underlying causes of agrobiodiversity loss in Mexico

During the preparation of the full Project Document (ProDoc), five causes or direct threats in terms of agrobiodiversity loss in Mexico were identified:

1. The expansion of mono-cropping and modern large-scale retailers
2. The gradual abandonment of traditional practices of agrobiodiversity management
3. The decrease in consumption of agroBD products
4. Public policies that discourage traditional agricultural practices
5. Weaknesses in the strategies and actions of agrobiodiversity conservation.

These direct threats to agrobiodiversity conservation are in turn due to a series of indirect underlying causes:

1. The expansion of mono-cropping and large-scale retailers

- **Modern agricultural production is based on a limited range of crops:** In Mexico, the large-scale intensive agricultural production, characterized by monocrops of a very narrow range of crops and varieties, has grown exponentially thereby displacing unique crop landraces in the last decades. Large-scale production relies on few agricultural crops. Consequently, genetic erosion is threatening agrobiodiversity species that could become "obsolete" or be lost. Native crops, and associated species survive mostly thanks to traditional communities that keep on cultivating them.
- **Uniformality of crop varieties:** In Mexico, the context of uniform and large-scale agricultural production, with growing food demand pressures and climate change effects, is reducing agricultural biodiversity. Genetic resources constitute the raw material for plant breeders to develop new varieties, are key to meet food demand from a growing population, and are fundamental to face the pressure of pests, diseases and changing environmental conditions as a result of climate change. Plant genetic resources are being lost in Mexico due to the spread of monoculture systems, introduced organisms, excessive use of external inputs, and loss of traditional management systems and knowledge due to migration of young community members. The sector of traditional agricultural practices where farmers freely cultivate, store and exchange their seeds has also been incrementally affected by the commercial seed sector. Two corporations

[31] IFOAM. https://www.ifoam.bio Consultation date (15/05/2017)

[32] This does not mean that GIs and PGSs are necessarily in conflict, but that they can complement one another on different geographical and market scales.

currently control more than 50 per cent of the commercial seed market, leading to more uniform agricultural production and thus reducing agroBD due to the replacement of local varieties by exotic and/or improved varieties and species.[33]

- **Lack of inclusiveness of modern value chains:** With globalization, food systems in Mesoamerica and Mexico are increasingly influenced by highly concentrated agro-industrial firms and retailers, and this trend is set to increase (OECD, 2011). It creates unequal power relations between upstream and downstream actors in the value chain, especially with regard to smallholders and family farmers. As recognized by the 2014 International Year of Family Farming (IYFF)[34], inclusiveness of smallholders is a key element for sustainability, and has big consequences on agricultural biodiversity, food security and social sustainability. Family farms are essential in safeguarding agrobiodiversity, and sustaining communities and cultures.

2. Gradual abandonment of traditional practices of agrobiodiversity management

One direct cause of agrobiodiversity loss is the abandonment of traditional agroecosystems, which is in turn caused by factors such as: changes in the economic activities and income sources of rural settlers; migration from the countryside to the city; changes in land use and abandonment of the countryside by young people, meaning that there is no generational continuity in the management of traditional production practices. These indirect causes are interrelated.

Intergenerational dynamics also occur in indigenous areas. Indigenous regions are actually driving out their young people. The Mixteca in Oaxaca stand out in this respect, but the Purépecha Plateau in Michoacán and Sierra Tarahumara are not far behind.

- **Changes in economic activities and income sources of rural settlers:** The precarious income from the sale of agricultural products and the monetization of the economy in rural areas means that families increasingly depend on jobs outside their plots of land and monetarized social subsidies. Non-farming activities can be carried out in the same community, outside it, nearby or even in far-off areas or abroad. In Mexico, therefore, farming has become a secondary activity, as evidenced by the sustained decline in the Economically Active Population (EAP) for the agricultural sector, which fell from 73 per cent in 1930 to 13 per cent in 2017. At national level, rural income from non-agricultural activities, even in remote areas, exceeds 50 per cent.[35] Case studies indicate that the population working in agriculture in predominantly rural regions around Lake Pátzcuaro has fallen by 60 per cent over the past 50 years. The proportion of the population currently engaged in agriculture in this region is only 4 per cent. The proportion of farmland in rural areas has fallen by between 22 and 39 per cent between 1995 and 2015.[36]
- **Migration from the countryside to the city, particularly by young people, and interruption of generational succession:** The economic processes mentioned above and also the continuous increase in the educational level of new generations in the countryside (the education level in remote rural areas increased from 4.7 to 5.7 between 2000 and 2005[37]) are accompanied by a growing abandonment by young people of their original communities. Between 2001 and 2005 it is estimated that an average of 400,000 people born in Mexico migrated to the United States. This migratory flow is more intense in rural regions to the west of the country and is mainly composed of young people.[38] These socioeconomic changes disrupt generational succession, the children of

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[33] Food and Agricultural Organization. 1997. State of the world's plant genetic resources for food and agriculture. Rome (Italy): FAO.

[34] http://www.fao.org/family-farming-2014/home/what-is-family-farming/en/

[35] OECD, 2007. *OECD Rural Policy Reviews MEXICO*

[36] Orozco-Ramírez, Q., & Astier, M. (2017). Socio-economic and environmental changes related to maize richness in Mexico's central highlands. *Agriculture and Human Values*, *34*(2), 377-391.

[37] OECD, 2007. *OECD Rural Policy Reviews MEXICO*

[38] CONAPO 2005, Migración México-Estados Unidos panorama regional y estatal [Mexico-United States Migration, regional and state overview]. With regard to internal migration since 2000, most migration is urban-urban (65 per cent) while rural-urban is a secondary phenomenon (20.6 per cent in 2000) and on the decrease (16 per cent in 2010). The phenomenon

farmers do not carry on farming because this employment option cannot provide a decent income. Young people are also changing their food preferences. They prefer foods that come from outside the area and stop eating traditional products. Consequently, local varieties are no longer sown. Therefore, rural poverty and migration towards urban zones and abroad have deepened the effects of intergenerational loss of traditional knowledge and varieties management.

- **Change in land use:** In rural areas near cities, there has been a rapid change in land use from agricultural to urban. In regions further away from the influence of urban growth, other land-use changes have contributed to the loss of agrobiodiversity, for example changing from farming to livestock keeping or mono-species plantations as in the case of avocado in temperate areas or palm oil (also an exotic species) in tropical areas. It has been estimated that in Michoacán, the area planted with avocados rose from 56,000 ha in 1990 to more than 126,000 in 2015, occupying mainly areas cultivated with maize and pine and oak forests. In Chiapas, the area dedicated to palm oil increased from 2,850 in 1990 to more than 43,000 in 2015.[39]

3. The decrease in consumption of agroBD products

- **Urbanization and changes in diets:** Urbanization is a trend that transforms drastically food systems. Today, half the world's population lives in urban areas and that number is increasing rapidly (FAO, 2012). By 2050, about 70 percent of the global population of 9 billion is expected to live in cities, which will have important consequences on consumption patterns and food chains (Esnouf *et al.,* 2011). Indeed, urban consumers usually purchase everything they eat: this deeply influences local food systems, orientating them on new diet patterns or lead access to richer products, often imported, which replace traditional foods. In Mexico similar patterns exist, with a change in dietary patterns characterized by increasing consumption of dairy products, eggs, processed meat products, fats, sugar and sugary drinks and low consumption of legumes, vegetables and fruits. For example, the availability of food products between 1961 and 2001 changed as follows: dairy products rose from 59 kg to 111 kg per inhabitant per year, eggs from 3 kg to 15 kg, meat from 29 to 60 kg and sugars from 27 to 49 kg.[40] Cereals were the main food group whose consumption fell, with the proportion of Kcal/person/day decreasing from 57.7 per cent to 44.6 per cent between 1961 and 2009. Another group affected by the same circumstances is legumes, especially beans, with consumption falling from 5.8 per cent to 3.4 per cent in the same period. At the other end of the scale, the contribution of sugars to daily per capita kilocalorie consumption rose, increasing from 12.6 per cent to 15.4 per cent; foods of animal origin fell from 11 to 4.8 per cent, while fats and oils of plant and animal origin increased from 7.0 to 10.8 per cent. Changes in dietary patterns and a combination of factors such as food imports, abandonment of traditional diets and the increased availability of processed foods in low income strata is associated with an increase in type 2 diabetes. [41]
- **Limited availability of products of agrobiodiversity and greater access to processed products:** Native varieties are part of traditional diets, but the international food system neither demands nor consumes them. The National Survey on Supply, Food and Nutritional Status in the Rural Environment (ENAAEN), carried out in 100 areas of Mexico in 2008, found that no fruits and vegetables were bought on a regular basis in 21 and 13 per cent of the areas in which the survey was applied, respectively. Meanwhile, products such as fats, sugars, beverages, cereals and eggs

described in this section took place between the mid-1970s and the 1990s. In other words, the exodus from the countryside has already happened and what we are seeing now is the tail-end of the process.

[39] SIAP, 2015. Anuario Estadístico de la Producción Agrícola [Agricultural production statistical yearbook]. SAGARPA.

[40] Ortiz-Hernández, L., Delgado-Sánchez, G., & Hernández-Briones, A. (2006). Cambios en factores relacionados con la transición alimentaria y nutricional en México [Changes in factors related to dietary and nutritional transition in Mexico]. Gaceta médica de México, 142(3), 181-193.

[41] Moreno-Altamirano, Laura, Silberman, Martín, Hernández Montoya, Dewi, Capraro, Santiago, Soto-Estrada, Guadalupe, García-García, Juan José and Sandoval-Bosch, Elvira (2015). "Diabetes Tipo 2 y patrones de alimentación de 1961 a 2009: algunos de sus determinantes sociales en México [Type 2 diabetes and eating patterns from 1961 to 2009: some social determinants in Mexico". In *Gaceta Médica de México* (151)354-368.

were available in 100 per cent of areas, both indigenous and non-indigenous. Availability of and ease of access to this type of food have been a driving force behind dietary standardization with associated problems of malnutrition, alongside the persistent problems of anaemia and malnutrition. The following are indirect causes of greater access to fatty products, sugars, drinks, industrialized flour and egg: increasing urbanization, the incorporation of women into the labour market, usually on an informal and precarious basis; monetarization of rural life, caused by remittances (in the order of 20 billion dollars per year) and cash transfers from social programmes; improved communications, expansion of rural supply stores offering industrialized products – and access to television and other electronic means of communication.

4. Public policies that discourage traditional agricultural practices

- **Decision-makers are not fully aware of the importance of agrobiodiversity and have adopted contradictory policies that affect conservation:** Until present, decision-makers in Mexico have not recognized the importance of domestic gardens and traditional cultivation systems. This lack of awareness has induced major risks and negative pressures through the design of public policies that have been contradictory or have had undesired effects. The promotions of mono-cropping to feed global and national markets have created serious challenges to conserve traditional species and agroecosystems in rural areas.
- **Institutions poorly coordinate their efforts creating an information and policy gap**: Despite the large number of institutions, researchers and technicians that participate in work related to phytogenetic resources, Mexico does not reach a satisfactory knowledge level on the actual conservation, use and access to plant genetic resources in the country. This is linked to limited coordination and harmonization between state agencies and their respective strategies, work plans and research objectives that impacts on efforts for *in situ* conservation of native species and its wild relatives being few, occasional and discontinuous (this is linked to the third bullet under cause 5).
- **Lack of agronomic support and technical assistance for capacity building aimed at traditional agriculture.** Although there are institutions in Mexico, such as the National Institute for Developing the Capacities of the Rural Sector (INCA Rural), which is the institution responsible for the National Integrated Rural Technical Training and Assistance Service (SENACATRI), it is estimated that only 3 per cent of Mexican farms receive technical assistance and that this is concentrated in states such as Baja California, Sonora and Sinaloa, which have a high proportion of irrigated land. This means that small producers who practise traditional seasonal agriculture do not receive any technical support to improve their capabilities.

5. Weaknesses in the strategies and actions for agrobiodiversity conservation

- **Limited species representation in the *ex situ* conservation modality:** *Ex situ* conservation safeguards a large and important amount of plant genetic resources for food and agriculture, vital to world food security, in genebanks. Germplasm of crops and crop wild relatives is conserved in more than 600 genebanks worldwide and adds up to a total of about 4.7 million accessions maintained under medium- and long-term conditions globally (United Nations, 2017)[42]. This total includes approximately 7000 genera and over 51,000 species. Since 1996, almost 2 million accessions have been added to *ex situ* genebanks with medium- and long-term collections, though gaps still exist (WIEWS, 2017)[43]. However, the vast majority of the samples stored worldwide belong to around 100 plant species of the approximately 7000 useful for man (1600 useful for food). Among the species considered for *ex situ* conservation, there are important gaps in terms of primitive cultivars and wild relatives that are related to the centres of origin and of genetic

[42] United Nations. 2017. The Sustainable Development Goals Report 2017 Available at https://unstats.un.org/sdgs/files/report/2017/TheSustainableDevelopmentGoalsReport2017.pdf

[43] WIEWS. 2017. World Information and Early Warning System on Plant Genetic Resources for Food and Agriculture. Available at http://www.fao.org/wiews/en/

diversity. In Mexico, the lack of funds and long-term financing, as well as the low interest from public and private sectors, have hindered the increase of *ex situ* conservation sites. Despite the very recent creation of the National Genetic Resources Centre in Tepatitlan[44], the lack of an adequate infrastructure has also limited the representation of species in seed banks.

- **The number of crop species and varieties existing in Mexico is not known:** Domestic gardens present in tropical countries have been considered the epitome of sustainability, providing food to millions of people through multiple use of species. Despite their important role, gardens have been poorly studied by science. In addition, underutilized species receive little assistance in terms of research, plant breeding and/or development and are being increasingly marginalized by the farmers. These species offer great potential in the face of climate change, for ecoagriculture, food regime diversity and the sustainability of agricultural production systems (FAO, 2011). In Mexico, the lack of funds as well as the great variety of species present in the country have limited the creation of a standardized database and knowledge management system. Policies are not informed and the status of agrobiodiversity conservation in centres of origin and diversification is not duly monitored. Few agrodiversity species have been studied and even the most studied species need extra and intensive research.
- ***In situ* conservation efforts for native crops and wild relatives have been few, intermittent and discontinuous over time:** Although various researchers and institutions have worked in the field of *in situ* conservation, the amount of effort remains modest when compared to the country's plant diversity. In particular, natural habitat conservation has hardly been addressed and only focused on the most abundant or stable species. Molina and Cordova[45] reported that the work done on conservation, rescue, and improvement of useful plants in traditional agroecosystems has been minimal. It has been estimated that 250 species have been studied in Mexico in this area, which represents approximately 1 per cent of the estimated number of plant species present in Mexico and about 3.5 per cent of all plant species useful to humans. Work aimed at the conservation of crops and wild relatives has in most cases been a focused effort by researchers, academic institutions and/or government agencies. It has not, however, been possible to sustain any conservation efforts in the long-term (see link to cause 4).

1.2.2 Baseline initiatives

Baseline initiatives relevant for the conservation and sustainable use of agrobiodiversity in Mexico in governmental entities

In 2002, the *National System of Phytogenetic Resources (SINAREFI)* began to implement a set of initiatives funded by SAGARPA that are linked to the various project components. Macro-networks were set up to promote exchange and joint work between researchers. One of these focused on the *ex situ* conservation of the 46 crops covered by SINAREFI (Conservation Centre Network). Its aim was to receive accessions collected by researchers linked to SINAREFI, including seed centres, working collections, in vitro collections and community banks. Five more macro-networks in turn grouped together specific networks of crops with common characteristics (basic and industrial, vegetables, pulses, fruit and ornamental, see table 4). These address the thematic areas of *in situ* conservation and management, *ex situ* conservation, sustainable use and capacity building, in line with FAO's Global Plan

[44] http://www.inifap.gob.mx/SitePages/centros/cnrg.aspx

[45] Molina M., J. C. and L. Córdova T. (eds.), 2006. *Recursos Fitogenéticos de México para la Alimentación y la Agricultura [Mexican plant genetic resources for food and agriculture]: Informe Nacional [National report]* 2006. Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food and Sociedad Mexicana de Fitogenética, A.C. Chapingo, Mexico. 172p. available at: http://www.fao.org/docrep/013/i1500e/Mexico.pdf

of Action[46]. The degree of progress in actions and inclusion of information from each network was variable.

Table 4. Networks considered inside each macro-network implemented by SINAREFI [47]

Macro-network: Basic and Industrial Products	***Macro-network: Vegetables***	***Macro-network: Impulse***	***Macro-network: Fruits***
Networks considered: Agaves (*Agave* spp.) Amarantos (*Amaranthus* spp.) Beans (*Phaseolus* spp.) Sunflower (*Helianthus annuus*) Nettlespurge (*Jatropha* spp.) Jojoba (*Simmondsia chinensis*) Maize (*Zea mays* subsp. *mays*) Vanilla (*Vanilla* spp.)	Networks considered: Pumpkin and squash (*Cucurbita* spp.) Sweet potato (*Ipomoea batatas*) Chayotes (*Sechium* spp.) Chili (*Capsicum* spp.) Tomato (*Solanum lycopersicum*) Potatoes (*Solanum* spp.) Green tomatoes (*Physalis* spp).	Networks considered: Achiote (*Bixa orellana*) *Quelites* (these include several species of different genus) *Romeritos* (*Suaeda* spp.) Purslane (*Portulaca* spp.) Cassava (*Manihot esculenta*)	Networks considered: Avocados (*Persea* spp.) Anonas (*Annona* spp.) Cocoa (*Theobroma cacao*) *Jobo* (*Spondia* spp.) Guavas (*Psidium* spp.) Nance (*Byrsonima crassifolia*) Pecan (*Carya illinoinensis*) Prickly pears (*Opuntia* spp.) Papaya (*Carica papaya*) Pitahaya and pitaya (*Hylocereus* spp., *Stenocereus* spp.) Sapotaceae (several species) Hawthorn (*Crataegus* spp.) Grapevine (*Vitis vinifera*)

CONABIO has compiled baseline information on native crops from Mexico. This was originally prompted by biosafety concerns. The aim of the Global Native Maize Project[48] was to update information on maize and its wild relatives in Mexico for the determination of maize genetic diversity centres (Articles 86, 87 and 88 of the Law on the Biosafety of Genetically Modified Organisms. LBOGM).

On a number of occasions since 2008, CONABIO (using funding from SEMARNAT and its own funds) has also supported the generation of baseline collection projects [49] for native crops and their wild relatives from the following genera: Gossypium, Carica, Ceiba, Cucurbita, Sechium, Persea, Physalis, Amaranthus, Tagetes, Capsicum, Opuntia, Vanilla, Zea, among others.

The project Actions Supplementary to Promac (ACP) coordinated by CONABIO, brings together working groups with different approaches to the *in situ* conservation of agrobiodiversity as performed in various regions of the country. Activities include analysing the effects and impacts of *in situ* agrobiodiversity conservation, as well as developing local conservation and valuation experiences, fostering synergies between them and the construction of models for the *in situ* conservation of agrobiodiversity appropriate to Mexico.

From 2015 to 2017 CONABIO has been involved in executing a feeder study to the "TEEB for Agriculture and Food", entitled "Ecosystems and agro-biodiversity across small and large-scale maize production systems" which was financed by the "Global Alliance for Food". "The underlying goal of this study was under the logic of improving the understanding among policymakers and key stakeholders about the economic dependencies and interactions between the maize producing sector and ecosystem services, and their value to society." The final report was handed to TEEB in October 2016 and is currently under revision.

[46] FAO 2012, Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture. Commission on Genetic Resources for Food and Agriculture, FAO.

[47] Macro-network on ornamental species is not considered.

[48] The results of this project, funded by SAGARPA, SEMARNAT and CIBIOGEM, can be consulted at http://www.biodiversidad.gob.mx/genes/proyectoMaices.html

[49] The results of some of these projects can be consulted at: http://www.biodiversidad.gob.mx/genes/centrosOrigen/proyectosCdeO.html

Amongst the most relevant results presented is the tight interrelationship between agriculture and genetic diversity, both as dependencies as well as externalities. In the specific case of maize production, the study shows how "modern intensive agriculture that promotes monocultures all the way to small scale farming" depend on the genetic diversity present in countries such as Mexico (which is the centre of origin of this crop) but in turn, how these different agricultural approaches to how maize is produced result in different externalities related to genetic diversity. Small scale farming is a positive vehicle to the conservation and further diversification of the crop thanks to the traditional maize production schemes behind its cultivation (allowing the presence of a series of new genetic combinations and rare alleles in each maize generation that adapt and evolve through time in very diverse agroecological conditions), while large scale intensive type farming practices promote no genetic diversity at all.

The *National Commission of Natural Protected Areas (CONANP)* has carried out the *Maizes landraces conservation programme (PROMAC*) to support the conservation of agroBD in areas under its mandate. *PROMAC* is focused on native maizes, and its wild relatives, the teocintles. It has been under implementation since 2009 and is aimed at supporting *in situ* conservation in natural protected areas and their buffer zones.

Four programs of *SAGARPA* offer a special synergy with this project: The *Small Producers Support Program*, the *Agrifood Productivity and Competitiveness Program*, the *Agriculture Promotion Program* and the *Concurrency Program with the Federative Entities*; programs that contribute to the attainment of the objectives of project components 2 and 4.

From the 11 components of the *Small Producers Support Program*, particularly important for the project are: i) the component of *Extensionism, Capacity Development and Productive Associativity*, which it is focused on developing the technical-productive knowledge and skills of self-management, productive associativity and economic promotion of the producers in marginalized localities; ii) the *Maize and Bean Producers Support Program* whose objective is to increase the productivity of small producers of maize and beans through technological packages; iii) *The Field in Our Hands* is aimed at rural women living in the poorest towns of the country and seeks to strengthen their capacities and presence in productive activities; iv) the *Promotion of Productive Projects in Agrarian Centers Support Program* whose main objective is to increase the productivity of the people who inhabit the agrarian centers; and v) the component called *Arráigate Joven Entrepreneurial Impulse*, which seeks to foster the permanence of young people in their communities through the provision of educational services focused on their entrepreneurial, productive, organizational and commercial capacities; together these components converge with the products and results proposed by Components 2 and 4 of this project.

The *Productivity and Competitiveness Program* has two components that can be linked to this project: the *Productive Development component of the South, Southeast and Special Economic Zones*, which offers incentives to increase production throughout the region's value chain; and the *Agrifood Certification and Standardization* component, which is aimed at encouraging traditional producers to become organic producers and certify their processes; both components have the potential to support the realization of the products and results of Components 2 and 4 of this project.

The *Agriculture Promotion Program*, particularly through its *PROAGRO Productivo* component, seeks to increase the productivity of Agricultural Rural Economic Units dedicated to priority crops with market potential; it also will support project components 2 and 4.

Finally, the *Concurrency Program with the Federative Entities* is another program that can contribute significantly to the project since its purpose is to promote partnership models that generate economies of scale and greater added value in the agri-food sector through investment in productive projects or strategic agricultural, livestock, fisheries and aquaculture projects; its component *Strengthening Technical-Productive and Organizational Capacities* can provide important resources particularly for project component 2.

The *National Commission for the Development of Indigenous Peoples (CDI)* is implementing the *Program for the Improvement of Indigenous Production and Productivity*; its objective is to contribute to improve the monetary and non-monetary income of the indigenous population through the impulse and consolidation of productive projects.

The *Program for the Promotion of the Social Economy* is implemented by the *National Institute of Social Economy (INAES)*; its purpose is to improve the income of people living in poverty through the support and development of productive projects and through the financial inclusion in the Social Sector of the Economy. Both programs not only focus on the target population of the project but are also in line with the objectives of the project and offer resources for the realization of Component 2.

Baseline initiatives on short food chains supported by FAO

FAO is helping to promote SFCs through three projects:

1) TCP/MEX/3502/MEX: *Creating short-circuits of marketing of ecological and traditional agricultural products from the southern part of Mexico City* (2015-2017). This project is aimed at providing tools that encourage the creation of short circuits as follows: (i) business models; (ii) design of public policies; and (iii) participation of civil society. This project is supporting marketing platforms of ecological agricultural products; encouraging consumption habits and sustainable production methods; and promoting higher profitability in family farming production units (FAO – SEDEREC).

This project works in partnership with the Mexico City Government Ministry of Rural Development and Fair Communities (SEDEREC) to develop three short chain mechanisms with producers in Mexico City. 1) Developing three producer markets bringing the produce of 120 producers farming an area of under 1 ha to urban consumers. 2) Adapting the method of commercial integration between producers farming an area of over 1 ha who currently sell their products in the Mexico City Supply Centre to be sold on other markets that value product traceability. 3) Adopting a marketing strategy to improve selling prices achieved by cactus pear pad producers. In addition to the methodological tools being developed for each of these actions, FAO is working closely with SEDEREC to help it adapt its operating rules to encourage the creation of short chains.

2) In addition, FAO is implementing the project MTF/MEX/124/FFD: *Developing short circuits schemes of ecological agricultural products in Mexico* (2015-2017). The project is aimed at increasing the knowledge of direct or indirect stakeholders on the functioning of short-circuits of agricultural ecological products and their benefits for the country (Ford Foundation).

As part of its activities, the project organized a workshop to exchange experiences in Short Chain Agrifoodstuffs in March 2016 (CCA). The workshop had three aims: (i) to propose an initial Short Food Chain (SFC) strategy and outline the various types of initiatives they can cover; ii) to know and understand the main success criteria and good practices required for an SFC; and iii) to reflect on the role of the various stakeholders involved in strengthening SFCs: consumers, producers, public and private sectors and organized civil society. A call is being published offering funding for innovative proposals for Short Chains at national level.

3) FAO and UNEP are also implementing the project *Sustainable Food for Mexico City,* financed by the Government of Mexico since 2014. This project has conducted a general survey of the production and consumption situation in Mexico City, and aims to *develop and scale-up the sales of ecological local products in the city and metropolitan area, raising consumers' awareness on the nutritional, social and environmental value and impact of their purchases, and fostering better trade opportunities for peri-urban producers to conserve their natural resources.* This project has 4 axes of work to promote urban agriculture and local consumption: i) Promotion of short-circuits local marketing of organic products in the Mexico City Metropolitan Area (MCMA); ii) Exchanges of experience with other countries in Latin America; iii) Certification and green labelling; iv) Communication, awareness and marketer development.

Civil society baseline initiatives

The following initiatives with aims and actions in line with this project's mission have been identified in project working regions.

Table 5. Civil society initiatives for agrobiodiversity conservation

Civil society organization	Working region	Working topics related to this project
Mexico City		
Chinampa Yolo producer group	Xochimilco	Preserving *chinampera* culture with regard to good practice, including: land biodiversity management, seed banks, direct sales and sales through "tianguis" markets, exchange of experiences.
Zacahuitzco Collective	Mexico City	Collective formed by families that produce and/or consume-exchange organic-sustainable products, urban and rural .
Carnaval del Maíz Collective	Mexico City	Encouraging the protection of native maize by organizing a working network to close the gap between rural and urban struggles, promoting the topic in digital and print media.
Chiapas		
Ambio cooperative	North-central Chiapas	Implementing multiple-crop systems such as milpa or agroforestry systems, for example *taungya* for carbon sequestration.
Idesmac (Institute for Sustainable Development in Mesoamerica)	Chiapas Highlands	Promoting cooperative agreements for municipal land management in the Chiapas highlands, including: Promoting the management of polycultures: stepping up backyard production; promoting the conservation and use of native seeds; encouraging agriculture models suited to variable local conditions.
Proyecto Impacto consultores (Impact project consultants)	Chiapas	Building bridges between producers and conscious consumers to generate sustainable development, using the principles of social enterprise and the value-chain approach in capacity-building for economic autonomy.
DESMI (Economic and Social Development of Indigenous Mexicans)	Northern, upper and southern areas of Chiapas	Promoting a solidarity-based economy to encourage sustainable agriculture, collective work and alternative trade from the viewpoint of gender equality, with indigenous and farming communities.
CASFA (St Francis of Assisi Agroecology Centre)	Soconusco, Sierra Madre de Chiapas	The Mayan Network of Organic Organizations provides services on aspects of agroecological production (e.g. cocoa) in order to obtain organic, environmental, social, fair trade and designation of origin certification.
Chihuahua		
Rakema	Sierra Tarahumara	- Provides seeds of important maize varieties to indigenous farmers. - A network of farmers selects seeds to implement inherited plant diversity and tackle climate change.
CONTEC (Community technical advisory service)	Sierra Tarahumara	-Supporting indigenous farmers by combining traditional knowledge systems with technology based on nature. -Saving the diverse legacy of many maize varieties. -Working with women who play an increasingly dominant role in maize production.
José A. Llaguno Tarahumara Foundation	Sierra Tarahumara	- Promoting the installation and technical adaptation of market gardens. The vegetables most commonly planted and eaten are: squashes, chili peppers, common beans, tomatoes and others.
Sierra Madre Alliance	Sierra Tarahumara	In the Biocultural Conservation Programme, traditional knowledge is prioritized as an essential part of conservation practices.
Michoacán		
Tsiri Network	Purépecha Plateau	Certifying that the production process used to make native maizes into *tortillas, tostadas, gorditas, pinoles* etc. is socially fair, hygienic and ecological. Receiving support and advice from GIRA and CIGA-UNAM.

GIRA (Appropriate Rural Technology Interdisciplinary Group)	Pátzcuaro	Developing sustainable models for managing agrobiodiversity; capacity for modules demonstrating agroforestry and biodiversity conservation systems.
Alternare	Mariposa Monarca Reserve and surrounding areas	Generating food self-sufficiency as a result of crop diversity in the family milpa, backyard vegetables, rearing of poultry and the use of medicinal plants to prevent disease.
Tierra Viviente organic farming	Purépecha Plateau	Promotes organic production and access to markets for community harvests of native maizes, beans, quelites and other products.
Oaxaca		
Ecosta Yutu Cuii	Coast of Oaxaca	Promotes the production and improvement of native maizes; supports actions for food self-sufficiency.
CEPCO (state coordinator of Oaxaca coffee producers)	Oaxaca	In addition to coffee, wholesaler of edible seeds and grains, spices and dried chili peppers.
Kukoj (Integral Innovation for Rural Development)	Sierra Mixe	Kokuj is a Rural Development Agency (RDA) that mainly works in the field of food sovereignty.
GAIA (Autonomous Group for Environmental Research)	Various regions of the State of Oaxaca.	Promotes the responsible management of natural resources through research and the technical assistance and training it offers to organized rural communities in southern Mexico.
Yucatán		
Seed guardians-Káa nán iinájoob	Yucatan Peninsula	Conserves and rescues native seeds; organizes seed fairs in the peninsula. Receives support from NGOs such as Educe A.C, Misioneros A.C and Hombre sobre la Tierra A.C.
EDUCE (Education, Culture and Ecology)	Yucatan Peninsula	-Supports seed protection; organizes seed fairs; contributes to food safety in the local population. -Provides intercultural learning and training spaces to strengthen and disseminate local knowledge and technologies.
El Hombre sobre la Tierra	Eastern Yucatán and Campeche	-Works in seed conservation, training in sustainability, development of family market gardens. -Promotes organic and traditional production and diets.

Important national initiatives include *Valor al Campesino*[50]*, Semillas de Vida* and *Puente a la Salud Comunitaria*[51]. The purpose of Valor al Campesino is to help raise the profile of and empower small producers through better and fairer public policies to ensure the sustainability of the ecoagrifood system. Constituent organizations are: Fundar, Ashoka, Semillas de Vida, El Poder del Consumidor, ANEC, and NUUP.

The following initiatives also consider marketing outlets: 1) Red Mexicana de Tianguis y Mercados Orgánicos A.C. (REDAC), which operates in Oaxaca, Chiapas, Mexico City and other states of the Republic; 2) agroBD fairs in Oaxaca and Mayan seed fairs; 3) initiatives of the UNAM Biology Institute to promote culinary meetings. A recent addition is Promaíz Nativo, A.C., which aims to promote a collective brand and marketing outlets for small producers.

1.2.3 Remaining barriers

Remaining barriers that prevent the conservation and sustainable use of agricultural diversity in Mexico

Despite the efforts carried out by state agencies and civil society organizations, there are some barriers still present in the baseline scenario:

[50] valoralcampesino.org

[51] semillasdevida.org and puentemexico.org

Barrier # 1: Limited scientific information due to lack of systematization and reliable databases: Despite the long-standing native knowledge present in local areas of Mexico, the scientific studies about those on-going processes have been scattered. The relationships among the domesticated diversity, wild or only semi-domesticated varieties, and human practices/uses that add value to these species have not been sufficiently analysed until present. Therefore, information is fragmented and unsystematized. Large groups of native species of local interest or used by rural communities are not recorded. At present, only 50 autochthonous species are registered in the Mexican agricultural statistics, including 24 annual crops and 26 perennial species. CONABIO has generated knowledge only on around 10 per cent of the total agroBD that exists in Mexico. If added to SAGARPA's actions, this percentage raises only to 15 per cent. This lack of standardized information has prevented these species from being protected through public policies. Decision-making has not always been adequately informed. Understanding is key to maintain these species, CWR and associated traditional systems valid over time. There is a considerable information gap in Mexico, and therefore, at the global level.

Barrier # 2: Deficient inter-institutional coordination and communication affect the conservation, use and access of phytogenetic resources: Despite the efforts made, the *National Report on the Status of Phytogenetic Resources for Agriculture and Food Supply*[52] recognizes that while there exists a great human and infrastructural potential in Mexico dedicated to the study of phytogenetic resources, coordination and communication among institutions and researchers is weak, limiting the efficiency of work in this area. Better organization of this work is required, with clear, transversal and well-defined policies that can drive effective actions directed towards the conservation, use and access of the phytogenetic resources in Mexico. Unless the existing capacities in Mexico work together towards a common objective, i.e. understanding and sustainably using the genetic resources, particularly the plant genetic resources, and the necessary instruments are provided, the coming challenges will not be addressed.

Barrier # 3: Perverse incentives still cause degradation of agroecosystems: Despite current initiatives, public policies are not harmonized and still generate perverse incentives. Some policies still promote conventional technological packages, the use of improved seeds, agrochemicals, monoculture, generating incentives to abandon traditional agricultural production. The simple idea behind these policies is just increasing yields at farm level, whereas core values of traditional practices are not appreciated. The perverse incentive results when traditional farmers enter into these schemes of technical support or financing and they abandon their traditional practices. This causes that key landraces and varieties remain disused, increasing the risk of genetic erosion and even loss.

Barrier # 4: The ongoing expansion of large-scale intensive and monocrop agricultural production practices puts pressure on traditional agro-ecosystems: At farm level, many areas have been incorporated in large-scale production systems using farming practices and technologies that deplete natural resources and affect traditional agroecosystems. Intensive agricultural production systems are based on management practices that involve the use of driving machinery, agrochemicals and improved commercial seeds, which are very genetically uniform, in order to obtain homogeneous produce. Pressure to increase the area of agricultural production by adopting this type of approach stems from external support for farming in Mexico and government policies and subsidy programmes that support farming while also impairing the long-term maintenance of traditional production systems and the agricultural and genetic diversity that these harbour. Examples of such processes include replacing *milpas* with pasture for livestock production or for the establishment of palm oil plantations in tropical areas. In temperate areas, traditional agroecosystems are replaced by monoculture plantations. In 1990, the number of agave and avocado plantations in Mexico was in the order of 36,000 and 86,000 ha respectively, which had increased to 108,000 and 187,000 respectively

[52] Molina M., J. C. and L. Córdova T. (eds.), 2006. *Recursos Fitogenéticos de México para la Alimentación y la Agricultura [Mexican plant genetic resources for food and agriculture]: Informe Nacional [National report]* 2006. Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food and Sociedad Mexicana de Fitogenética, A.C. Chapingo, Mexico. 172p. available at: http://www.fao.org/docrep/013/i1500e/Mexico.pdf

by 2015.[53] These intensive systems consume local natural resources such as water and require high doses of fertilizers and other agrochemicals, causing pollution. When production of their staple foods is reduced, families have to turn to food supplies from outside the community, putting their food sovereignty at risk. While important species are being lost or disused, limited research or action has been taken to rescue them. Many potential edible species are being ignored or are only considered by local and indigenous communities.

Barrier # 5: Social dynamics in rural areas continue threatening the survival of traditional agricultural knowledge and practices: Agrobiodiversity conservation and sustainable use depend on people. Poor rural areas are facing the problem of species disuse or abandonment as young people tend not to see rural production as a viable or valuable activity. Rural families are discouraged by the *lack of incentives* or some political actions or omissions to continue with their traditional activities. Thus, the lack of alternative livelihoods is pushing young generations out of the rural areas. The migration of family farmers of working age is affecting the survival of traditional knowledge, agricultural management and interest in cultivating existent lands. This is disturbing the maintenance of traditional systems as *milpa* and other agroforestry or multi-cropping models.

Barrier # 6: Lack of valuation of agrobiodiversity and the functional agroecosystems that maintain it: Many political, social and economic stakeholders are not aware of the contribution of traditional agroecosystems to plant genetic diversity in the country. Plant diversity generates current and potential benefits (see section 1.3.4) that tend to be ignored. The economic and political environment in which farmers, consumers and agricultural policy-makers make decisions regarding the conservation and use of agroBD is distorted by positive and negative externalities[54], as well as by a lack of understanding of the crucial role that agrobiodiversity plays in maintaining key functions of agrifood systems. The enormous value of agroBD for food and nutritional security is invisible in the marketplace and does not therefore receive the attention it deserves from stakeholders particularly in the face of the health crisis due to malnutrition and encroaching climate change. There is widespread ignorance of the local and global importance of agrobiodiversity, even among the traditional producers who are fundamentally dependent on it for their livelihood. Traditional farmers believe that they sow traditional varieties because they do not have enough money to access improved varieties, which are perceived, in some cases, as being better than local varieties, even though the latter are also appreciated for different reasons (see above, page 22). This contradictory perception by traditional farmers themselves may lead to a low valuation of local genetic resources reinforced by the low comparative value of such products in local and regional markets.

[53] SIAP, 2015. Anuario Estadístico de la Producción Agrícola [Agricultural production statistical yearbook], SAGARPA.

[54] An externality arises when (i) the actions of an economic agent in society impose costs or benefits on other agents of that society and (ii) there is no full compensation for such costs or benefits and they are therefore not considered in decision-making by the decision-making agent. Without intervention in the free market to internalize externalities, there are few benefits of positive externalities and the costs of negative externalities are excessive (The Economics of Ecosystems and Biodiversity).

1.3 THE GEF ALTERNATIVE

1.3.1 Project strategy and project principles

The **overarching objective** of this project is the conservation and sustainable use of globally significant agrobiodiversity, including the associated knowledge and cultural methods within the traditional agro-ecosystems present in Mexico and considering fair and equitable sharing of the benefits arising from its use.

The **project strategy** for achieving this objective consists of:

- generating and making available to users comprehensive knowledge about globally important agrobiodiversity;
- strengthening local capacities to support long-term plans and actions for agrobiodiversity conservation and sustainable use, developing strategies for revaluating traditional knowledge, and supporting continuous adaptation to climate change;
- mainstreaming the protection and promotion of knowledge, practices and traditional production systems into governmental plans and policies, while building effective alliances with local communities and producers;
- building and strengthening awareness and recognition of agroBD´s value among stakeholders through integrated agroBD strategies, including market incentives.

Each one of these four approaches has a direct impact on the objective of agroBD conservation and sustainable use, but together they exert synergic effects due to causal relations between them. For example, knowledge about globally important agrobiodiversity will feed into mainstreaming public policies; or building awareness about the economic and non-economic values of agrobiodiversity will contribute to strengthening capacities among stakeholders to conserve and sustainably use agroBD; etc.

This project is not meant to address the comparative differences between traditional and large-scale intensive and monocrop production systems.

This project strategy rests on some basic **principles**:

- Building trust amongst scientists, small-scale farmers, local communities and indigenous peoples and decision-makers involved in the conservation and sustainable use of plant genetic resources for food and agriculture (PGRFA), through a renewed and more equitable way of interacting that ensures an adequate dynamic feedback system.
- From the design stage, the project will seek to help ensure that the data and information making up the agrobiodiversity information system has the least negative impact on the genetic resources and the communities that protect them.
- Helping ensure that ongoing local and regional processes in support of agrobiodiversity are maintained and strengthened, by promoting stakeholder engagement and self-management of agrobiodiversity by local communities and local organizations collaborating with them.
- Helping to halt the promotion of contradictory or counterproductive public policies and actions that affect or put into risk processes that support traditional farming systems, conservation and sustainable use of agrobiodiversity and their products, and local livelihoods.
- Supporting food security of traditional farmer communities by stimulating self-consumption and promoting commercialization and consumption of agrobiodiversity-based food products in local, regional and national markets.

1.3.2 Project objectives, outcomes and outputs

The **project objective** is to develop policies and mechanisms that support agrobiodiversity conservation, sustainable use and resilience, by promoting the knowledge of traditional agro-ecosystems and the cultural methods that maintain that agroBD in Mexico.

Target species are: maize, beans, amaranth, chili peppers, squashes, chayotes, green tomatoes, cacao, avocado, nopal, agaves and particular local edible tender leaf vegetables (quelites).[55]

The project **target sites** are located in the states of: Chiapas, Chihuahua, Mexico City, Michoacán, Oaxaca and Yucatán.

These states have been selected by CONABIO given the existing work already conducted and the representativeness of their agroecosystems (see table 5 on page 25; maps for each project region are presented in Appendix 7).

The project will contribute to **Programme 7, Objective 3 of the GEF Biodiversity Focal Area** by promoting biodiversity mainstreaming in agriculture while increasing the genetic diversity of globally significant cultivated plants, wild relatives and associated species in a Vavilov Centre of diversity like Mexico. This will occur by providing tested methodologies, innovative mechanisms and lessons learned that can be scaled up in Mexico, in the Mesoamerica region, and adapted to other centres of origin around the world, through South–South Cooperation, the FAO network and the Commission on Genetic Resources for Food and Agriculture and Biodiversity. The project will support *in situ* conservation, agriculture practices based on local and traditional knowledge that allow continued evolution, and adaptation, will improve food security of local communities by supporting self-consumption of agroBD-based products; will promote policies that shift the balance in agricultural production in favour of agrobiodiversity; will strengthen the capacities of extension and research agencies and institutions for *in situ* conservation; will support climate change adaptation through sustainable agriculture and traditional knowledge; and will strengthen the capacities of community and family farmers to participate in the identification, development and implementation of plant breeding and other solutions to prevent genetic erosion. GEF resources will be invested in improving and rescuing milpas and other traditional agricultural systems through project components 1, 2 and 4.

In order to remove the barriers detailed under section 2) and achieve global environmental benefits, GEF incremental financing will be invested in four components, as follows:

Component 1: Information and knowledge management

Component 1 addresses barriers 1, 2, 5 and 6 described in section 1.2.3 above, by fostering linkages between the critical stakeholders, identifying, validating, documenting and promoting the knowledge base that underpins traditional agro-ecosystems and the traditional practices and research that maintain agrobiodiversity.

Component 1 is aimed at identifying, gathering and recording the agrobiodiversity present in Mexico, along with the socioeconomic and cultural processes that maintain and promote that agroBD. This data and related knowledge-management mechanism will inform public policies and appropriate field interventions, as well as marketing strategies for agroBD products, for the conservation and sustainable use of agrobiodiversity. Data collection criteria will be designed *ex profeso* based mainly on previous CONABIO experiences.

Component 1 will also feed into indicator 7.1 of GEF Biodiversity Focal Area programme 7: *Diversity status of target species: improved knowledge, conservation and monitoring of agroBD species, CWR and associated species*, in particular concerning "improved knowledge and monitoring".

The aim is to achieve the following outcome for component 1 using incremental GEF resources:

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[55] See more details in Appendix 8. Crop wild relatives of these native crops are included. The *quelites* can be considered 'associated species' that grow next to cultivated crops in the milpa system (i.e. they are tolerated, consumed, and/or used in different ways).

Outcome 1.1: Comprehensive knowledge about globally important agrobiodiversity, its values, the traditional practices, the scientific and technological research and development activities, associated knowledge base and capacities that maintain diversity in Mexico, has been generated and made available for use.

The expected result is to gather and make available to interested users existing information and information to be generated during the project (as well as in the future) on various related aspects that influence the generation, maintenance and promotion of agrobiodiversity. This will mainly be in biological, agricultural, social, economic and cultural areas, namely: collection and characterization of material from native breeds and local varieties, genetic improvement, development of improved varieties; information generated through traditional farming practices – and the traditional knowledge of those who conserve and sustainably use the biological and genetic resources used for food and agriculture. The aim is to link the various themes and stakeholders through an information system that supplies agrobiodiversity intelligence with the aim of ensuring that society as a whole has access to the factors necessary to build a broad understanding among stakeholders (researchers, producers, processors, traders, consumers and public policy-makers) to ensure that the decisions they make are backed by knowledge and have a positive impact on agrobiodiversity in Mexico.

The achievement of this result will be monitored through the following **indicators**: 1) the compiled information related to the 12 target crops, their relatives and the agroecosystems where these thrive covering 700,000 hectares; 2) No of existing databases converted / transformed according to a Comprehensive Agrobiodiversity Information System (SIAgroBD); 3) No of analysis and synthesis exercises based on the SIAgroBD and on results of research projects to guide decision making; 4) Increased level of awareness of the economic and cultural values of agroBD among key stakeholders, measured through an AgroBD Value Awareness Index to be developed at the beginning of the project.

The **target** for this outcome is that we have screened 350,000 hectares mid way during project implementation in relation to the 12 target crops and their relative species and agroecosystems completing 700,000 ha by the end of the project. For the 12 databases (for 12 species covered) to be in the process of conversion midway through the project and for the 12 databases to be fully converted by the end of the project. It is also planned to obtain three analysis and synthesis exercises based on the Agrobiodiversity Information System (SIAgroBD) as well as the results of the research projects to be carried out. The goal of indicator 3 is to ensure that the communication strategy is applied in components 2, 3 and 4.

As the SIAgroBD is designed and built, it will be possible to carry out some analysis and synthesis exercises based on its contents; the baseline is that these analysis and synthesis exercises have not been carried out because the SIAgBio has not yet been built but in the medium term we expect to have at least one published analysis and synthesis exercise and by the end of the project we expect to have at least three.

The **key stakeholders** for achieving the outcome desired through this component are government institutions at all levels, research institutions related to agriculture, agrobiodiversity, biology, anthropology, society and so on, civil society organizations and communities and various productive organizations linked to traditional Mexican agriculture.

Assumptions: To achieve these targets, it is assumed that: i.- Key stakeholders (institutional and social) have access to and knowledge of information generated, and ii.- Alliances are set up between key stakeholders and they are willing to participate in decision-making.

In order to achieve outcome 1.1 three outputs will be generated that will in turn be achieved through their own corresponding activities:

Output 1.1.1: New knowledge generated through participatory research

This output will be achieved by carrying out a series of efforts in order to generate new information in the field in a participatory manner, particularly with regard to management and use of agrobiodiversity, in order to feed SIAgroBD. The various stakeholders will be asked to submit research projects intended to gather intelligence in the field of agrobiodiversity and ensure better decision-making and good design of public policies that have a favourable impact on its conservation and sustainable use. Such projects will include those intended to take stock of diversity present in areas/localities[56] where the project is implemented; systematization of knowledge of yields from traditional practices for the production of native varieties, contribution of agrobiodiversity systems to household food security; abiotic and biotic conditions faced and productive strategies used to manage them; the problems faced before, during and after harvest; proportion of the crop used for self-consumption versus sale on the market; uses of agroBD; local diet and nutritional values, among others. Some projects will be designed and implemented in conjunction with components 2 and 4.

Information in participating communities (see also component 2), including information relating to traditional knowledge, will be gathered after obtaining prior consent and in a manner that the community considers relevant and considering information protection mechanisms, if necessary.

The achievement of this output will be monitored through the following **indicators and targets**: 1) Number of participatory research projects; 2) Number of implementation areas with ongoing projects; 3) Number of publications. It is expected to conduct at least 10 projects under this output, which will have started by halfway through the project and will be complete before the end of the project. It is also planned to have covered the six working areas by the end of the project.

The following **activities** will be carried out to achieve this output:

1. *Collect and generate relevant information for inclusion in SIAgroBD*: As the first step, it is planned to compile relevant information that already exists and is available and accessible through the key stakeholders in order to be able to identify any information gaps or requirements with regard to the Protocol designed in output 1.1.2 and existing information. Calls will be issued inviting the submission of projects intended to generate information that will allow us to begin filling the information gaps identified. Projects will be selected and their development will be supported, in coordination with components 2, 3 and 4 if applicable.
2. *Add information generated by research projects to SIAgroBD.*
3. *Analyse and summarize information generated by research projects:* Once data and information have been generated, they will be added to the SIAgroBD. Once this information begins to be added, the project will conduct several information analysis and synthesis exercises in relation to various topics of interest to agrobiodiversity.
4. *Disseminate and publish information and knowledge generated based on the system, which will also serve as an input for output 1.1.3 Communication and dissemination strategy:*
   Lastly, particular importance will be attached to the dissemination and publication of information and knowledge generated by the SIAgroBD with regard to the various analysis and synthesis exercises to ensure that these are available to all stakeholders, are easy to understand and are of practical use. In particular, we will seek to feed information back to participating communities by generating communication products addressing local priorities.

Assumptions: In order to achieve output 1.1.1, the following is assumed: i.- Communities are willing to participate in the design of research projects as well as in the collection and analysis of information; ii.- Government institutions are willing to participate; iii.- Various stakeholders are able and willing to participate.

Output 1.1.2: A Comprehensive Agrobiodiversity Information System (SIAgroBD) has been developed through a protocol designed, approved and adopted by key stakeholders to facilitate its public access.

[56] Mexico´s official statistics agency uses the term "locality" for places constituted by one or more houses, inhabited or not. A community, in turn, can consist of one or more localities.

The achievement of this result will be monitored through the following **indicators:** 1) Protocol designed, approved and adopted; 2) Comprehensive Agrobiodiversity Information System (SIAgroBD) adopted and used by key project stakeholders; 3) N° of key institutional stakeholders that have adopted and are using the SIAgroBD

Targets: The Agrobiodiversity Information System (SIAgroBD) is not yet in existence; by midway through the GEF project, we hope that it has been designed and by the end of the project that it will have been adopted and used on a regular basis by all key stakeholders in the project. The process of building the SIAgroBD is dependent on the existence of the protocol that we hope to have designed by mid-term and to have approved and adopted by the end of the project.

In order to achieve this output, two groups of **activities** will be carried out that are different yet complementary and necessary: the first task will be to generate and adopt the protocol indicating data and information to be contained in the SIAgroBD in order to design and implement the information system as the next step. The following specific activities to be carried out are:

1. *Identify existing information sources and their characteristics:* Firstly, define relevant information to be incorporated into the system based on information already held by CONABIO in its databases. Additional sources of information and their characteristics will be identified in order to finish defining the information universe. This will be carried out through consultation with the various stakeholders and based on a review of existing information in agrobiodiversity databases.
2. *Involve key stakeholders in protocol design and adoption once a working group has been established:* Key project stakeholders will be invited to participate in designing the protocol that will specify the type of data and information to be held in the SIAgroBD at the most detailed and specific level possible. For this purpose, a specific technical working group will be set up to support protocol design and implementation. We will seek the cooperation of people familiar with the nature of existing and necessary data and information. Once this protocol has been designed and implemented, we will invite key project stakeholders to adopt it.
3. *Set up a working group with key stakeholders for the design, creation and adoption of SIAgroBD:* Together with setting up a technical working group for protocol development, key stakeholders will also be called upon to form a bioinformatics working group to take charge of designing and subsequently implementing the SIAgroBD. It is expected that the system will be ready and adopted together with the protocol.

Assumptions: In order to achieve output 1.1.2 it is assumed that: i.- Key stakeholders are open to collaborating in the design and implementation of the protocol; ii.- Key stakeholders are open to sharing information; iii.- Key stakeholders are open to participating in database conversion.

Output 1.1.3 Strategy of participatory economic valuation and communication/dissemination of agroBD values between the different stakeholders, aimed at small producers and their families (in coordination with output 2.1.1), policymakers (see output 3.1.1) and consumers (see output 4.1.1), designed and implemented.

Output 1.1.3 is cross-cutting because it is linked to other project components. The rationale for this output is to address the shortfall in agroBD assessment through a strategy that highlights agroBD values and includes a) a participatory valuation strategy for food and nutritional security; b) a strategy for communicating and disseminating agroBD values among the various stakeholders.

Following the rationale of The Economics of Ecosystems and Biodiversity (TEEB) for Agriculture and Food[57] initiative, the actions proposed in this output are based on the following premise: the economic environment in which agricultural producers, policymakers and consumers currently operate is

[57] Sukhdev, P. and Sharma, K., undated. Proposed framework for evaluating the true costs and benefits of the "Eco-Agri-Food" systems complex. Framework for the TEEBAgFood

distorted by significant externalities. The impacts that the various productive systems have on agroBD, and that the latter has, in turn, on food and nutritional security and other environmental services are economically invisible and do not receive the attention they deserve from decision-makers.

The invisibility of agroBD values at macro and micro level often leads to suboptimal decisions by all stakeholders. Therefore, output 1.1.3 seeks to conduct a economic valuation[58] that uses participatory assessment methods[59] (including rural and urban areas), to show the various stakeholders the value of agroBD for household food security through agroBD provision, regulation, support and cultural services).

It is also proposed to carry out an economic valuation of the nutritional value of agroBD products through food quality and appropriate interpretative studies led by strategic project partners.

Aware that "the outcomes of the valuation will only lead to absorption by policy-makers and implementation of policy change if there is strategic communication and outreach to disseminate its findings"[60], output 1.1.3 seeks to support better decision-making by small producers (output 2.1.1), agricultural policy designers (output 3.1.1), and consumers (outputs 4.1.1), through a strategy to communicate and disseminate agroBD valuation, designed on the basis of information generated in component 1.

The **indicators** of output 1.1.3 are:

- Protocol for participatory rural valuation (including suburban areas) of agroBD services for the food security of small producers and their families
- Protocol for the economic valuation of the nutritional, health and other functional values of agroBD products
- No of stakeholders involved and reached by campaigns for the communication and dissemination of agroBD values
- Level of awareness of the economic and cultural values of agroBD among key stakeholders measured through an AgroBD Value Awareness Index to be developed at the beginning of the project.

The following **activities** will be conducted to achieve this output:

1. *Develop a participatory rural valuation protocol for agroBD services for food security.*
2. *In cooperation with other strategic partners, develop an economic valuation protocol for agroBD product nutritional values.*
3. *Organize and facilitate focus group work or other participatory approaches approved for the implementation of participatory rural appraisal.*
4. *Identify the most important messages for the agroBD value communication and dissemination strategy differentiated by stakeholder and area*, in coordination with those responsible for components 2, 3 and 4.
5. *Design a mechanism for communicating and disseminating the value of agroBD for producers in project intervention areas, with particular emphasis on young people, women and children*

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[58] Economic valuation refers to the process of estimating the value of particular goods or services in a specific context, whether in monetary or non-monetary terms (TEEB, 2015. TEEB for Agriculture & Food: an interim report, United Nations Environment Programme, Geneva, Switzerland).

[59] One of these methods is the participatory rural appraisal; this is a method to estimate non-monetary economic values of agroBD. However, they can provide useful information on the importance of agroBD to food security in ways that monetary methods cannot. In-depth interviews and focus groups may allow more detailed assessments of the motivations underlying producers' conservation of agroBD. Participatory rural appraisal is compatible with multicriteria analysis and can support monetary assessment exercises if necessary (M. Christie et al. 2012. An evaluation of monetary and non-monetary techniques for assessing the importance of biodiversity and ecosystem services to people in countries with developing economies. Ecological Economics 83 (2012) 67–78)

[60] Hussain, S. and Miller, D., 2014. The Economics of Ecosystems and Biodiversity (TEEB) for Agriculture and Food. Concept Note. 27 February 2014

(in coordination with output 2.1.1); for policymakers (in coordination with output 3.1.1) and for consumers (in coordination with output 4.1.1).

6. *Produce relevant materials (graphs, audio-visual material, policy papers, event programs, etc.) to aid dissemination.*
7. *Support regional coordinators in the implementation of the dissemination strategy. This strategy for communicating and disseminating the value of agroBD will be implemented within the framework of components 2, 3 and 4 addressing participating communities, policymakers and consumers, respectively.*

Assumptions: In order to achieve output 1.1.3 it is assumed that: i.- Communities in the working areas are willing to participate in assessment sessions. ii.- We can call on the support of the three levels of government and national, regional and local strategic partners for the design and implementation of assessment and dissemination strategies.

Sources of co-financing for component 1:

CONABIO will contribute its previous experience in linking distributed databases, registries and databases provided by the various stakeholders and previous work in implementation areas by other projects with regard to the generation of data and information on agrobiodiversity, with a contribution in kind amounting to USD 2,959,394. Other stakeholders who will contribute information and experience from previous work to the building of the SIAgroBD and the research projects are: the SEMARNAT DGSPRNR with a contribution in kind amounting to USD 1,000,000; the INCMNSZ will contribute nutritional analyses of agroBD products and their appropriate interpretation with a contribution in kind of USD 3,333,333. SAGARPA will support new information generated through the Research, Innovation and Technological Development Component of the Agriculture Promotion Programme with a contribution of USD 666,667 in cash. At local level, SEDUMA of the State of Yucatan will contribute to this component through research projects with USD 3,272,726 in cash and USD 909,092 in kind; the AZP of the City of Mexico Government will contribute USD 541,500 in cash and USD 142,500 in kind; SEMAC of Coahuila State will contribute with USD 150,000 in kind – and IDESMAC in the State of Chiapas will contribute resources amounting to USD 800,000 in kind. Other stakeholders who will contribute to this component, although their participation is not quantified, include: the SAGARPA SNICS, the Postgraduate College (COLPOS), Chapingo Autonomous University, and the College of the Southern Border (ECOSUR), among others.

Component 2: Strengthening local capacities

Component 2 will address barriers 4, 5 and 6 (4: The ongoing expansion of large-scale intensive and monocrop agricultural production practices puts pressure on traditional agro-ecosystems; 5: Social dynamics in rural areas continue threatening the survival of traditional agricultural knowledge and practices. 6: Lack of valuation of agrobiodiversity and the functional agroecosystems that maintain it.) presented in section 1.2.3 above by means of specific projects in each working region; projects aiming to strengthen local capacities to maintain long-term programmes and actions for the conservation and sustainable use of agroBD. The programmes and actions will take into account experiences already developed in the region and traditional knowledge. They also follow methods that communities consider relevant and in keeping with the local outlook. These projects draw on the results of research in component 1 on the characteristics and values of agroBD products and include the implementation of strategies to strengthen traditional knowledge and support the ongoing adaptation of farming systems to climate change.

The rationale behind this component is to address loss of local agroBD in target regions by strengthening local capacities in three main aspects: 1) Increasing the knowledge of farmers and families, including young people, about the local and global importance of agroBD, will increase the appreciation and use of agroBD. This will encourage use and conservation thereof. 2) Developing conservation, access and distribution methods used for local seed varieties, particularly those that are least used. The exchange will promote diversity and conservation. 3) Improvement of agricultural activity through participatory improvement, diversification or improvement of *milpa*. Such actions will increase the harvest to ensure that families have food available throughout the year and can sell the surplus. Family income will be improved, planting will continue and agroBD will be conserved. All actions carried out as part of this component will be designed, developed and assessed in accordance with a participatory approach. Free and informed consent protocols will also be followed.

The aim is to achieve the following outcome for component 2 using incremental GEF resources:

Outcome 2.1: Local capacities have been strengthened to support long-term plans and actions for agroBD conservation and sustainable use, to develop strategies for revaluating traditional knowledge, and to support continuous adaptation to climate change.

The achievement of this outcome will be monitored through the following **indicators**:

1) *Area in hectares* where knowledge, practice and/or management derived from capacity-building projects for agroBD conservation are applied and the number of species preserved. After year two, the project impact might be extended to other areas through knowledge-sharing processes between farmers. If this is the case, the indicator will take this area into account. At present, a total of 604 ha has been registered in project implementation regions where knowledge, practices and/or management stemming from agroBD conservation projects are being applied and where local varieties are conserved. Midway through project development, it is expected to reach 1,208 has and a total of 2,416 has by the end of the project. There is also a total of 168 species in working regions (considering cultivated, wild and managed species as well as *quelites*; see table 1).

2) *Number of producers* having received different benefits for conserving and sustainably using agroBD (market incentives, subsidies for conserving agroBD and related traditional practices): Baseline: 2,268; 2,900 at project mid-term and 4,100 at project final.

3) *Number of globally significant species* (cultivated and wild) is maintained in the agroecosystems described in the specific implementation areas. Baseline: 168 species/described agroecosystems, mid-term and at project final is maintained.

These indicators will be assessed through annual reports that regional coordinators send to the Project Coordinating Unit.

Target group: Stakeholders (women, men and young people) involved in this component include: traditional farmers and indigenous and non-indigenous local communities, producer organizations, non-governmental organizations, educational and research institutions and development institutions.

The **target sites** are located in the States of Chiapas, Chihuahua, Michoacán, Oaxaca, Mexico City and Yucatan. Key stakeholders developing agroBD conservation projects could be identified in these sites (see table 2 in section 1.1.2 and maps in Appendix 7).

This component is related to indicator A, proposed in the BD tracking tool: A) Direct coverage in hectares of globally significant landraces (traditional varieties) where project is directly intervening. This is part of Objective 3 (Sustainable Use of Biodiversity), Programme 7: Securing Agriculture's Future: Sustainable Use of Plant and Animal Genetic Resources in the GEF biodiversity focal area.

In order to achieve **outcome 2.1,** three **outputs** will be generated and these will be achieved through the following activities:

Output 2.1.1: Capacity building programs to increase local knowledge and skills for managing regional agroBD through participatory research and information sharing among farmers, developed and implemented.

The achievement **indicators** of output 2.1.1 are: 1) Number of annual events for exchanging knowledge about agroBD; 2) Number of materials per year for disseminating knowledge about agroBD (catalogues, books, posters, murals, radio programmes, etc.). The baseline of indicators of this output, taking into account all regions, as well as the targets, are described in Appendix 1 Results framework.

This product will be achieved by carrying out the following **activities:**

1. *Design programmes to build capacities for the conservation and sustainable management of agroBD* through regional and inter-regional exchange events, participatory research projects, dissemination materials and other methods. These programmes will take into account agroBD-related projects present in the region. Some activities cooperate with component 1 (particularly output 1.1.3 *Strategy for communicating and disseminating agroBD values)* and vice versa, for example, drawing up lists of agrobiodiversity present, describing methods for managing or gathering sociocultural information in locations where component 2 is implemented.
2. *Produce and distribute materials for disseminating knowledge and appreciation of agroBD* (brochures, books, posters, murals, radio programmes and so on).
3. *Arrange regional and inter-regional events for information exchange and participatory research* and other methods. These events will include regional agroBD fairs.
4. *Systematize and disseminate lessons learned from capacity-building programmes* for the conservation and sustainable use of agroBD (including lessons learned from actions carried out under outputs 2.1.2 and 2.1.3).

Regional agroBD studies and diagnoses carried out in coordination with component 1 on "Information and knowledge management" will be used as input for the design and dissemination of catalogues of varieties and recipes for the use of these species, books, posters, murals or other appropriate means of dissemination for communities in the region, for example community radio programmes or contributing information on agroBD to strengthen community museums.

The events included to achieve this output include workshops to exchange experiences, farmer-to-farmer workshops, visits to communities and agroBD fairs. AgroBD fairs are public events where farmers display their diversity of seeds and/or harvested products. The aim of such events is to allow farmers to tell other farmers and the general public about their cultivated diversity. The events may be at community, regional or state level. During the event, seeds and products can be exchanged between farmers and sold to the general public. Cultural and artistic activities can also be carried out focusing on the social recognition and appreciation of agroBD, farming activities and farmers. The fairs will be organized in conjunction with component 4 "Appreciation of agroBD by consumers and link to the market", within the framework of output 4.2.1.

Each of these actions will be carried out with the participation of local technicians who are community members, preferably educated to middle-school or higher level, and are coordinated by project advisers. Community technicians are the field staff who will collect information, systematize it with the support of component 1 (following agroBD value communication strategy guidelines designed under output 1.1.3) and disseminate it to the community by the appropriate means in the given context. The local technicians should be preferably young and female to promote gender equality. The same principles will apply for outputs 2.1.2 and 2.1.3.

Output 2.1.2: Seed conservation projects (community and family seed banks, networks of seed custodians, seed exchange initiatives, and others) for improving self-management and control of local and regional agroBD by farmers, implemented.

The **indicators** for this output are: 1. Total number of projects (broken down into n° of seed banks, n° of exchange networks, n° of exchanges, n° of custodians); 2. Number of locations where seed conservation projects are implemented; 3. Number of farmers participating in seed conservation projects; 4. Percentage of women participating in seed conservation projects; 5. Percentage of young people participating in seed conservation projects. The operational plans will specify activities relating to the setting up and number of seed banks, custodian networks, seed exchange networks and indicators of the number of varieties conserved and the number of exchanges per year will be added with the aim of measuring the project activity level. The baseline and the indicator goals are set out in Appendix 1 ProDoc outcome framework.

The following **activities** will be conducted to achieve this output:

1. *Establish principles and conditions for conserving seeds in target regions*, including technical rules and specifications. During project design, participatory workshops held in each of the target regions clearly showed that [61] seed conservation rules must be adapted to each region because not all actions (e.g. community seed banks) are suited to all circumstances (these possible actions are described below).
2. *Identify, diagnose and select seed management initiatives* that are in progress or planned by local and external stakeholders, such as farmers, farmers' organizations, local entrepreneurs, researchers or civil society organizations. These must involve young people, and women in particular. Property and access to benefit rights are safeguarded in such projects. Seed management in communities does not obey market rules, no varieties are registered with the SNICS and no intellectual property rights are registered. Managed seeds are common property and means of proper conservation and access must be obtained.
3. *Implement seed conservation projects* by establishing:
    - Seed custodian and seed exchange networks. These are networks of farmers who communicate with one another constantly and keep an up-to-date catalogue of the seeds they hold. Members of the network exchange seeds and supply seeds to farmers in the communities.[62] This actively maintains seed diversity in the region covered by the network. Each member of the network is committed to keeping good quality seed of the varieties that he or she sows throughout the year. To do this, producers at family and community level must be provided with training and appropriate infrastructure or equipment for seed conservation.
    - Community seed banks[63] are places designated and managed by farmers' committees and where local crop seeds are stored. The aim of these banks is to safeguard seed diversity in order to supply farmers who wish to plant seeds of varieties that they do not possess. They also serve as a safeguarding mechanism to ensure the existence of seeds and a source of supply in the event of loss due to adverse conditions. The development of such banks is entirely dependent on the consent of the community or communities involved.
4. *Build and/or upgrade the local infrastructure for community seed banks* when it has been established that this is the most appropriate strategy.
5. *Provide direct technical and organizational assistance to community seed bank and seed exchange projects*, through ongoing support by local technicians and project advisers. Each project will have its own allocated budget to cover project monitoring visits based on a schedule agreed with the community and the regional coordinator (this support will also apply to output 2.1.3). This project will work to ensure that the created capacity stays in communities and that local technicians and people in the community are trained to make the project their own (see also section 4 on social sustainability).

[61] Including access and benefit sharing rules. This project is being carried out in conjunction with the GEF Access and Benefit Sharing (ABS) Project that has recently started.

[62] The formal and informal networks present use commercial and reciprocal arrangements or a combination of both. There are several incentives for network members. The first is access to quality seeds for their own planting, but being part of the seed committee is also a source of pride, as in the case of seed banks in Tlaxcala or seed guardians in Yucatán. Other benefits are participation in events and exchange of experiences, field trips and even income from the sale of seeds.

[63] Existing seed banks work in accordance with very different rules. The size and infrastructure also varies, depending on the bank organizing committee. None of this can be defined *a priori* in the project. Seed bank experiences are described in handbooks and case studies. The quest for sustainability is also a goal of seed banks and each rural development project.

Output 2.1.3 Milpa and other agroforestry systems improved, diversified, more productive and better adapted to climate change

The **indicators** for this output are: 1. Total number of projects, differentiated by project type; 2. Number of locations where milpa and other agroforestry systems (MoAS) are improved; 3. Number of farmers participating in improvement of MoAS; 4. Percentage of women participating in improvement of MoAS; 5 Percentage of young participating in improvement of MoAS. The baseline and the indicator goals are set out in Appendix 1 Project results framework.

The following **activities** will be conducted to achieve this output:

1. *Identify and diagnose initiatives under way or planned for participatory genetic improvement or milpa improvement carried out by local or outside stakeholders*.
2. *Select participatory genetic or milpa improvement projects to be supported by this project*. A regional advisory committee made up of farmers, civil society associations, research centres and institutions will be set up for this selection as well as for output 2.1.2 initiatives.
3. *Implement participatory genetic improvement or milpa improvement projects* by carrying out the following specific actions:
    - participatory genetic improvement by selecting the best seeds from each variety or even crossing varieties. Working in conjunction with the technician – who is advised by advisers and plant improvement experts – the farmers decide on the traits that they wish to improve in their own particular variety. In very special cases, when it is desirable for the local variety to have a trait not found in the region, crosses can be made with varieties outside the region. This process takes several years and requires strong technical support.
    - *milpa* diversification and improvement: *milpa* is a diverse system by definition, however diversity is sometimes reduced due to the reasons set out above (see section 1.2.1). In order to improve the *milpa*, problems with pests, diseases and/or productivity are dealt with through training workshops for the participatory design of *milpas* that are improved using fruit trees or carrying out water and soil conservation and improvement activities using fertilizers, crop rotation, biological control and so on.
    - improvement of traditional seed storage techniques will help prevent crop losses due to insects, rodents or fungi and maintain seed viability. It includes the purchase of airtight containers and training workshops for their proper use.
4. *Provide technical and organizational assistance to projects* through ongoing support by local technicians and project and scientific advisers.
5. *Periodically assess the acquisition and application of acquired knowledge and skills by farmers participating* in genetic improvement and/or *milpa* improvement projects; this is done through participatory assessment methods.

Co-financing in component 2:

Co-financing of component 2 will come from the following sources: SAGARPA through programmes for 1) Agricultural Research, Innovation and Technological Development, 2) Support Programme for Small Producers, 3) Food Security Project for Rural Areas, 4) Extensionism, Capacity-Building and Productive Partnerships, and 5) *Arráigate Joven – impulso emprendedor,* with a cash contribution during the project life of USD 2,000,000; SEDESOL and INAES will provide support through the Social Economy Promotion Programme for the development and implementation of productive projects, with cash resources amounting to USD 500,000 each; CONABIO will provide support with expert staff for the development of these activities with USD 1,337,075 in kind; INIFAP will provide technical assistance for this component amounting to USD 565,745 in kind; acting through the DGSPRNR, SEMARNAT will contribute USD 688,200 in kind; FAO will provide technical advice for developing activities considered for achieving this outcome, with in kind resources amounting to USD 100,000; through the AZP, the City of Mexico government will provide USD 285,000 in kind and USD 4,731,000 in cash for the Chinampa region; SEDUMA will contribute USD 1,363,636 in cash, and 454,546 in kind for the Region of milpas in Yucatán; IDESMAC will provide USD 1,000,000 in kind for technical support in the Chiapas region; through the Programme for the Improvement of Indigenous Production and Productivity, the CDI will provide USD 300,000 in cash; SEMAC will contribute with USD 78,050 in kind.

Component 3: Improvement of public policies

Component 3 will address barriers 2, 3 and 6 (2: Deficient inter-institutional coordination and communication affect the conservation, use and access of phytogenetic resources, 3: Perverse incentives still cause degradation of agroecosystems, and 6: Lack of valuation of agrobiodiversity and the functional agroecosystems that maintain it), presented in section 1.2.3, through a review of existing institutional policies and arrangements in order to formulate and implement agrobiodiversity assessment, conservation and use strategies for decision-makers at different levels.

The aim of this component is to address loss of knowledge and of traditional agroecosystems by highlighting the value of agricultural biodiversity to decision-makers – using the valuation strategy developed in component 1 – in order to address the food and social development needs of current generations and to face potential environmental and food security risks at national and global level. The basic assumption is that decision-makers will only be able to engage in formulating policies and programmes that incorporate and foster the conservation and sustainable use of agricultural biodiversity nationally if they become aware of these risks.

This component also involves active project coordination and interaction in conjunction with CONABIO officials, particularly those responsible for promoting the implementation of the National Strategy on Mexican Biodiversity and the 2016-2030 Action Plan and coordination mechanisms arising out of the Integration Strategy for the Conservation and Sustainable Use of Biodiversity. Both strategies were constructed based on a broad participatory process that involved officials at different government sectors and levels, academics across the country, civil society organizations and local stakeholders.

The aim is to achieve the following outcome for component 3 using incremental GEF resources:

Outcome 3.1 The protection and promotion of traditional knowledge, practices and production systems have been mainstreamed into public policies and planning, generating effective partnerships with the communities, and disseminating values associated with agroBD and local cultures.

The achievement of this outcome will be monitored through the following **indicators**:

- **Indicator 1**: The 2019-2024 National Development Plan incorporates agrobiodiversity in one or more objectives, strategies or lines of action. **Baseline**: The 2019-2024 National Development Plan has not been drawn up. The current 2013-2018 National Development Plan does not include agrobiodiversity in any objective or line of action. The **target** is the same as the indicator.
- **Indicator 2**: Number of sectoral programmes incorporating agrobiodiversity in one or more objectives, strategies or lines of action. These are the sectoral programmes on (1) Environment, (2) Farming development, (3) Social development and (4) Special Indigenous Peoples. **Baseline**: The 2019-2024 Sectoral Programmes have not been drawn up. The **target** is for the four sectoral programmes to incorporate agrobiodiversity.
- **Indicator 3**: Number of budget programmes whose operating rules incorporate regulations, rules, criteria or incentives aimed at the conservation and sustainable use of agrobiodiversity. **Baseline**: Two budget programmes currently specifically incorporate agrobiodiversity in their operating rules. **Target**: Nine budget programmes incorporate regulations, rules, criteria or incentives aimed at the conservation and sustainable use of agrobiodiversity in their operating rules.

In order to achieve outcome 3 two outputs will be generated and these will be achieved through the corresponding activities:

Output 3.1.1: A communication and awareness-building strategy aimed at decision-makers on the value and importance of the conservation and sustainable use of agroBD, formulated and implemented.

The indicators for this output are:

- Communication and awareness-building strategy formulated and implemented
- Public officials´ awareness of agroBD values, to be measured with the AgroBD Value Awareness Index developed under output 1.1.3.

The following activities will be conducted to achieve this output:

1. *Determine the knowledge, perceptions and awareness levels of decision-makers.* We do not currently know the knowledge, understanding, perceptions and awareness levels of decision-makers about the importance of agrobiodiversity and the traditional farming practices behind it. We must find this out, because it is a crucial input for formulating communication and awareness goals and defining key messages.
2. *Formulate communication and awareness objectives.* This involves clearly establishing key aspects that the communication strategy sets out to implement (e.g. increasing knowledge, changing conceptions, etc.).
3. *Define key messages and the call to action, in coordination with components 1, 2 and 4*. This involves defining what we wish to communicate and the actions that the target group is called upon to perform. As the project is implemented, results obtained from component 1 as well as components 2 and 4 will serve as evidence for empirically supporting key messages to be disseminated. It is particularly important for the communication and dissemination strategy designed in output 1.1.3 to be available at an early stage of the project so that it can be used to guide the definition of key messages for decision-makers.
4. *Identify and select communication channels and prepare the corresponding products*. At this stage, the Project Coordination Unit will have to identify the most effective communication channels (e.g. radio, television, Internet and so on) that will allow it to deliver the message to decision-makers and, based on this, develop relevant communication activities or products (videos, presentations, press releases, policy documents and so on). Communication products must be drawn up in language appropriate to the different types of decision-makers.
5. *Monitor and assess the effectiveness of messages*. This involves examining to what extent the message delivered has had the expected impact. The instrument applied during diagnosis could be used for this purpose. This would establish a baseline to serve as a reference for determining whether or not there have been any changes in knowledge, conceptions or perceptions for decision-makers.

Output 3.1.2: Inter-institutional strategy for integrating the conservation and use of agrobiodiversity, agreed and implemented.

The indicators for this output are:

-Number of policies (regarding NDP, sector programmes and budget programmes) prioritized

-Number of policies negotiated

-Number of policies amended

The following activities will be carried out to obtain this output:

1. *Prioritize legislation, policies and programmes that the project seeks to influence.* In order to carry out this activity, CONABIO must have actively promoted the implementation of the *National Strategy for Mexican Biodiversity and 2016-2030 Action Plan*, as this strategy involves

setting up an interagency mechanism for integrating biodiversity, which is an ideal resource for promoting the inclusion of agrobiodiversity in agricultural, social and tourism policies. If this mechanism has not yet come into operation at the beginning of the project or during its lifetime, CONABIO, in conjunction with the Project Coordinator, must actively participate in the various working groups (e.g. the group set up by GIZ to implement the *Integration Strategy for the Conservation and Sustainable Use of Biodiversity*) or in interministerial coordination mechanisms (e.g. The Interministerial Commission on Sustainable Rural Development) to ensure that the participants of all these groups or mechanisms collectively establish a priority order for legislation, policies or programmes seeking to integrate the conservation and sustainable use of traditional agroecosystems and their associated agrobiodiversity.

2. *Draw up an analysis of policies and formulate alternative policies.* Once the legislation, policies or programmes have been prioritized, their implementation and impact on agrobiodiversity must be analysed with the aim of obtaining the empirical evidence required for developing alternative legislation, policies or programmes and evaluating their cost-benefit ratios. These alternative policies may involve the creation, removal or amendment of legislation, policies and programmes.
3. *Negotiate and agree on proposals.* When the legislation, policies and programmes have been prioritized, the Project Coordinating Unit will draw up a proposal for the creation, removal or amendment of the relevant legal instrument and this will be negotiated and agreed within the relevant interministerial coordination mechanism working group.
4. *Incorporate proposals in the relevant instruments.* Once the proposal has been negotiated and accepted, the decentralized agencies and bodies will be responsible for incorporating the agreed changes in the relevant policy instruments.
6. *Develop the capabilities of institutions responsible for implementing changes.* To ensure effective implementation of these changes, the decentralized agencies and bodies must amend their processes and systems and train public officials in the method of implementing such changes.
7. *Monitoring and assessing changes.* This involves finding out whether changes to legislation, policies and programmes have been effectively implemented and whether these changes have translated into effective application of the new conservation policies to traditional farming practices as well as to agrobiodiversity and its sustainable use. Measures will be taken to ensure that the mechanism for monitoring and assessing changes in public policies is housed in one of the institutions involved after project closure. When monitoring changes, regional coordinators must actively participate in government decision-making and maintain a close relationship with State delegates from federal agencies to ensure that changes to policies or their instruments are properly implemented. For this to happen effectively, members of the Project Steering Committee must notify federal delegates and State agencies of the existence of the project and its corresponding regional coordinators.

Sources of co-financing for component 3

The co-financing in Component 3 will all be in kind and will come from the resources used for the analysis and social and political management of changes within the planning and programming frameworks of the various agencies that influence agrobiodiversity in some way. In this area, SAGARPA will contribute USD 200,000; INCMNSZ will contribute to the development of a healthy diet based on greater use of locally-produced resources taking into account regional biocultural diversity with USD 1,388,889 – and IDESMAC will contribute USD 75,000 as part of its local management in the State of Chiapas.

Component 4: Valuation of agrobiodiversity and market linkages

Component 4 will address barriers 5 and 6 (5: Social dynamics in rural areas continue threatening the survival of traditional agricultural knowledge and practices; 6: Lack of valuation of agrobiodiversity and the functional agroecosystems that maintain it), shown in subsection 1.2.3.

The rationale behind this component is to address the lack of appreciation for agroBD by means of a two-pronged strategy: a strategy to communicate and disseminate the values of agroBD to consumers and an agroBD product linkage strategy that generates financial incentives for producers, by improving their opportunities for market access. Whether the products are primary or processed, this access reflects the quality defined by specific product characteristics and the utility ascribed by consumers, namely recognition, prestige and the product's intrinsic nutritional values. These incentives will be offered in response to knowledge generated about agroBD values and will be supported by consumer-to-consumer dissemination mechanisms designed under output 1.1.3. They will be applied at points of the value chain that can be improved in terms of economic and value-related incentives, with a special focus on nutritional values.

According to this approach, component 4 seeks to achieve recognition of agroBD values, particularly nutritional and health values, by consumers through a communication and education strategy, linking agroBD with local and regional markets. The expected result of this component is:

Outcome 4.1: The marketing and consumption of agroBD products have been enhanced through new strategies of agroBD valuation and market incentives[64], with a short value chain approach.

The identification of added value of agroBD and the design of communication strategies are preliminary steps for linking agroBD products and services to markets[65] and thus helping create better living conditions for farmers locally and greater consumer satisfaction by: 1) ensuring self-consumption by rural and indigenous families and planning diversified production for marketing; 2) marketing agroBD products, particularly those that are undervalued and underused such as *quelites* in order to increase the range of edible species, with a focus on short marketing circuits or short value chains; 3) identifying local product attributes as a basis for their differentiation and labelling under participatory and inclusive schemes such as local seals, umbrella brands (identifying the supply of goods and services from a specific area) and collective marks to help establish a premium price and add intangible value, for example landscape conservation, intangible heritage such as cuisine and festivals, and so on; 4) public procurement with local purchase from smallholders; 5) implementing advertising campaigns within the strategy designed as mentioned above (output 1.1.3), in order to increase interest in agroBD conservation and bring about a change in consumer behaviour and preferences.

The aim is to strengthen links with the market taking the region and its areas of influence as a starting point. However, this view does not rule out links with urban markets in big cities. There are two different ways to consider the market linkages: the first one is a value chain (VC)[66] approach oriented to national/international markets and the other one is the Short Food Chains (SFC) approach.

The VC approach looks at all the stakeholders and stages in the chain and not only at the farmer´s level. In view of this, the approach considers farmers and their organizations, as well as small traders, small and medium food processers, small and local markets and retailers, food services (restaurants and *comedores*), final consumers (locally but also in cities). The VC approach also looks at the value added all along the chain and how it is possible making a business from these products in a sustainable way[67], providing economic incentives for producers and other stakeholders who can acquire this value added.

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[64] Market incentives are as follows: a surcharge based on acknowledgement of authenticity and local roots, marketing circuits controlled by stakeholders, labelling to ensure quality and surcharging.

[65] FAO has documented many experiences where developments in markets have enabled farmers to maintain their sustainable practices (see: http://www.fao.org/3/a-i5398e.pdf; http://www.fao.org/fileadmin/templates/cfs/Docs1415/Events/HLF_Small/CFS_HLF_Smallholders_Markets_EN.pdf).

[66] FAO has worked extensively on this approach, kindly see as example: http://www.fao.org/3/a-i3953e.pdf

[67] *Value chain* as per FAO's definition means: "all the stakeholders that participate in the coordinated production and value-adding activities that are needed to make food products."

SFC considers that the *value chain* approach in its complete description may not fit to all smallholders, since the territory is not a part of its concerns and many of these farmers do not have access to all stages of a full value chain.

During the project preparation stage, evidence was gathered of links to domestic and export markets in the project working areas for native maizes and processed products such as tostadas [toasted corn tortillas]. However, a more in-depth diagnosis must be carried out for the other species and this will be done during the first few months of project implementation.

The outcome 4.1 **indicator**s are:

- Strategy for agroBD product promotion and marketing campaigns designed and implemented.
- Accessibility of agroBD products to local and regional markets, measured through a compound index of 4 indicators of marketing access facilities identified under project output 4.1.2 for strengthening market linkages (sum of values of these 4 output indicators).

Target group: AgroBD product producers, traders and consumers; including at least 30 per cent women.

Target sites are located in the States of Chiapas, Chihuahua, Michoacán, Oaxaca, Valley of Mexico and Yucatan. Key stakeholders have been identified in these sites who are developing agroBD product marketing activities (see table 1 and descriptive fact sheets under appendix 7: Files and maps of the project intervention regions).

Output 4.1.1: Dissemination and education campaigns directed to consumers on the specific nutritional, health, wellbeing and other values of agroBD products (values identified in participatory economic valuation under component 1, output 1.1.3)

There are 4 **indicators** for this output:

- No of market studies
- No of agroBD valuation and marketing campaigns
- No of social communication and promotion materials on agroBD values aimed at consumers for positioning brands, geographical designations and other marks of local identity
- No of campaign and material evaluations at the intermediate and final project stages

Assumptions for the implementation of this output include participation of producers in designing campaigns and their ownership of activities as well as the support of federal and local governments, civil society organizations and other stakeholders (advisers, academic establishments and so on).

The following **activities** are to be carried out:

1. *Carry out market studies in intervention areas* to map stakeholders, identify needs and understand consumers.
2. *Implement agroBD valuation and marketing campaigns in each project working area in accordance with the overall agroBD valuation strategy indicated in output 1.1.3.* The aim of these is to position primary and processed agroBD products, establish their nutritional importance, local roots and importance for food security as well as change the dietary habits of urban consumers with the aim of creating differentiated, healthy and sustainable products. The aim is for producers to own their product attributes and design brand and label promotional content and positioning with advice from the project. It is intended that these campaigns should have an impact on the volume and sales revenue of marketed products while also increasing the number of knowledgeable consumers attracted by the campaign contents. We are seeking the support of federal and local governments, CSOs and other stakeholders (advisers, academic establishments, etc.).

3. *Design and produce social communication and promotional material on the values of agroBD aimed at consumers.* As part of campaigns implemented and guided by the communication strategy designed under output 1.1.3, communication materials will be designed that can convey the messages and values of agroBD and change consumer habits, taking into account the specific characteristics (geographical, social and cultural) of each project implementation area.
4. *Evaluate the impact of communication campaigns and materials among consumers at intermediate and final project stages in project working areas and at national level, if possible.* This activity is required to determine the degree of achievement of project goals and objectives, the positioning of farmers, the perception of agroBD consumers and the recognition of brands and labels. The interim assessment will allow adjustments to be made to the project based on progress achieved in the generation of labelled brands.

Output 4.1.2: Strengthened market linkages between small-scale farmers (family farmers and indigenous communities) and local and regional markets, to support conservation through sustainable production of food and goods based on agrobiodiversity.

There are 5 **indicators** for this output:

- Number of marketing premises and outlets in short marketing chains or circuits
- Number of agrobiodiversity fairs
- Number of special gastronomic fairs or meetings between traditional cooks and chefs
- Number of contracts in local supermarkets
- Number of pivot businesses set up.

Target group: AgroBD product producers, traders and consumers; including at least 30 per cent women.

Assumptions for the implementation of this output are the owning of activities by producers as well as support from federal and local governments, CSOs (civil society organizations) and other stakeholders (consultants, academic establishments etc.) to promote increased agroBD product access to markets.

The following **activities** are to be carried out:

1. *Set up and strengthen marketing premises and outlets in short marketing chains or circuits*, namely: *in situ* sales, barter markets, *tianguis* markets, organic markets, public markets, small establishments and specialist markets, etc. Activities will include strengthening sales outlets that already offer products differentiated using brands and stamps of organizations in project working microregions. We expect to strengthen at least six premises by mid-term and 12 will be in operation by the end of the project. The activity includes capacity-building and support with business, accounting and organizational management (strengthening social and organizational capital). The participation of women and young people in such activities will be encouraged.
2. *Promote and organize agrobiodiversity fairs:* In conjunction with component 2 (under output 2.1.1), annual fairs will be set up in all project working areas in coordination with local governments to provide setting-up spaces as well as logistics, transport and promotion, learning lessons from the fair held in Oaxaca. The baseline in Oaxaca is the fair that is already held and it is proposed that the project should co-finance these activities. We expect that three regional fairs will be operating by project mid-term and six by the end of the project. One necessary condition for fair set-up and continuity is the contribution and support of stakeholders who share resources and common interests, namely: producers, organizations, local governments and consumer organizations etc. to ensure positioning of the fairs.
3. *Promote and organize special gastronomic fairs or meetings between traditional cooks and chefs:* One such pilot experience is the meeting held in the municipality of Guachochi,

Chihuahua. The goal is for annual fairs to be held in all working areas and for selected microregions to carry out such meetings and ensure their sustainability through the support of producers, traditional cooks, restaurants and chefs, national and local academic establishments, the Ministry of Tourism and local governments. Where conditions permit, we will seek to tie the agroBD fairs in with the gastronomic fairs in order to generate more awareness and links.

4. *Draw up contracts with public and private sector self-service stores:* The baseline is an informal agreement with a supermarket in Guachochi, Chihuahua. Producers and organizations will be trained in the use of barcodes, food safety studies (through partners such as INNSZ), packaging to reduce the environmental impact of petroleum-based packing materials, logo and brand design and how to incorporate the different product attributes in labelling, i.e., local, food-related and nutritional characteristics. Assistance will be given in negotiating contracts that reduce payment times to producers and in shelf positioning.
5. *Strengthen community organizational and business administration capacities and support for family business start-ups.* Capacity-building workshops will be held (also covering knowledge and analysis of public and fiscal policies affecting marketing as well as administration and knowledge of the market environment) and company training management support will be provided for groups that are not yet ready for market. The aim is for accounting and management knowledge to be acquired to ensure that such companies are self-sufficient with regard to management.

Output 4.1.3: Innovative market incentives that promote the conservation of agroecosystems and generate a transformational change in business-as-usual rural production.

There are 4 **indicators** for this output:

- A collective brand
- Number of participatory guarantee systems
- Number of websites for encouraging product promotion and marketing
- An agroBD gastronomy App

Target group: AgroBD organizations and producers, consumers, chefs, restaurants and hotels, scientific and academic institutions.

As before, the aim of this output is to generate mechanisms of interface between producers and consumers to enable assessment of agroBD products by strengthening relationships of trust and knowledge-sharing through market relations. Through mechanisms such as participatory guarantee systems (PGSs), consumers can assess different product attributes such as local origin and will be willing to pay fair prices in a sustainable manner to encourage the producer to conserve agrobiodiversity. PGSs must also be legitimized in order to allow the expansion of local markets to regional and/or national markets. Other market mechanisms consider new forms of contract farming for markets willing to pay a premium or using electronic methods of promoting e-commerce and other novel forms such as apps, which allow the consumer to map and grade agroBD shops and cuisine.

The following **activities** are to be carried out:

1. *Support the registration and operation of a collective brand.* The activity is currently at zero baseline. However, the process of registering a collective mark of native maize is well advanced and this brand should feasibly be ready by midway through the project. The final outcome is market sustainability for the benefit of producers. The law provides that associations of producers, manufacturers or traders are able to obtain collective mark rights and establish rules for its use.

2. *Cooperate in establishing participatory guarantee systems.* We need to establish a strategy for developing such systems as part of civil society activities. We also need to revise policies in this area with regard to component 3. There are numerous initiatives in such systems in Mexico, such as the Mexican Network of *Tianguis* markets and the Organic Markets civil association (REDAC), which operates *tianguis* markets and organic markets in Oaxaca, Chiapas, Mexico City and other Mexican States. The implementation areas include eight alternative markets belonging to this network and agroecological fairs. A register of agroBD products operating under this scheme will be kept during the first six months of the project. With regard to agroBD collective marks related to species selected in the project, no such register is kept in the implementation areas. Relationships of trust between producers and consumers are required to establish PGSs. The participation of scientists and academic institutions that are strategic project partners in selected working areas is also required.
3. *Set up and supply social network websites to promote and market products* aimed at consumers in general and agroBD product buyers in particular. Traditional markets work in remote areas, but websites and social networks will include information on these and lay the grounds for youth involvement in e-commerce. Producers and producer organizations establish marketing conditions and limits. These entities, particularly when operated by young people, will use computer tools with specialist support. A system for electronic payment and distribution of baskets by courier and/or home delivery will be designed in the selected working areas. There are currently no websites of this type in project working areas. Our goal is to ensure that they are operational in three areas by mid-term and in six areas by the end of the project.
4. *Develop, distribute and add to an agroBD gastronomy app:* This tool is intended to help users locate agroBD sales and gastronomy sites and assess them. To do this, agroBD consumers will have to download and use the app, which can be verified by checking the number of users.

Sources of co-financing for component 4

Co-financing in Component 4 will be provided by SAGARPA through the *Agriculture Development Programme* (Component: Agrifood Innovation), PESA, the *Commercial Development of Family Farming* project, the *Certification of food standards* programme, this support will amount to USD 1,300,000 in cash; SEDESOL through the *Support for Productive Impulse* project, USD 1,000,000 in cash; INAES will contribute USD 1,000,000 in cash for the incubation of projects and productive projects; CDI will contribute USD 533,333 in cash through the *Programme for Improvement of Indigenous Production and Productivity* and the *Consolidation Project* and with USD 1,111,111 in kind to support communication and dissemination campaigns on the importance of agrobiodiversity through the indigenous cultural broadcasting system; INCMNSZ will contribute USD 1,282,222 in kind with promotion of knowledge and consumption of locally produced fresh food by incorporating educational content in primary schools and other impact sites, and FAO with USD 100,000 in kind for technical advice for developing activities considered for achieving this outcome

1.3.3 Project Stakeholders

<u>Primary stakeholders</u>

At a local level, project beneficiaries and primary stakeholders are: traditional farmers, indigenous groups and local communities. Within these groups, women have a key role particularly regarding the management of domestic family gardens and the associated agrobiodiversity. These groups have traditional knowledge associated to agrobiodiversity and have guaranteed the continuity of the evolutionary processes that help adapt the different species and subspecies to different agroecoclimatic conditions. This project will specially promote the participation of young people to work towards securing that the replacement generation exists.

Table 5 above (civil society initiatives for agrobiodiversity conservation) shows a list of the main local stakeholders.

Second level stakeholders

At a second level, key stakeholders are the social and some academic organizations that have worked in the communities and have already acquired recognition and prestige. These organizations can serve as catalyzers to facilitate the dialogue between the communities and the academic and governmental agencies that will participate in the project.

At a third level, academic actors from the universities and research centres will be responsible for the classification and documentation of the agrobiodiversity. As well, academia centres will manage and provide technical support to, where appropriate, conservation schemes and participatory plant breeding programs with local farmers.

At a national level, governmental agencies with competence in agrobiodiversity or protected natural areas will play a key role in project implementation. Table 6 below illustrates the list of main institutional stakeholders.

Table 6. Institutional Project Stakeholders

Institution	Mandate	Role in the Project
National Commission for the Knowledge and Use of Biodiversity (**CONABIO**)	**Conabio's** mission is to coordinate actions and studies related to the knowledge and preservation of biological species, and to promote and encourage scientific research activities to explore, study, protect and use biological resources aiming to conserve the ecosystems of the country and generate criteria for sustainable management.	Main project executing partner. CONABIO has technical departments that will provide support to the different project components, as well as carrying out its coordination, and monitoring.
Food and Agriculture Organization of the United Nations (**FAO**)	FAO's three main goals are: the eradication of hunger, food insecurity and malnutrition; the elimination of poverty and the driving forward of economic and social progress for all; and, the sustainable management and utilization of natural resources, including land, water, air, climate and genetic resources for the benefit of present and future generations**.**	FAO is the GEF agency for this project, and will provide technical assistance during the full project cycle.
Ministry of Environment and Natural Resources (**SEMARNAT**)	**SEMARNAT** is primarily responsible for the conservation and sustainable use of ecosystems and their biodiversity as well as aspects of pollution, management of water resources and combating climate change. The DGSPRNR is responsible for designing and promoting development instruments and environmental standards for sustainable development of primary sector activities, including agriculture, preservation of biodiversity and genetic resources and biosafety of genetically modified organisms. It is the National Focal Point for the Nagoya Protocol in Mexico, but it also addresses general biological and genetic resource issues.	It provides support and cooperation in sustainable land management and biodiversity conservation while also supporting issues arising within the project regarding the fair and equitable sharing of benefits arising out of the use of genetic resources.

Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (**SAGARPA**)	**SAGARPA** is responsible for the inspection and certification of seeds through the National System of Inspection and Certification of Seeds (SNICS), which in turn manages the National System of Phytogenetic Resources (SINAREFI). SINAREFI is aimed at harmonizing actions and efforts among different agencies linked to phytogenetic resources for food supply and agriculture, with the objective of securing their conservation and sustainable use. SAGARPA is also responsible for coordinating the institutions involved in rural development.	SAGARPA and its dependencies will provide technical support to the four technical components, within their mandates.
National System of Research and Technology Transfer (**SNITT**)	SNITT coordinates and brings together the actions of public institutions as well as private and social organizations conducting and fostering scientific research, technological development and knowledge validation and transfer in the farming sector.	Support for research and technology transfer projects through the SAGARPA – CONACyT fund and the SAGARPA Innovation Component.
Secretariat of Social Development (**SEDESOL**)	SEDESOL's mission is contribute to the construction of a society in which all persons, regardless of their social, economic, ethnic, physical or other status, are guaranteed the fulfilment of their social rights and enjoy a decent standard of living. This, through the formulation and conduction of a social development policy, giving priority to the most vulnerable social sectors, and fostering the generation of capacities and an enabling environment.	SEDESOL will provide support to improving livelihood activities during project design and execution as well as supporting productive projects within the social sector of the economy.
Commission for the Development of Indigenous Peoples (**CDI**)	CDI is intended to guide, coordinate, promote, support, encourage, monitor and evaluate programs, projects, strategies and public actions for comprehensive and sustainable development of indigenous peoples and communities in Mexico.	A portion of the social groups that will participate in the project are indigenous peoples (IP). CDI is the agency in charge of IP development. Its participation will support linking the project with these groups.
National Institute of Social Economy **(INAES)**	This is a decentralized agency of SEDESOL with technical, operational and management autonomy. Its purpose is to implement public policies to promote the social sector of the economy through participation, training, research, dissemination and support for productive projects.	It provides for capacity and resource-building by bodies operating within the social sector of the economy for groups working within the project. It runs initiatives within the field of agroBD product production and agroBD value and marketing chains.
National Commission for Natural Protected Areas (**CONANP**)	**CONANP's** mission is to conserve the natural heritage of Mexico through Protected Areas and other forms of preservation, by promoting a culture of conservation and the sustainable development of communities living in their own environment.	Given that one part of the agrobiodiversity, particularly that relating to the wild relatives of the cultivars, can be found best conserved in protected areas, CONANP will play an important role under Component 1 and 2.
German Federal Institute for International Cooperation (**GIZ**)	This international agency has worked with Mexico on three aspects of sustainable development: 1) biodiversity conservation; 2) inclusion of biodiversity in cross-sectoral policies and strategies; 3) inclusion of biodiversity in other economic sectors. The Including Biodiversity in Agriculture (IBA) project that GIZ will run in Mexico in conjunction with SAGARPA overlaps with this	The GIZ project will start processes of community-based capacity strengthening for the Inclusion of Biodiversity in Agriculture (IBA) and will strongly promote public policies that consider biodiversity as an important element in agricultural production. There is a mutual

	GEF project in some areas: Yucatán, Michoacán and Chihuahua.	collaboration agreement of this project with GIZ.
National Institute for Forestry, Agricultural and Livestock Investigations (**INIFAP**)	**INIFAP** contributes to the productive, competitive, equitable and sustainable development of agricultural and forestry chains, through the generation and adaptation of scientific knowledge and technological innovations and the development of human resources to meet the demands and needs to benefit the sector and society in an institutional cooperation frame with public and private organizations.	INIFAP is a research institution with wide experience in the research of phytogenetic resources. INIFAP will provide its knowledge and expertise under Components 1 and 2.
The College of the Southern Border **(ECOSUR**)	**ECOSUR** seeks to contribute to the sustainable development of the southern border of Mexico, Central America and the Caribbean through the generation of knowledge, human resources training and linking from social and natural sciences.	As a research centre with experience in the development of projects on regional phytogenetic resources, ECOSUR will provide technical support to project implementation.
National Autonomous University of Mexico (**UNAM**)	The **UNAM** has the primary purpose to train professionals, organizing and conducting investigations, mainly about the national conditions and problems, and spread as widely as possible, the benefits of culture	As a key institution with wide experience in the research of species and varieties related to the agroecosystems of Mexico, UNAM will provide technical support to project implementation.
Other Universities or Research Centres	Institutions with regional experience in the characterization and documentation of agrobiodiversity	Provide technical support at local and regional levels.
Salvador Zubirán National Institute of Medical Sciences and Nutrition (**INCMNSZ**)	This is one of the National Health Institutes of the Mexican Health Ministry providing tertiary care to adults. The INCMNSZ was designed at the outset as a specialized response unit to meet public health needs regarding nutrition and internal medicine	Support for the nutritional assessment of food derived from Mexican agroBD in order to obtain information to encourage consumption.

1.3.4 Expected global environmental and adaptation benefits

Global Environmental Benefits (GEBs) resulting from GEF's biodiversity financing include:

- *Conservation* of globally significant biodiversity; and
- *Sustainable use* of the components of globally significant biodiversity.

Specifically, the federal, regional and local governmental agencies, civil society organizations, the local communities, traditional farmers (especially women and young people) and their organizations, the academia and FAO will help attaining these Global Environmental Benefits (GEBs) through this project under the GEF biodiversity focal area.

- *Conservation* of globally significant biodiversity
    - Securing species and varieties that constitute a reservoir of genetic resources and knowledge for the whole mankind, both for global future security and future agricultural research (see Appendix 8);
    - Ensuring the continuity of the domestication and diversification processes and local seed conservation projects, and reducing the uniformity of global crops and their vulnerability to extreme situations;

- Conserving genetic diversity which is fundamental to face future challenges - like food supply and adaptation of crops to upcoming social and environmental pressures (i.e. increase of global population and climate change);
- Improving the conservation status of traditional agricultural systems.

- *Sustainable use* of the components of globally significant biodiversity
  - Providing tested methodologies, innovative mechanisms and lessons learned that can be scaled up in Mexico, in the Mesoamerica region, and adapted to other centres of origin around the world, through South-South Cooperation, the FAO network and the Commission on Genetic Resources for Food and Agriculture and Biodiversity[68];
  - Supporting crop landraces and local varieties exchange or promotion in appropriate zones, and eventually in plant breeding programs;
  - Generating agroecological knowledge of these species, crop's landraces and local varieties, including their optimal development environmental ranges, resistance to pests, diseases or drought.

Targeted *knowledge generation* and public policies have an important supporting function for achieving these GEBs

- Knowledge generation
  - Generating systematized documentation and improved knowledge on species and varieties, including crop wild relatives, that are poorly known or threatened to be disused at present due to their invisibility; in order to enhance their conservation and monitoring.
  - Generating agroecological knowledge on species, crop's landraces and local varieties, including their optimal development environmental ranges, resistance to pests, diseases or drought;
  - Generating information about traditional practices of agroBD conservation and use;

- Public policies
  - Providing support through targeted public policies.

Global Environmental Benefits delivered by the project will be measured through the following indicators:

- Indicator 1: Number of globally significant species (cultivated and wild) in the specific implementation areas (see Map 1. Location of project regions in the country) Baseline: 168 species (3432 records in the SNIB); the species number is maintained at the end of the project and records in the SNIB increase 10% (3,775 records in the SNIB).
- Indicator 2: Number of globally significant species (cultivated and wild) collected during data generation at a national scale and through collation of existing information Baseline 570 species (99,599 records in the SNIB); the species number is maintained at the end of the project and records in the SNIB increase 5% (104,579 records in the SNIB).
- Indicator 3: Number of different globally significant agroecosystems described in the specific implementation areas (see Map 1. Location of project regions in the country), with a final target of at least 9.
- Indicator 4: Direct coverage: Number of hectares of globally important landraces (traditional varieties) secured (through data and information gathering related to the 12 target crops, their relatives and the agroecosystems where these thrive, capacity development, improved public policy and markets), with a final target of 700,000 hectares.

[68] http://www.fao.org/nr/cgrfa/cgrfa-home/en/

- Indicator 5: Indirect coverage: Total area covered by traditional agriculture in the country. Baseline: 4,340,000 hectares in 2015; project final target: The coverage of traditional agriculture is maintained.
- Indicator 6: Number of producers having received different benefits for conserving and sustainably using agroBD (market incentives, other subsidies for conserving agroBD and related traditional practices): Baseline: 2,268, with a final target of 4,100 producers.

This proposed project will also contribute to GEBs by addressing Aichi Targets #1, 2, 13, 18 & 19 through the following outcomes and outputs:

Table 7. Project contributions to Aichi Biodiversity Targets

Aichi Biodiversity Target	Project Outcomes and Outputs	Selected SMART Indicators
Target 19 By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	**1.1; 1.1.1, 1.1.2**	-N° of existing data bases for agroBD species converted / transformed according to a Comprehensive Agrobiodiversity Information System (SIAgroBD). Trend: From 0 to 12 data bases. -N° of analysis and synthesis based on the SIAgroBD and on results of research projects to guide decision making. Trends: From 0 to 3 analysis and synthesis - A comprehensive Agrobiodiversity Information System (SIAgroBD) has been developed and is being implemented. No of participatory research projects on the use and management of agroBD. Trend: 10 specific research projects
Target 13 By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	**2.1; 2.1.1, 2.1.2, 2.1.3**	-Area in hectares where the knowledge, practices and/or management derived from capacity-building projects for agroBD conservation are applied. Trend: Baseline: 604 hectares in 2015. Project end target: 2,190 hectares - No of seed conservation projects. Trend: From 7 to 21 projects -No of projects for improving *milpa* and other agroforestry systems. Trend: From 98 to 300 projects
Target 2 By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.		-Indirect coverage in hectares of globally significant landraces (traditional varieties) that project is influencing. Trend: Baseline: 4,340,000 hectares in 2015. Project end target: The coverage of traditional agriculture is maintained. -The National Development Plan (NDP) incorporates agroBD in one or more objectives, strategies or lines

Aichi Biodiversity Target	Project Outcomes and Outputs	Selected SMART Indicators
Target 3 By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socioeconomic conditions.		of action. Trend: From NDP 2013-18 (agroBD not considered) to NDP 2019-24 (agroBD incorporated) -No of sectoral programmes incorporating agroBD in one or more objectives, strategies or lines of action. Trend: From 0 to 4 programs
Target 18 By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.		
Target 1 By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	**1.1.3**	-Level of awareness about the economic and non-economic values of agroBD among project stakeholders, measured through an AgroBD Value Awareness Index to be developed by the project. Trend: From baseline 30 points (as an example) to final target 80 points (from 100) on the agroBD value awareness index in the project implementation areas.

1.4 LESSONS LEARNED

Within the design process of the present project, lessons were learned from various programs and projects in Mexico and other countries. The projects that have a strong methodological and strategic affinity to this agrobiodiversity conservation project are:

CONABIO has extracted lessons from the following projects, which are being considered in the design of the present GEF proposal:

i. *The Global Maize Project*: Compilation, updating, and analysis of information on maize genetic diversity and their wild relatives in Mexico was implemented in 2006-2010. It was financed by SEMARNAT, CONABIO, SAGARPA and the Inter-sectoral Commission on GMOs (CIBIOGEM). The project had 3 transversal action lines: i) generating documents about centres of origin and genetic diversity of maize; ii) computerizing scientific collections of native maizes, teocintles, and tripsacum; iii) generating knowledge on native maize diversity including its wild relatives and current distribution. As a result, the project generated the most complete information set that currently exists in terms of the status of the genetic reserve of maize in Mexico.

ii. *The Centres of Origin Project* and other baseline generating projects have been developed since 2008. These efforts have been mainly financed by the General Direction of the Primary Sector and Renewable Natural Resources (DGSPRNR, SEMARNAT) and technically supported by CONABIO. The objective was to know the status of selected crop genera in centres of origin and genetic diversity. Projects were financed to study the following genera: *Amaranthus, Capsicum, Carica, Ceiba, Cucurbita, Sechium, Gossypium, Tagetes, Opuntia, Persea, Physalis, Vanilla* and *Zea*.

iii. Local uses and consumption preferences as diversity factors of native Maizes in Oaxaca (2014-2016). Ethnographical work was performed relating native landrace preferences and *in situ* conservation with local uses and consumption to conservation.

iv. Monitoring of landraces and geographical lineages of maize in Mexico using a genomic approach. This project has been an ongoing effort since 2008 to characterize landraces by generating genetic and genomic data and linking it to morphological characteristics from a geographical perspective.

v. The *Complementary Actions to PROMAC* (ACP). The ACP project gathered working groups that have followed different approaches in diverse regions of the country, for *in situ* conservation of agrobiodiversity.

The following is a summary of lessons learned through these projects:

- ✓ Collaboration with researchers and their working groups, throughout academic institutions in the country, has been key to achieve progress during project implementation;
- ✓ The available information level may considerably vary from one plant genus to another. This includes the knowledge on the intra- or inter-specific diversity (existence, characterization of local landraces or variants), uses and management systems. This difference depends on the quantity of previous works and the number of research groups dedicated to the study of each plant genus in the country.
- ✓ Much has been advanced in relation to data gathering and genetic resources collecting, but in a centre of origin and genetic diversity of numerous and extremely relevant crops for food and agriculture, much still remains to be explored and put publicly in adequate databases.
- ✓ Although Mexico has invested more than a century in studying the genetic diversity of agricultural species and their wild relatives, the totality of species is still unknown as well as their distribution, ecology, uses, among other features[69].
- ✓ The way to solve agrobiodiversity conservation needs might follow particular approaches depending on the country region considered, although there is indeed a synergic effect of promoting the exchange of field experiences between the different involved actors.

The GEF-FAO project "Conservation and Sustainable Management of Below Ground Biodiversity" in which Brazil, Côte d'Ivoire, Indonesia, India, Kenya, Mexico and Uganda participated, offers the following lessons learned relevant to the project:

- ✓ The participation of universities and academic institutes encourages scientific research into the subject and adds sustainability to projects, because the scientists' research projects are long-term.
- ✓ Remote project sites are less effective for demonstration purposes than those closest to populated areas.
- ✓ Agro productive projects must ensure constant and close agricultural assistance to producers.

[69] See as examples the studies: J. J. Sánchez G. et al, 2011: http://www.amjbot.org/content/98/9/1537.full.pdf+html?sid=fa0bbdd2-a38b-484e-bcf1-32adeb663d19; and Acevedo et al., 2011: http://www.nature.com/nbt/journal/v29/n1/full/nbt.1752.html

- ✓ To gain the support of the local population, biodiversity conservation projects such as this one must create strong links with people's needs (i.e., soil fertility, productivity, public health, drinking water and so on).
- ✓ In future projects of this type, environmental education should be included as an essential subcomponent. This could serve as an effective mechanism for raising awareness and promoting the project.

Lessons were also extracted from the following **FAO** projects described before under subsection “Market oriented conservation efforts” (p. 23-25).

i) *Creating short-circuits of marketing of ecological and traditional agricultural products from the southern part of Mexico City* (2015-2017)
ii) *Developing short circuits schemes of ecological agricultural products in Mexico* (2015-2017)
iii) FAO and UNEP project *Sustainable Food for the Mexico City,* financed by the Government of Mexico since 2014 FAO-SAGARPA project *Special Programme for Food Security (PESA)*
iv) FAO´s *Globally Important Agricultural Heritage Systems* (GIAHS)[70]

Lessons learned through these programs are:

FAO has worked through the **PESA** Programme since 2003 with SAGARPA in promoting sustainable soil management to ensure that native seeds can give yields to farmers, because otherwise they may feel incentivized to change system and abandon the milpa. FAO has been supporting traditional farmers in improving their resilience to climate change and adopt preventive measures, especially regarding soil management, to avoid productivity decreasing and traditional system abandonment (i.e. agrobiodiversity loss). Furthermore, the project is supporting the exchange of experiences between communities living in different zones of the country, as PESA has shown this is really enriching for farmers. Lessons learned in particular are:

- ✓ Capacity-building at household and community levels (producer groups), rather than with individual farmers, enabled sustainable food production systems to be achieved.
- ✓ Awareness-raising in nutritional education promoted production for family self-consumption and for local markets.
- ✓ Strengthening of local markets made the economy of marginalized rural communities more dynamic.
- ✓ The productive models promoted must fit local resource availability conditions, the interests of producers and household needs.
- ✓ The productivity of Production Units can be increased through the proper use of local inputs with a holistic approach.
- ✓ Rural Development Agencies are stakeholders that facilitated community planning and organization.

The **Mexico Mesoamerican Biological Corridor project**, which has been operational since 2002 in 9 biological corridors located in connectivity areas between protected areas in the states of Yucatan, Quintana Roo, Campeche, Chiapas, Tabasco and Oaxaca. Its aim is to strengthen local capacity in biodiversity conservation and the sustainable use of natural resources. To do this, it seeks to create and consolidate comprehensive models to stop the expansion of the agricultural frontier, protect forests and forest remnants and adopt strong measures against the phenomenon of climate change. One of the most *important lessons learned from the project experience* refers to

- ✓ the importance of having local agencies that act as a hinge between federal programs and local communities, supporting state and local authorities in their efforts. These agencies have the task of constantly managing different government sectors for the coordinated and concerted

[70] http://www.fao.org/giahs/en/

use of resources and to respond to local territorial development strategies that have previously been agreed with communities[71].

The **Mixteca GEF Project** (*Integrating Trade-offs between Supply of Ecosystem Services and Land Use Options into Poverty Alleviation Efforts and Development Planning*), implemented between 2010 and 2014 by the UNEP and the World Wide Fund for Nature (WWF), had as its central objective the integration of biodiversity conservation in the use of natural resources and development planning in the Mixteca region, through the use of ecosystem services and tools and offering options for sustainable livelihoods. The main lessons learned in relation to project implementation strategies are as follows:

- ✓ There should be a functional organizational structure where all partners involved in the project can participate with the institutions that come together in the work area to promote inter-institutional synergy and ensure that project activities are relevant and consistent with their respective thematic areas.
- ✓ To facilitate work at the local level and strengthen operational capacity in the region, field offices should be established in strategic zones in the area of implementation.
- ✓ It is important that the teams have sufficient experience and knowledge in the area of implementation and that they are recognized at the local level by the communities in order to accelerate implementation and results.

1.5 STRATEGIC ALIGNMENT

1.5.1 Consistency with national development goals and policies

The project is aligned with:

i. ***National Strategy on Mexican Biodiversity and 2016-2030 Action Plan***, particularly in three lines of action: (1) the inclusion of sustainable agricultural practices incorporating traditional knowledge and good practices (Line of Action 3.2.4); (2) adaptation to climate change through *in situ* and *ex situ* conservation of genetic agrobiodiversity reserves present in the country (Line of Action 4.6.1) and (3) the establishment and updating of training programmes for decision-makers or covering issues associated with agrobiodiversity and its relationship to human rights (Line of Action 5.2.4)

ii. ***Integration Strategy for the Conservation and Sustainable Use of Biodiversity (2016-2022)***, particularly the section corresponding to the farming sector, which states that: (1) government actions will seek to take into account the traditional knowledge of indigenous people and local communities, (2) the government will promote schemes such as stamps, certifications, collective marks, among others that take into consideration criteria for the sustainable use of agrobiodiversity, (3) ecosystem service payment programmes for rural production units will be assessed and established; (4) the concept of biodiversity as well as principles, criteria and incentives for the sustainable management and use of biodiversity will be included in sectoral planning instruments, (5) the establishment of education and awareness campaigns for producers and technicians as well as for public officials will be promoted, (6) financial resources will be managed for the sustainable use and management of biodiversity, (7) a national system of genetic resources for food and agriculture will be established and (8) a law on agricultural genetic resources will be drawn up and proposed in accordance with the Nagoya Protocol.

[71] For more information see: http://www.biodiversidad.gob.mx/corredor/cbmm/cbmm.html

iii. The ***National Development Plan 2013-2018,*** transversal approach (iv) Prosperous Mexico: (Objective 4.10) "To construct a productive agricultural and livestock production sector that guarantees the food security of the country"; (Strategy 4.10.4) "To drive the sustainable use of the natural resources of the country", and in its Action Line: "To establish instruments to rescue, conserve and strengthen genetic resources".

iv. The ***Environment and Natural Resources Programme 2013-2018***, its Objective 4: "To recover the functionality of basins and landscapes through conservation, restoration and sustainable use of the natural heritage", Strategy (4.3) "To promote the sustainable use of the natural heritage in priority regions for conservation and/or with marginalized and impoverished inhabitants", and (4.5) "To promote the integration of different conservation schemes, promote good productive practices and sustainable use of the natural heritage".

v. The ***Sectoral Programme of Agricultural and Livestock Production, Fisheries and Food 2013-2018***, National Goal: Prosperous Mexico (Objective 4) "To drive the sustainable use of the natural resources of the country", and its Strategy 4.3: "To establish instruments to rescue, conserve and strengthen genetic resources"; in Action Line: (4.3.1.) "To promote the conservation and use of genetic resources, as well as conserve natural protected areas", (4.3.2.) "To articulate public and private institutions in order to characterize and legally protect strategic genetic resources for the food and industrial sector", (4.3.3.) "To develop research on non-traditional genetic resources in order to identify new uses", and (4.3.4.) "To generate new value chains based on local genetic resources".

vi. The ***Presidential Programme of the National Crusade against Hunger***, especially in its strategic axe: "Increasing Food Supply and Productive Inclusion".

vii. The work of the ***Commission on Genetic Resources for Food and Agriculture*** (CGRFA), hosted by FAO. Mexico periodically submits a national report on the status of its PGRFA, which is used by FAO to prepare its periodic Report on the State of the World´s Plant Genetic Resources for Food and Agriculture, a document that reflects the global situation of this theme. The present project will enhance the capacity of Mexico to implement the Second GPA and report periodically on the progress as a contribution to the *Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture* envisaged to be published in about five years' time.

viii. The ***National Cuisine Promotion Policy***. The Mexican Presidency has implemented inter-institutional and multidisciplinary work at all levels with the aim of promoting the national cuisine that we recognize as Mexican and world heritage. CONABIO is also contributing its efforts to link Mexico's biological heritage, including its genetic resources, with its cultural heritage, including traditional cuisine.

1.5.2 Consistency with national communications and reports to the United Nations Convention to Combat Desertification, Convention on Biological Diversity, Stockholm Convention on POPs, United Nations Framework Convention on Climate Change (as applicable).

The ***5^th^ National Report to CBD*** **(2014)** which recognizes the need for setting efficient mechanisms or tools that generate updated and systematized information on genetic diversity of native species, in coordination with academic centres. In addition, the Report indicates that the role of scientific institutions and entities financing research needs to be strengthened to better inform decision-making processes and public policies design. The Report considers as urgent the need of conducting periodic assessments on the sustainability level of agrobiodiversity resource use, given that information about the production and consumption cycles is neither systematized nor clear. This project is also aligned with the CBD Decision XI/5 Financial Mechanism / Global Strategy for Plant Conservation.

1.5.3 Consistency with GEF focal area

The project will contribute to **Programme 7, Objective 3 of the GEF Biodiversity Focal Area** by promoting biodiversity mainstreaming in agriculture while increasing the genetic diversity of globally significant cultivated plants, wild relatives and associated species in a Vavilov Centre of diversity as Mexico.

The present project is consistent with key directions given under this Program, by:

- focusing its support on *in situ* conservation, through farmer management, which allows continuing evolution and adaptation of cultivated plants and domesticated animals;
- meeting the needs of rural communities, including indigenous peoples and local communities, especially women, who often depend on agricultural biodiversity for their livelihoods through its contribution to food security and nutrition, medicines, fodder, building materials and other provisioning services as well through support for ecosystem function.

The design of **component 2** of this project "Strengthening of local capacities for agrobiodiversity conservation and sustainable use" is aligned with Programme 7 orientations through:

- maintaining and strengthening different production systems and their elements, including agriculture practices based on local and traditional knowledge, that allow continued evolution and adaptation;
- strengthening capacity of the agricultural development, extension and research communities and institutions that are needed for *in situ* conservation, so that agricultural biodiversity is embedded adaptation to climate change;
- strengthening the capacities of community and smallholder organizations, and farmers (both men and women) to participate in the identification, development, and implementation of long-term plans and actions for agroBD conservation and sustainable use.

In accordance with Programme 7, Objective 3 of the GEF Biodiversity Focal Area Component, project **component 3:** "Improvement of public policies" will develop or influence policies, strategies, legislation, and regulations that shift the balance in agricultural production in favour of diversity rich approaches. These include support for the adoption of appropriate fiscal and market incentives to promote or conserve diversity on-farm and across the production landscape.

Component 4 "Valuation of agrobiodiversity by consumers and market linkages" is consistent with Programme 7 by linking genetic diversity maintenance to improved food security and economic returns for rural communities and farmers, by enhancing marketing of agroBD products through new strategies of agroBD valuation and market incentives.

1.5.4 Consistency with FAO's Strategic Framework and Objectives

This project is in line with the FAO Strategic Framework (2014-2019), particularly with Strategic Objective 2 (SO2): *Increase and improve provision of goods and services from agriculture, forestry and fisheries in a sustainable manner*: Output 2.1: Producers and natural resource managers adopt practices that increase and improve the provision of goods and services in agricultural sector production systems in a sustainable manner; Output 2.2: Stakeholders in member countries strengthen governance – the policies, laws, management frameworks and institutions that are needed to support producers and resource managers – in the transition to sustainable agricultural sector production systems. Strategic Objective 4 (SO4) Enable more inclusive and efficient agricultural and food systems; Output 4.2: Agribusinesses and agrifood chains that are more inclusive and efficient are developed and implemented by the public and private sectors. And Strategic Objective 5: Increase the resilience of livelihoods to threats and crises: Output 5.3 Countries reduce risks and vulnerability at household and community level.

Similarly, the project is consistent with FAO regional priorities for Latin America and the Caribbean[72], aligning with the priority area *Climate change and environmental sustainability*: [assist Governments to] *strengthen national programs for the sustainable management of natural resources, reduce agro-climatic risks, mitigate emissions and adapt the agricultural sector to climate change, in the new context of low-carbon development.*

Finally, the project is aligned with FAO's Country Priority Framework for Technical Assistance, particularly with priorities B. Cooperation in the formulation and evaluation of policies and the implementation of public programs to make the Mexican countryside more productive; and C. Supporting environmental sustainability, resilience and the green economy as tools against climate change and other risks and extraordinary events.

In addition, the project will generate co-benefits for the International Treaty of Plant Genetic Resources for Food and Agriculture, hosted by FAO.

[72] See *Areas of Priority Actions for Latin America and the Caribbean for the Following Biennium (2014–2015), taking into account the summary of recommendations of regional technical commissions*, 32nd FAO Regional Conference Latin America and the Caribbean. Buenos Aires, Argentina, 2012.
Source: http://www.fao.org/docrep/meeting/024/md240e.pdf

2.1 ENVIRONMENTAL AND SOCIAL SAFEGUARDS

According to FAO´s *Environmental and Social Management Guidelines*[73], the proposed project is classified within the category Moderate. A full Environmental and Social Analysis has been carried out during project preparation. The Environmental and Social Screening is attached in Appendix 5. A summary of the main risks identified and related mitigation plan is outlined in Table 8.

Table 8. Environmental and Social Risk Management Plan

Risk identified	Risk Classification	Risk Description in the project	Mitigation Action (s)	Progress on mitigation action	Indicators
The project may involve access to genetic resources for their utilization and/or access to traditional knowledge associated with genetic resources that is held by indigenous, local	Moderate	Project Component 1 focuses on consolidation of an information system for national AgroBD. There is a shared discomfort around the idea that the visibilization of traditional knowledge, in particular their genetic resources, will make their communities more vulnerable to extraction. Indigenous groups are present in most project locations. One potential risk of implementing the project is that their traditional knowledge base will be made more visible and	Stakeholders of all sectors have expressed interest in better understanding how to sensibly share genetic resources and traditional knowledge of their communities, in a way that it will make them more resilient, not more vulnerable. In order to mitigate this risk it is important to provide all stakeholders with information and tools to deepen their understanding of agroBD and to transmit it to others within their communities.		1. ABS Trust Index 2. Number of socio-cultural and benefit sharing protocols

[73] http://www.fao.org/environmental-social-standards/es/

Risk identified	Risk Classification	Risk Description in the project	Mitigation Action (s)	Progress on mitigation action	Indicators
communities and/or farmers.		accessible to others outside their communities and thus more vulnerable to outside appropriation without securing adequate benefit sharing.	In accordance to FAO directives, a thorough Free Prior and Informed Consent (FPIC) process has begun in some project´ communities and it will be conducted from the start-up of project implementation in all of them In addition, capacity development on access and benefit sharing will be key in the project implementation. To this aim, the project will operate in close coordination with the UNDP/GEF project "Strengthening of National Capacities for the implementation of the Nagoya Protocol on Access to Genetic resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity". Within this partnerships, the UNDP project will further support the consultation processes started in AgroBD Project in several communities, taking advantage of the drafted community procedures for access to genetic resources and benefit sharing they developed.		

Risk identified	Risk Classification	Risk Description in the project	Mitigation Action (s)	Progress on mitigation action	Indicators
			Together with the GEF project on ABS, we will conduct some actions related to Biocultural Protocols in some of the implementing areas of the AgroBD project, and in others guidance will be provided by them (ABS project). In order to commence the consultation processes, the starting point of the collaboration will be the design of written and audiovisual material with information of the project, its scope and objectives, in the appropriate language targeted to each social group to be consulted. The basic themes to be addressed besides the project itself will include: 1.-Introduction to access and benefit sharing; 2.- Traditional Knowledge; 3.- Use of genetic resources; 4.- The Nagoya Protocol on Access and Benefit Sharing; 5.- National Implementation; 6.- Access to and sharing of the benefits; 7.- The Bonn guidelines. Once the information material is available, the consultation processes will begin for each community in which implementation will take place.		

Risk identified	Risk Classification	Risk Description in the project	Mitigation Action (s)	Progress on mitigation action	Indicators
			Specific agreements are expected to be achieved with each community with respect to traditional knowledge information (and its management thereof) as well as with respect to the genetic resources specific to the project. These agreements will be registered in the Biocultural Protocols to be elaborated under these procedures, and for which in this specie case concern agrobiodiversity. This project also strongly builds upon lessons learned from the Biodiversity Governance Project funded by the German Federal Ministry for Economic Development and Cooperation (BMZ) and implemented by the Deutsche Gesellschaft fuer internationale Zusammenarbeit (GIZ) together with CONABIO and SEMARNAT. Finally, it is anticipated that the governance of the SIAgroBD information system —component 1— will be transparent and participative, implying that new accessions resulting from project activities will be disclosed to all participating indigenous		

Risk identified	Risk Classification	Risk Description in the project	Mitigation Action (s)	Progress on mitigation action	Indicators
			communities periodically, in accordance with the risk mitigation progress monitoring strategy.		
Existing gender inequalities in terms of men's and women's participation in decision making and/or their differential access to productive resources, services and markets	Moderate	The role of women in terms of access to and control over productive resources and services is not equitable in project targeted communities. The participation in stakeholder consultations was equitable but some concerns were voiced around the promotion of women participation in the project. Women play a crucial role in the use and conservation of agroBD due to their importance in culinary traditions as well as medicinal practices, but this is often pushed to the background where the access to and control over productive resources and services is harder. There is a loophole associated with the issue of land tenure rights, which centers on the lack of recognition of women's rights in the context of the Mexican Agrarian Law with regards to the definition of the rights of *ejidatarios* and	To mitigate this risk the project is designed to ensure that the various components focus on actions and processes aimed at the participation and empowerment of women. Since its conception the project has been based on the assumption that the role of women in aspects of agrobiodiversity is fundamental and overriding because women contribute in some way when deciding on the crops and landraces to be grown due to their experience and preferences in food preparation. Women also participate by maintaining a group of species and varieties with culinary, medicinal and other properties in more domestic cultivation settings that are under their control, such as home gardens or backyards. In other words, women play an important role in conserving agrobiodiversity. However, we realize that the role of women has changed in the new social contexts (migration, dietary changes		1. Participation index of women

Risk identified	Risk Classification	Risk Description in the project	Mitigation Action (s)	Progress on mitigation action	Indicators
		comunales. Without specific legal recognition of the rights of women as lawful owners and users, there is little legal obligation or recourse to include them in discussions concerning ABS, ultimately increasing women's vulnerability	and so on) and this project therefore aims to find out exactly how the role of women has changed and document this change with the aim of influencing their empowerment. Thus, in Component 1, Information and Knowledge, one of the approaches is to understand the role of women in promoting knowledge of agrobiodiversity in order to use this as a basis for specific reinforcement actions. In Component 2, Strengthening Local Capacities for the Conservation and Sustainable Use of Agrobiodiversity, specific actions are planned to empower women and young people. In Component 3, Public Policy Improvement, the project is tasked with encouraging strategic project partners to design programmes that will stimulate and add value to women's participation in aspects of agrobiodiversity. Lastly, Component 4, Development of Agrobiodiversity by Consumers and Value Chains, seeks to promote markets for agrobiodiversity products where women have great potential for		

Risk identified	Risk Classification	Risk Description in the project	Mitigation Action (s)	Progress on mitigation action	Indicators
			joining cooperatives and entering local, regional and national markets, thus boosting household income through women. It is worth mentioning that the operating rules of most programmes submitted by strategic partners offering co-financing for the project prioritize women's participation in proportions ranging from 30% to over 50% depending on the programme concerned. These provisions are designed to ensure that women will participate significantly in project actions within roles that in turn incorporate other emerging roles, which will be encouraged., as is being heads of family as a result of men migrating. Once the project gets under way, the M&E consultant will support the setting up of an Index that will measure women's participation in the various processes and actions carried out by the project.		

Risk identified	Risk Classification	Risk Description in the project	Mitigation Action (s)	Progress on mitigation action	Indicators
Indigenous peoples living in the project area	Moderate	As indigenous communities have been vital in the preservation of the targeted cultivars, they often sit in agroBD hotspots. The following Indigenous peoples have been identified: Mixteco, Chinanteco and Chapino in Oaxaca; Rarámuri in Chihuahua; Purépecha and Mazahua in Michoacan; Zoques and Tzotziles in Chiapas.	**Free, Prior and Informed Consent** (FPIC) will be implemented throughout the project life cycle and will include all concerned communities in accordance with FAO Policy on Indigenous and Tribal People and following the guidelines of the Free, Prior and Informed Consent Manual. The first two steps of of FPIC started during full project preparation in some communities: (1) *Identify the Indigenous Peoples' concerns and their representatives* and (2) *Document geographic; and demographic information through participatory mapping*. . Project activities were agreed upon taking into consideration communities' concerns and needs and as a result of a series of participatory workshops held during project preparation. Steps (3) *Design a participatory communication plan and carry out iterative discussions through which project information will be disclosed in a transparent way;* and (4) *Reach consent, document Indigenous*		1. Reports documenting the agreements reached with indigenous people, including a complaint mechanism (one per community). 2. Indicators for the monitoring of the agreements included in the project M&E system and evaluated each PPR and PIR.

Risk identified	Risk Classification	Risk Description in the project	Mitigation Action (s)	Progress on mitigation action	Indicators
			Peoples' needs that are to be included into the project, and agree on a feedback and complaints mechanism will be finalized at project inception with all the communities involved. Step (5) *Conduct participatory monitoring and evaluation of the agreement* will be implemented throughout the life of the project, while Step (6) *Document lessons learned and disclose information about project achievements* will be undertaken in PY 5. Sufficient resources for the implementation and monitoring of the process have been foreseen in the project budget.		
Some of the Project's implementation areas are located in Natural Protected Areas	Low	Some of the areas of the implementation of the project are located within natural protected areas, mainly in the state of Chiapas (*e.g.* Reservas de la Biosfera el Ocote, y la Sepultura). According to UICN, the protection category that corresponds to these areas is number VI (Sustainable use of natural resources), mainly due to the fact that the potential areas for the project implementation	From the beginning on, the presence of officials from the National Commission of Natural Protected Areas (CONANP) within the regions of implementation of the Project has been promoted. They have participated in the starting and validation workshops, as well as in 3 of 4 regional workshops (*i.e.* Chihuahua, Oaxaca and Chiapas). The reason for including them in these workshops is to introduce them to the purpose and aim of the Project as well as		1. Integration of actions index 2. Annual report of conjoint activities with CONANP and their partners within natural protected areas.

Risk identified	Risk Classification	Risk Description in the project	Mitigation Action (s)	Progress on mitigation action	Indicators
		are located within the buffer zones, were traditional economic activities are allowed. Eventually, the inclusion of other protected areas in the states of Michoacán, Guerrero and Chihuahua, might also be considered. The potential environmental impact of the project however is difficult to assess in spite of the fact that the activities proposed by the project do not involve further transformation of the already human-modified landscape or any further loss of diversity. On the contrary, the aim of the Project is to foster a greater diversity of cultivars and native landraces, and to generate synergies with other related actions already under way in some of these areas.	establishing a link between these officials and the diverse GEF projects. The mentioned GEF projects include the following: **GEF Project #5751**, Maintaining and Increasing Carbon Stocks in Agro-silvopastoral Systems in Rural Communities of the Selva Zoque - Sumidero Canyon Complex as a Climate Change Mitigation Strategy. Its objective is to maintain and increase carbon stocks (through avoiding deforestation in natural ecosystems) and to reduce greenhouse gas emissions and increase carbon sequestration. This project is implemented by Conservation International, Cooperativa AMBIO and CONANP, same partners as in the Selva El Ocote project. A mechanism of cooperation with this project will consist in exploring together how agroBD species conservation and sustainable use efforts can be included in a feasible way in climate change mitigation policies and programs. **GEF Project #4883,** Integrating the Management of Protection and Production Areas for Biodiversity		

Risk identified	Risk Classification	Risk Description in the project	Mitigation Action (s)	Progress on mitigation action	Indicators
		A potential risk of the implementation of the Project might involve the increase of the area dedicated to agriculture. However, this is considered highly unlikely. In fact, projects that promote agrobiodiversity tend to stabilize agricultural areas and improve the sustainable use of natural resources.	Conservation in the Sierra Tarahumara of Chihuahua, implemented by UNEP. This is a comprehensive project executed by CONANP and WWF Mexico/MAR, which aims at developing and implementing a participatory strategy to sustainably conserve biodiversity engaging communities, government and NGO participation. Opportunities for cooperation with this project have been visualized regarding the exchange of experiences and lessons learned about: - The involvement of project stakeholders in generating and using BD information systems (the SIAgroBD of this project and the Data Monitoring and Information System -DM&IS- of the Tarahumara project); - Capacity strengthening of local stakeholders for conservation and sustainable use of BD in selected sites. - Project impact on public policies with an environmental governance approach involving communities. **GEF Project # 9445**, Conservation and Sustainable Use of Biological Diversity in Priority Landscapes of Oaxaca and Chiapas, implemented by CI. This is a project implemented by the Commission of Natural Protected Areas – Southern Border, Isthmus and South Pacific Region		

Risk identified	Risk Classification	Risk Description in the project	Mitigation Action (s)	Progress on mitigation action	Indicators
			(CONANP) and Conservation International Mexico, A.C. (CI Mexico). Its objective is to strengthen the conservation of globally significant biodiversity in the National System of Protected Areas and corridors, through integrated management of priority coastal, marine and terrestrial landscapes of Oaxaca and Chiapas, Mexico. The AgroBD CONABIO Project will develop mechanisms of cooperation within Components 2, to exchange the territorial approach to biodiversity conservation experiences and lessons learned that are related to the BD focal area. In sum, the mitigation actions proposed to reduce this risk involve the integration of the activities of the Project with those already implemented by CONANP and their partners. In this way, the corresponding environmental safeguards will be taken care of. To secure the integration of actions during the M&E design stage, an indicator that measures the compatibility of the proposed actions with those implemented by CONANP and their partners will be constructed.		

Risk identified	Risk Classification	Risk Description in the project	Mitigation Action (s)	Progress on mitigation action	Indicators
			In addition to this indicator, an annual report of the conjoint actions implemented by this Project and CONANP will be provided.		

2.2 RISK MANAGEMENT

Project risks have been identified and analysed during the preparation phase and mitigation measures have been incorporated into the design of the project (see the Risk Matrix in Appendix 4). With FAO support and supervision, the Project Steering Committee will be responsible for the management of such risks as well as the effective implementation of mitigation measures. A Monitoring and Evaluation (M&E) System will serve to monitor performance indicators and outputs, project risks and mitigation measures. The Project Steering Committee will also be responsible for monitoring the effectiveness of mitigation measures and adjusting mitigation strategies as needed, and to identify and manage any new risks that were not identified during the project's preparation, in collaboration with project partners.

The Project Progress Reports (PPR) are the main instrument for monitoring and risk management. PPRs include a section covering the systematic monitoring of risks and mitigation actions that were identified in previous PPRs. PPRs also include a section to identify new risks or risks that have yet to be addressed, their classification and mitigation actions, as well as those responsible for the monitoring of such risks and their estimated deadlines. FAO will monitor the project's risk management closely and will follow up as needed, lending support for the adjustment and implementation of mitigation strategies. Reports on the monitoring of risks and their classification will also be part of the Annual Project Implementation Review (PIR) prepared by FAO and submitted to the GEF secretariat (see section 3.5.3).

2.3 ANALYSIS OF FIDUCIARY RISKS AND MITIGATION MEASURES

The project will be implemented through the OPIM – Operational Partner Implementation Modality. The selected Operational Partner is PROFONANPE. An Operational Partner Assessment has been carried out during project preparation, the overall risk is low. The table below summarizes the main risks and gaps identified, related mitigation measures and assurance activities to be implemented during the life of the project. The Risk Mitigation and Assurance Plan will be reviewed annually.

Table 9. Risk Mitigation and Assurance Plan

Risks identified	Risk mitigation measures and actions for correction	Responsible for follow-up
Fixed assets and inventory: The fixed asset register needs to be reconciled to the control accounts with greater frequency. Physical assets counts should also be performed more than once per annum. There is no system in place at the OP to ensure the safeguarding. *Risk assessment*: **Significant**	Given the significant risk associated to this particular topic, every time an equipment or fixed asset is to be acquired the following information will be required: type of equipment, brand, specifications, adjuncts, software (if applicable), reason for the purchase (even if previously planned during the elaboration of the PRODOC) and procedure (with a description of the steps taken). This requisite is aimed at generating a registry or inventory of all assets acquired during the project. Additionally, an annual visit to the field is planned to verify the adequate use of the equipment and fixed assets purchased. A biannual report with a listing or inventory about the equipment or fixed assets acquired, its location and information about their responsible custodians must be provided along with reports of the disbursement requests.	**FAO Mexico through the operations area.**

Organisational structure and staffing: There is no documented human resources policy or equivalent manual / procedures handbook circulated to employees detailing specific reporting lines; and the rules / regulations that employees are required to follow in their specific line of work. *Risk assessment*: **Low**	FAO will be involved in the hiring process and selection of the individual consultants, as well as in the previous revision of the Terms of Reference (TOR) and Curriculum Vitae (CV) of the potential candidates.	**FAO Mexico through the operations area in conjunct with the human resources area and the representative assistant of the Program.**
Programme management: The OP lacks procedures to identify potential risks posed to programme delivery. For example, conflict of interest forms are not checked or updated prior to the signing of project contracts. *Risk assessment*: **Low**	A monitoring committee of the project (MCP), that includes FAO and the Operation Partner (OP), will be held periodically (proposed to be trimestral) to review the physical and financial progress of the project, as well as the work plans and administrative actions required for each period. It should indicate the procedure to follow on part of the OP, with guidance on part of FAO, if necessary.	**FAO Mexico through the operations area with the participation of the areas designed by the committee.**
Accounting policies and procedures: The OP needs to document its payment approval procedures and should evidence on the invoice when it has been physically paid. Stronger controls are required to record the hours worked by all employees. There is also no evidence of an internal audit function. *Risk assessment*: **Low**	The expected outcome is the identification on part of the OP of the appropriate measures to implement in order to improve its procedures with the consultants working for the project during the term of its implementation.	**FAO Mexico through the operations area with the support of the administration area.**

SECTION 3 – IMPLEMENTATION AND MANAGEMENT ARRANGEMENTS

3.1 INSTITUTIONAL ARRANGEMENTS

The Food and Agriculture Organization (FAO) will be the GEF Implementing Agency for the Project. The project will be executed by CONABIO which will be the project "Operational Partner" (OP) in line with FAO rules and regulations on indirect implementation of projects. CONABIO will be accountable to the Government of Mexico and FAO for the quality and timely achievement of project results, the appropriate use of project resources entrusted to it by FAO, both when directly implementing project activities and when delegating others to do so. CONABIO will ensure that project planning, review, monitoring and reporting requirements are met; that coordination among participants is effective; and that decisions are implemented. CONABIO is responsible for ensuring that outputs and outcomes are produced on time and are of good technical quality. CONABIO will manage the budget, achievement of results and progress monitoring in full compliance with terms and conditions of the Operational Partners Agreement that will be signed between CONABIO and FAO and other FAO requirements. FAO will closely monitor the project implementation, monitor compliance of the OP with provisions of the OPA and provide overall guidance and technical support to the OP.

CONABIO will also ensure the overall coordination of the project implementation, as well as coordination and collaboration with partner institutions, local governments and community-based organizations, academia and private sector, and other entities participating in the project.

In close coordination with FAO, CONABIO will lead the technical implementation of the four project components. CONABIO will be responsible for the day-to-day management and implementation of the agreed project components in full compliance with the signed Operational Partners Agreement and the Project Document, as well as the follow-up on the co-financing commitments made by the project partners during project formulation. A National Project Director (NPD) will be hired by CONABIO, in consultation with FAO, for carrying out the above-mentioned tasks. See Appendix 6 for the detailed NPD Terms of Reference (TORs). The PD will inform periodically, but not less than twice a year, the National Coordination of CONABIO and the Project Steering Committee on the achievements and obstacles that the Project has faced related to project implementation and financing.

In addition, the main institutions involved in the project are the Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA), the Secretariat of Environment and Natural Resources (SEMARNAT), the Secretariat of Social Development (SEDESOL), and the National Commission for the Development of Indigenous Peoples (CDI). Local partners include the Government of the State of Yucatan – through the Secretariat of Urban Development and Environment (SEDUMA) – and the Government of Mexico City – through the Authority of the World Cultural and Natural Heritage Site of Xochimilco, Tlahuac y Milpa Alta (AZP), between other.

FAO, CONABIO and the project partners will collaborate with the implementing agencies of other programs and projects to identify opportunities and facilitate synergies with other relevant GEF projects, as well as projects supported by other donors. This collaboration will include: (i) informal communications between GEF agencies and other partners in implementing programs and projects; and (ii) exchange of information and outreach materials between projects. The project will also develop collaboration mechanisms with the initiatives led by Civil Society Organizations (CSOs) described in Table 5 of this Project Document.

The project will develop mechanisms for collaboration with the following GEF initiatives:

1. GEF Project #4883, Integrating the Management of Protection and Production Areas for Biodiversity Conservation in the Sierra Tarahumara of Chihuahua, implemented by UNEP. This is a comprehensive project executed by CONANP and WWF Mexico/MAR, which aims at developing and implementing a participatory strategy to sustainably conserve biodiversity engaging communities, government and NGO participation. It addresses GEF BD focal area objectives. Opportunities for cooperation with this project have been visualized regarding the exchange of experiences and lessons learned about:

- The involvement of project stakeholders in generating and using BD information systems (the SIAgroBD of this project and the Data Monitoring and Information System -DM&IS- of the Tarahumara project);
- Capacity strengthening of local stakeholders for conservation and sustainable use of BD in selected sites.
- Project impact on public policies with an environmental governance approach involving communities.

2. GEF Project #5751, Maintaining and Increasing Carbon Stocks in Agro-silvopastoral Systems in Rural Communities of the Selva Zoque - Sumidero Canyon Complex as a Climate Change Mitigation Strategy, implemented by Conservation International (CI). This is a project implemented by Cooperativa Ambio S.C. de R.L. (AMBIO) and CONANP. Its objective is to maintain and increase carbon stocks (through avoiding deforestation in natural ecosystems) and to reduce greenhouse gas emissions and increase carbon sequestration (adopting sustainable management practices in agro-pastoral systems) in the Selva Zoque – Sumidero Canyon Complex. It addresses CC focal area objectives. A mechanism of cooperation with this project will consist in exploring together how agroBD species conservation and sustainable use efforts can be included in a feasible way in climate change mitigation policies and programs.

3. GEF Project #5738, Strengthening of National Capacities for the Implementation of the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity, implemented by UNEP. This is a comprehensive proposal implemented by SEMARNAT, CONABIO, IMPI and CDI. Its objective is to enhance in Mexico in a participatory manner, the capacities of national authorities (SRE, SEMARNAT, SAGARPA, CDI, SE), as well as the legal and administrative framework in relation to genetic resources, associated traditional knowledge and benefit-sharing, according to institutional conditions for the implementation of the Nagoya Protocol on Access to Genetic resources and the Fair and Equitable Sharing of Benefits Arising From their Utilization to the Convention on Biological Diversity. The project addresses BD focal area objectives. The AgroBD CONABIO Project will develop mechanisms of cooperation within Components 1 and 2, to exchange experiences and lessons learned that are related to the BD focal area.

4. GEF Project # 9445, Conservation and Sustainable Use of Biological Diversity in Priority Landscapes of Oaxaca and Chiapas, implemented by CI. This is a project implemented by the Commission of Natural Protected Areas – Southern Border, Isthmus and South Pacific Region (CONANP) and Conservation International Mexico, A.C. (CI Mexico). Its objective is to strengthen the conservation of globally significant biodiversity in the National System of Protected Areas and corridors, through integrated management of priority coastal and terrestrial landscapes of Oaxaca and Chiapas, Mexico. The project addresses BD focal area objectives. The AgroBD CONABIO Project will develop mechanisms of cooperation within Components 2, to exchange the territorial approach to biodiversity conservation experiences and lessons learned that are related to the BD focal area.

5. GEF Project #5785, Sustainable Land Management Promotion (PROTIERRAS), implemented by FAO. This is a project implemented by SEMARNAT and CECADESU. Its objective is to reduce land degradation through the implementation of a land management model focused on sustainable land management and the strengthening of local institutions to facilitate the concurrence of multi-sectoral policies and investment in public goods in 3 priority micro-regions. The project addresses LD focal area objectives. Opportunities for cooperating with this project are seen in exchange of experiences and lessons learned regarding:

- Building on the management plan that is elaborated in the PROTIERRAS project, identifying and enhancing contributions of traditional agricultural practices in the production of agroBD species for halting and reverting land degradation processes;

- In the start phase of this project, taking advantage of the experiences and knowledge developed by PROTIERRAS in the classification of genetic material of endemic or other species;

- Capacity building for traditional farming systems.

3.2 IMPLEMENTATION ARRANGEMENTS

The Food and Agriculture Organization (FAO) is the GEF Implementing Agency responsible for supervising and providing technical backstopping during project implementation. Technical backstopping will be provided in coordination with CONABIO. FAO's role and responsibilities are described in sub-section 3.2.2 below.

For strategic project decisions, a **Project Steering Committee (PSC)** will be established and integrated by CONABIO (through the National Coordinator of CONABIO or whoever he/she appoints for this purpose), the Representative of FAO in Mexico (or his/her delegate), and focal points designated by SAGARPA, SEMARNAT, SEDESOL, INAES, INCMNSZ and CDI. The Project Director (PD) will act as Technical Secretary of the PSC.

PSC Functions: The PSC will meet at least every six months. The PSC will take strategic decisions; oversee the project execution; review, discuss and approve the Annual Work Plan and Budget (AWP/B) prepared by the PD. The PSC will also advocate for the sustainable use and conservation of agrobiodiversity and traditional ecosystems and their inclusion in public policies, programs and projects of the project partner institutions. The PSC will agree on the co-financing and its distribution as per the AWP/B, in order to achieve project outcomes in each project area (Section 3.2.3 further describes the PSC functions).

An **External Advisor Council** (EAC) presided by the National Coordinator of CONABIO will support the PSC. The EAC will be composed of technical experts in the project topics. The EAC's main function will be to provide advice on the project implementation and recommend corrective actions if needed. FAO technical officers will participate in the EAC.

A **Project Coordination Unit** (PCU) will be created, and comprised of a Project Team (PT) funded by the GEF. The main function of the PCU, following the guidelines of the Project Steering Committee and being responsive to the **Regional Operational Committees** (see 3.2.3 below), is to ensure the coordination and execution of the project through the effective implementation of the annual work plans and budgets (AWP/Bs). The PCU will be composed of a National Project Director (NPD) and six Local Project Coordinators (LPC) (one for each state) who will work full-time for the project lifetime. In addition, the PCU will include some specialists/expert consultants on a short-term basis, a Project Administrative and Operational Unit will be part of the PT, including an Administrative Coordinator, an Administrative Assistant, a Financial Specialist, and a Budget and Operations Officer. The PCU and the PT will be physically placed in the Project Operational Partner premises, CONABIO, except the financial monitoring officer.

The **Project Director (PD)** will be in charge of daily project management and technical supervision including: (i) coordinating and closely monitoring the implementation of project activities; (ii) day-to-day management; (iii) coordination with related initiatives; (iv) ensuring a high level of collaboration among participating institutions and organizations at the national and local levels; (v) tracking the project's progress and ensuring timely delivery of inputs and outputs; (vi) implementing and managing the project's monitoring and communications plans; (vii) organizing annual project workshops and meetings to monitor progress and preparing the Annual Budget and Work Plan (AWP/B); vii) submitting the six-monthly Project Progress Reports (PPRs) with the AWP/B to the PSC and FAO; viii) submitting the OP six-monthly technical and financial reports to FAO and facilitate the information exchange between the OP and FAO, if needed; and ix) preparing the Project Implementation Review (PIR); x) supporting the organization of the mid-term and final evaluations in close coordination with FAOMX and the FAO Independent Office of Evaluation (OED). Likewise, under FAO rules and procedures and in conformity with this project document, the Operational Partner Agreement (OPA) and the AWP/B, the NPD will identify expenses and disbursements that should be requested to FAO for the timely execution of the project. The NPD will be accountable for monitoring, providing technical support and assessing the outputs of the project national consultants, who will be hired with GEF funds, as well as the products generated in the implementation of the project, including products and activities carried out by project consultants

The **Local Project Coordinators (LPC)** will be responsible for the project implementation in the field. The LPCs will be supported by the **Regional Operational Committees (ROC).** One ROC will be set up per each state where the project implementation areas are placed. The ROC will be composed of one LPC and local representatives of partner institutions that are PSC members: SAGARPA, SEDESOL, SEMARNAT, INCMNZS and CDI. In addition, representatives of local governments, social organizations and academia that are involved in the project in those states. See more in Section 3.2.3.

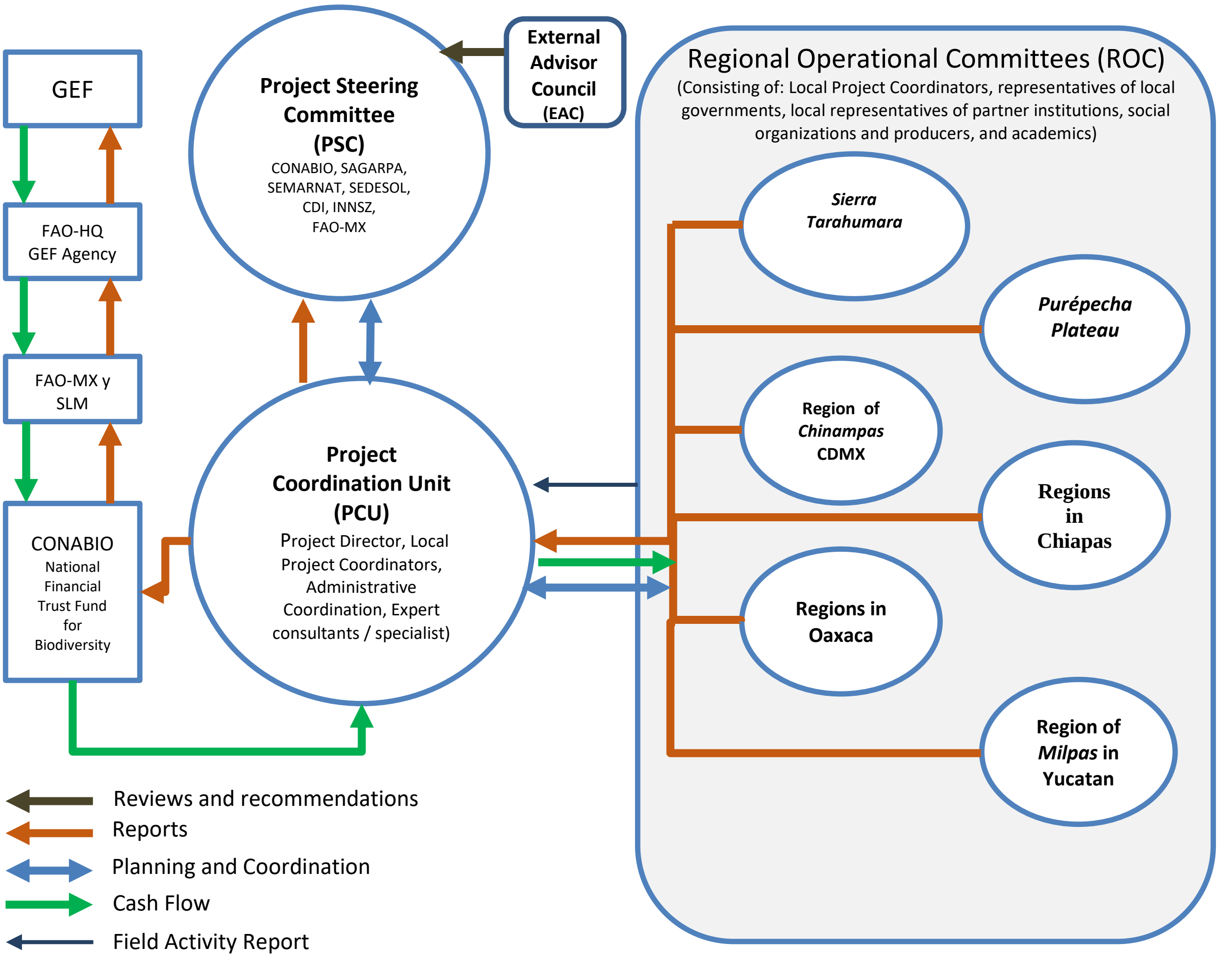
A full-time **Financial Monitoring Specialist** (FMO) will be hired with project funds and placed at the FAO Representation in Mexico. The FMO will be responsible for delivering training in the areas where the OP needs to improve (as identified by the Capacity Assessment); reviewing the quarterly Financial Reports that the OP (CONABIO) will submit to FAO; checking that the Financial Reports are in line with the approved AWP/Bs and the Project Results Framework and the conditions of the signed OP for eligibility of expenditures; requesting further information to the OP, if needed; advising the Budget Holder (FAO Representative in Mexico) on the report approval; reviewing the quarterly Request for Funds from the OP; ensuring that the request is in line with agreed WP/B, OPA conditions and eligibility requirements and that cost estimates are reasonable; requesting further information to the OP, if needed; advising the BH on the request for funds approval and disbursement of the quarterly transfer of funds to the OP.

A part-time **Operations Officer** (BOC) will be seated at the FAO Representation in Mexico. The BOC is responsible for the financial management, contract and day-to-day operations of the project activities implemented by FAO, as well responsible for progress monitoring, clearance of progress reports and organizing and following up on results. Given that this project is executed by CONABIO and most of the project funds will be transferred from FAO to the CONABIO, the BOC's functions will be limited to the following tasks: i) supporting FAO OED in organizing the independent project mid-term and final evaluations, including contacts with the OP, logistics, travel, and other administrative matters; ii) issuing the vacancy announcement, supporting the selection process, processing the contract, payment and payroll of consultants under direct FAO's supervision (see Appendix 3, Project Budget); iii) processing purchase, contracts and other necessary inputs according to the approved AWP/B. The BOC will act on behalf of the FAO Budget Holder, and will work in close consultation with the NPD, the FAO Lead Technical Officer (LTO, see below) and the OP. The BOC will be responsible for the timely delivery of inputs needed to produce results.

The draft Terms of Reference (TOR) for the Project Director (PD) and Project Team (PT) are listed in Appendix 6.

Implementation arrangements are presented in Figure 3.1.

Figure 3.1. Project implementation arrangements



3.2.1 OP`s roles and responsibilities

CONABIO will be the project "Operational Partner" (OP), delivering project results on behalf of FAO and responsible for the day-to-day management of project components entrusted to it in full compliance with all terms and conditions of the signed OPA. CONABIO will be responsible for the following:

a) Commencing work on the responsibilities allocated to it in the Project Document, results matrix and work plan promptly (but in no case prior to signing the OPA) and, as applicable, receipt of the first instalment of the funds, supplies and equipment to be transferred to it by FAO;

b) Making its designated contributions of technical assistance, services, supplies and equipment towards the implementation of the project as provided for under this Agreement, including the Project Document, results matrix, work plan and budget;

c) Completing its responsibilities with diligence and efficiency, and in conformity with the requirements set out in the Project Document results matrix, work plan and budget;

d) Providing the reports required under the OPA in a timely manner and satisfactory to FAO, and furnishing all other information covering the Project Document, results matrix, work plan and budget and the use of funds, supplies and equipment transferred to it by FAO that FAO may reasonably ask for;

e) Exercising the highest standard of care when handling and administering the funds, supplies and equipment provided to it by FAO, and ensuring that its personnel will conduct itself with the highest standards of integrity and care in the administration of public assets including money.

f) Maintaining accurate, complete and up-to-date books and records and keep original supporting documentation as per OPA provisions.

g) Accommodate monitoring visits of representatives of any Resource Partners that are funding the project, supervision missions organized by FAO and cooperate with auditors during performance of Spot-checks and Audits.

3.2.2 FAO's roles and responsibilities

FAO's role in the project governance structure

FAO will be the GEF Implementing Agency of the project and, as such, FAO will supervise and provide technical guidance for the overall implementation of the project, including:

a) Administrate the portion of project GEF funds that has been agreed with the OP to remain for FAO direct implementation. These funds will be managed in accordance with the rules and procedures of FAO;

b) Monitor and oversee OP's compliance with the OPA and project implementation in accordance with the project document, work plans, budgets, agreements with co-financiers and the rules and procedures of FAO;

c) Commence and completing the responsibilities allocated to it in the Project Document in a timely manner, provided that all necessary reports and other documents are available;

d) Making transfers of funds, supplies and equipment, as applicable, in accordance with the provisions of the OPA;

e) Review, discuss with the OP, and approve the project progress and financial reports, as detailed in the OPA and its annexes. undertaking and completing monitoring, assessment, assurance activities, evaluation and oversight of the project;

f) Liaising on an ongoing basis, as needed, with the Government (as applicable), other members of the United Nations Country Team, Resource Partner, and other stakeholders;

g) Providing overall guidance, oversight, technical assistance and leadership, as appropriate, for the Project;

h) Initiating joint review meetings with the OP to agree on the resolution of findings and to document the lessons learned;

i) Report to the GEF Secretariat and Evaluation Office, through the annual Project Implementation Review, on project progress and provide consolidated financial reports to the GEF Trustee;
j) Conduct at least one supervision mission per yearLead the Independent Mid-Term and Final Evaluation, through the FAO Evaluation Office;
k) Monitor implementation of the plan for social and environmental safeguards, in accordance with the FAO Environmental and Social Safeguards.

In collaboration with the PCU and the PSC, FAO will participate in the planning of contracting and technical selection processes. FAO will process fund transfers to the OP as per provisions, terms and conditions of the signed OPA.

FAO's roles in internal organization

The roles and responsibilities of FAO staff are regulated by the *FAO Guide to the Project Cycle, Quality for Results, 2015*, Annex 4: Roles and Responsibilities of the Project Task Force Members, and its updates.

The FAO Representative in Mexico will be the **Budget Holder** (BH) and will be responsible for timely operational, administrative and financial management of GEF resources implemented by FAO directly (see Appendix 3). The budget holder will be also responsible for i) managing OPIM for results, including monitoring of risks and overall compliance with the OPA provisions; ii)review and clear financial and progress reports received from the OP and certify request for funds iii) review and clear budget revisions and annual work plan and budgets; iv) ensure implementation of the Risk Mitigation and Assurance Plan v) follow up and ensure that the OP implements all actions and recommendations agreed upon during Assurance Activities.

As a first step in the implementation of the project, the FAO Representation in Mexico will establish an interdisciplinary Project Task Force (PTF) within FAO, to guide the implementation of the project.

The PTF is a management and consultative body that integrate the necessary technical qualifications from the FAO relevant units to support the project. The PTF is composed of a Budget Holder, a Lead Technical Officer (LTO), the Funding Liaison Officer (FLO) and one or more technical officers based on FAO Headquarters (HQ Technical Officer).

The FAO Representative in Mexico, in accordance with the PTF, will give its non-objection to the AWP/Bs submitted by the PCU as well as the Project Progress Reports (PPRs). PPRs may be commented by the PTF and should be approved by the LTO before being uploaded by the BH in FPMIS.

The **Lead Technical Officer (LTO**) for the project will be the Agri-Food Systems Officer, Pilar Santacoloma. The role of the LTO is central to FAO's comparative advantage for projects. The LTO will oversee and carry out technical backstopping to the project implementation. The LTO will support the BH in the implementation and monitoring of the AWP/Bs, including work plan and budget revisions. The LTO is responsible and accountable for providing or obtaining technical clearance of technical inputs and services procured by the Organization.

In addition, the LTO will provide technical backstopping to the PT to ensure the delivery of quality technical outputs. The LTO will coordinate the provision of appropriate technical support from PTF to respond to requests from the PSC. The LTO will be responsible for:

1. Assess the technical expertise required for project implementation and identify the need for technical support and capacity development of the OP.

2. Provide technical guidance to the OP on technical aspects and implementation.

3. Review and give no-objection to TORs for consultancies and contracts to be performed under the project, and to CVs and technical proposals short-listed by the PCU for key project positions and services to be financed by GEF resources;
4. Supported by the FAO Representation in Mexico, review and clear final technical products delivered by consultants and contract holders financed by GEF resources;
5. Assist with review and provision of technical comments to draft technical products/reports during project implementation;
6. Review and approve project progress reports submitted by the NPD, in cooperation with the BH;
7. Support the FAO Representative in examining, reviewing and giving no-objection to AWP/B submitted by the NPD, for their approval by the Project Steering Committee;
8. Ensure the technical quality of the six-monthly Project Progress Reports (PPRs). The PPRs will be prepared by the NPD, with inputs from the PT. The BH will submit the PPR to the FAO/GEF Coordination Unit for comments, and the LTO for technical clearance. The PPRs will be submitted to the PSC for approval twice a year. The FLO will upload the approved PPR to FPMIS.
9. Supervise the preparation and ensure the technical quality of the annual PIR. The PIR will be drafted by the NPD, with inputs from the PT. The PIR will be submitted to the BH and the FAO-GEF Coordination Unit for approval and finalization. The FAO/GEF Coordination Unit will submit the PIRs to the GEF Secretariat and the GEF Evaluation Office, as part of the Annual Monitoring Review report of the FAO-GEF portfolio. The LTO must ensure that the NPD and the PT have provided information on the co-financing provided during the year for inclusion in the PIR;
10. Conduct annual supervision missions;
11. Provide comments to the TORs for the mid-term and final evaluation; provide information and share all relevant background documentation with the evaluation team; participate in the mid-term workshop with all key project stakeholders, development of an eventual agreed adjustment plan in project execution approach, and supervise its implementation; participate in the final workshop with all key project stakeholders, as relevant. Contribute to the follow-up to recommendations on how to insure sustainability of project outputs and results after the end of the project.
12. Monitor implementation of the Risk Mitigation Plan, in accordance with the FAO Environmental and Social Safeguards.

The **HQ Technical Officer** is a member of the PTF, as a mandatory requirement of the FAO Guide to the Project Cycle. The HQ Technical Officer has most relevant technical expertise - within FAO technical departments - related to the thematic of the project. The HQ Technical Officer will provide effective functional advice to the LTO to ensure adherence to FAO corporate technical standards during project implementation, in particular:

1. Supports the LTO in monitoring and reporting on implementation of environmental and social commitment plans for moderate risk projects. In this project, the HQ officer will support the LTO in monitoring and reporting the identified risks and mitigation measures (Appendix 4) in close coordination with the OP.

2. Provides technical backstopping for the project work plan.
3. Clears technical reports, contributes to and oversees the quality of Project Progress Report(s) (PPRs – see Section 3.5).
4. May be requested to support the LTO and PTF for implementation and monitoring.
5. Contribute to the overall ToR of the Mid-term and Final Evaluation, review the composition of the evaluation team and support the evaluation function.

The FAO-GEF Coordination Unit will act as **Funding Liaison Officer (FLO).** This FAO/GEF Coordination Unit will review and provide a rating in the annual PIR(s) and will undertake supervision missions as necessary. The PIRs will be included in the FAO GEF Annual Monitoring Review submitted to GEF by the FAO GEF Coordination Unit. The FAO GEF Coordination Unit may also participate in the mid-term evaluation, and in the development of corrective actions in the project implementation strategy if needed to mitigate eventual risks affecting the timely and effective implementation of the project. The FAO GEF Coordination Unit will in collaboration with the FAO Finance Division to request transfer of project funds from the GEF Trustee based on six-monthly projections of funds needed.

The FAO Financial Division will provide annual Financial Reports to the GEF Trustee and, in collaboration with the FAO-GEF Coordination Unit, request project funds on a six-monthly basis to the GEF Trustee.

3.2.3 Decision-making mechanisms of the project

The **Project Steering Committee** (PSC) will be integrated by decision-making officials, appointed as focal points by partner institutions: SAGARPA, SEMARNAT, SEDESOL, CDI, INCMNSZ, CONABIO, and the FAO Representation in Mexico.

The **PSC main role** is to adopt and oversee the implementation of project strategic decisions, and to position this Agrobiodiversity Project in the plans and programs of the partner institutions, aiming at build a public policy for the conservation and sustainable use of agrobiodiversity and traditional agroecosystems in Mexico. The **PSC responsibilities** are: i) to supervise the implementation of project strategic decisions; ii) to verify the application of this public policy in partner institutions, and to sign agreements with other national or international entities that may contribute to project results; 3) to coordinate and manage, through institutional means, the in-kind and cash co-financing agreed with each partner institution, as well as other co-financing sources that could contribute to project outcomes; 4) to call and organize meetings with national stakeholders, states and micro-regions linked to project objectives; 5) to promote agreements and other collaboration mechanisms with national and international organizations.

The **Regional Operational Committees** (ROCs) will be integrated by a Local Project Coordinator (LPC) and the local representatives of each partner institution (SAGARPA, SEDESOL, SEMARNAT, CDI, INCMNSZ, and CONABIO), the representatives of local governments (state, municipal or agriculture authorities, as applicable), academia, social organizations and producer organizations.

The **ROCs** are collegiate bodies of planning and operations for the project intervention areas. The **ROCs main functions** are: 1) to support the PCU in the successful implementation of the 4 project components in each region; 2) to plan specific actions per region to be developed following the guidelines and budget set by the PSC; 3) to review and agree the project methodology and strategy presented by the PCU, as well as the changes resulting from their field application, in close consultation with the LTO FAO; 4) to ensure the active participation of local stakeholders in each region. The **ROCs main responsibility** is to assist the PCU in the execution of AWP/B and in preparing the project progress reports for each region.

3.3 PLANNING AND FINANCIAL MANAGEMENT

The total cost of the project will be USD 41,514,640 of which USD 5,329,452 will be financed with a grant from the GEF and USD 36,185,188 will be cash and in-kind co-financing from SEDESOL, SEMARNAT, INAES, CDI, INCMNSZ, INIFAP, SEDUMA Yucatan State, AZP Mexico City, SEMAC Coahuila State, IDESMAC, and CONABIO. FAO will contribute USD 200,000 in technical assistance.

3.3.1 Financial plan (by components, outcome and co-financiers)

Table 3.2 presents the cost per component, outputs and source of funding and Table 3.3 shows the sources and types of confirmed co-financing. FAO, as a GEF agency, will be responsible only for the implementation of GEF resources and FAO co-financing.

Table 10. Financial plan (by components, outcome and co-financier).

Component/output	SEDESOL / PRODUCTIVE OPTIONS	SAGARPA	SEMARNAT DGSPRNR	SEDUMA	CDI	INAES	CDMX AZP	CONABIO	INIFAP	IDESMAC	INCMNSZ	SEMAC	FAO	Total Co-financing	% Co-financing	GEF	% GEF	Total
Component 1: Information and knowledge management	-	666,667	1,000,000	4,181,818	-	-	684,000	2,959,394	-	800,000	3,333,333	150,000	-	13,775,212	88%	1,906,018	12%	15,681,231
Component 2: Strenghtening of local capacities for agrobiodiversity conservation and sustainable use	500,000	2,000,000	688,200	1,818,182	300,000	500,000	5,016,000	1,337,075	565,754	1,000,000	-	78,050	100,000	13,903,261	86%	1,864,066	14%	15,767327
Component 3: Improvement of public policies	-	200,000	-	-	-	-	-	-	-	75,000	1,388,889	-	-	1,663,889	77%	449,657	23%	2,113,546
Component 4: Valuation of agrobiodiversity and market linkages	1,000,000	1,300,000	-	-	1,644,444	1,000,000	-	-	-	-	1,282,222	-	100,000	6,326,666	85%	855,927	15%	7,182,593
Project Management	-		-	-	-	-	-	516,161	-	-	-			516,160	67%	253,783	33%	769,943
Total Project	1,500,000	4,166,667	1,688,200	6,000,000	1,944,444	1,500,000	5,700,000	4,812,629	565,754	1,875,000	6,004,444	228,050	200,000	36,185,188		5,329,452		41,514640

Table 11. Confirmed sources of co-financing

Sources of Co-financing	Name of Co-financier	Type of Cofinancing	Amount (US$)[74]
Recipient Government	SAGARPA	Cash	4,166,667
Recipient Government	CONABIO	In-kind	4,812,629
Recipient Government	CDI	Cash	833,333
		In kind	1,111,111
Recipient Government	SEMARNAT	In kind	1,688,200
Recipient Government	SEDESOL	Cash	1,500,000
Recipient Government	INAES	Cash	1,500,000
Recipient Government	SEDUMA (YUCATAN)	Cash	4,636,362
		In kind	1,363,638
Recipient Government	AZP (MEXICO CITY)	Cash	5,272,500
		In kind	427,500
Recipient Government	INIFAP	In kind	565,745
CSO	IDESMAC	In kind	1,875,000
Recipient Government	SEMA (COAHUILA)	In kind	228,050
Recipient Government	INCMNSZ	In kind	6,004,444
GEF Agency	FAO	In kind	200,000
Total Co-financing			36,185,188

3.3.2 GEF Contribution

GEF resources will be distributed throughout the four project components, focusing on: i) hiring full time and part-time consultants that will form part of the PCU; ii) implementation of activities that cannot be financed by the partner institutions; iii) preparation of sub-projects that will receive co-financing; iv) training and, in particular, the activities aimed at young people and women; v) activities related to project monitoring and evaluation, and risk mitigation.

3.3.3 Government Contribution

All co-financiers will partially contribute to the Project Management Costs. See details in the Financial Plan (Table 3.2) above. Co-financing to technical components is detailed as follows:

Contribution of SEDESOL

SEDESOL will provide co-financing through programs for inclusive production (targeted to rural or urban population with low index of social welfare), in particular: i) Promotion of the Social Economy, aimed at enhancing the income of poor people through support and development of productive projects; and ii) the Programme of Social Co-investment, which strengthens social participation and

[74] Exchange rate: 1 USD = 18 MXN, unless specified differently in co-financing letters.

promote community-based development through productive inclusion and social cohesion schemes. Both programs will support Component 2 and 4. SEDESOL will provide cash co-financing by USD 3 million. Included in this amount, the contribution of the National Institute of Social Economy, an agency centralized in SEDESOL.

<u>Contribution of DGSPRNR – SEMARNAT</u>

The General Directorate of Primary Sector and Renewable Natural Resources (DGSPRNR) of SEMARNAT will contribute to project Components 1 (Information Management and Knowledge) and 2 (Strengthening of local capacities for agrobiodiversity conservation and sustainable use) through actions aimed to information generation, implementation of the Nagoya Protocol, and sustainable land management. SEMARNAT will provide in-kind co-financing by USD 1,688,200.

<u>Contribution of CDI</u>

CDI is a key Project partner, given that Indigenous Peoples live in all Project intervention areas. CDI will co-finance the proposed Project through three programs: i) Enhancing Indigenous Production and Productivity[75], which provides incentives for indigenous women; ii) Programme for Indigenous Rights, which promotes the recognition, validity of rights and access to Justice through capacity strengthening. This includes creating IP capacities in the implementation of the NP-CBD; iii) the Communication Program, which works with IP radios and print media. CDI co-financing will support Components 2, and 4. The amount to be contributed by CDI is US $ 1,944,444, of which US $ 833,333 will be in cash to support component 2 and 4, and US $ 1,111,111 in kind will be in the communication programme.

<u>Contribution of INIFAP</u>

The INIFAP will co-finance Component 2, through activities of participatory enhancement, genetic improvement, conservation and protection of genetic resources of some project target species. INIFAP will contribute with in-kind co-financing by USD 565,745.

<u>Contribution of CONABIO</u>

CONABIO will provide in-kind co-financing through biodiversity data systematization, generation of new information, expert network, information analysis, communication and dissemination of results and conclusions, elaboration of recommendations to conserve and sustainable use biodiversity. CONABIO has 25 years of experience. CONABIO will provide knowledge and state-of-the-art studies on agrobiodiversity in Mexico. CONABIO information system will support Component 1. CONABIO will also provide support for the entire project through its infrastructure and administrative and computer support, hosting the Project Coordinating Unit (PCU), and providing its network of experts. The contribution of CONABIO is estimated at USD 4,812,629.

<u>Contribution of INCMNSZ</u>

Salvador Zubirán National Institute of Medical Sciences and Nutrition, belonging to the Ministry of Health, will participate in the project in various actions such as: assessing the nutritional quality of agrobiodiversity, promoting a healthy diet with these products, co-publications of common interest, promotion of school gardens, and various dissemination materials, as well as databases with nutritional information. For this purpose, INCMNSZ will make a contribution in kind of USD 6,004,444.

<u>Contribution of the Government of Yucatan</u>

The Secretariat of Urban Development and Environment of the State of Yucatan will support the Project through the Interdisciplinary Programme of *Milpa Maya* for the following areas: research, technology development, innovation, production support, environmental protection, and agroBD conservation. The Government of Yucatan will provide co-financing by USD 6 million (USD 1.36 million in-kind, and USD 4.64 million in cash).

[75] *Improvement of Production and Productivity*

Contribution of the Government of the Mexico City

The Government of Mexico City through the AZP will provide co-financing through the *Programme for the Preservation and Diffusion of the Heritage Zone of Xochimilco, Tláhuac and Milpa Alta*. This Programme will support Components 1 and 2 with activities that: i) preserve and recover chinampas ecosystems; ii) preserve and recover the infrastructure of chinampas ecosystems; iii) preserve and disseminate the tangible and intangible importance of the Cultural Heritage. The AZP will also contribute with the project supported by the French Development Agency and its two components: 1) Valuation of agricultural activities, development of an integrated agriculture, and promotion of agriculture in five chinampas pilot sites, including value chain studies and generation of a label for the Heritage Site; 2) Preservation, restoration and valuation of the ecosystem and its biodiversity. The French-supported project will last 5 years and will provide co-financing by USD 5.7 million (USD 5,272,500 cash USD 427,500 in-kind).

Contribution of Coahuila State

The State of Coahuila, through the State Environment Secretariat (SEMAC), has requested a twinned project with this one, located in the Carboniferous Region and North of the State, where it seeks to characterize and make an inventory of the state's wild walnut trees. To achieve this, the methodology of the project will be followed and the information that arises from that project will be kept by CONABIO. In order to carry out this twinned project, SEMAC will contribute in kind with USD 228,050.

3.3.4 FAO Contribution

FAO will provide in-kind contributions and technical assistance and advice to complement the activities of all Component Project. It will also provide in-kind contributions that will include office space and related services for project staff for the five-year duration of the project.

3.3.5 Inputs from other co-financiers

Contribution of OSC

The Institute for Sustainable Development A.C. (IDESMAC), with experience in the State of Chiapas since 1995, will support aspects of participatory planning, agroecology, work with women's groups, and school feeding circuits as a step towards the food sovereignty of communities. IDESMAC will provide in-kind resources for the support of Components 1, 2 and 3 of the project in the amount of USD 1,875,000.

3.3.6 Financial management and reporting on GEF resources

Financial management in relation to the GEF resources directly managed by FAO will be carried out in accordance with FAO’s rules and procedures as outlined below.

CONABIO is accountable to FAO for achieving the agreed project results and for the effective use of resources made available by FAO. Financial management and reporting for the funds transferred to CONABIO will be done by CONABIO in accordance with terms, conditions, formats and requirements of FAO and the signed Operational Partners Agreement (OPA). The administration by the OP of the funds received from FAO shall be carried out under its own financial regulations, rules and procedures, which shall provide adequate controls to ensure that the funds received are properly administered and expended. The Operational Partner shall maintain the account in accordance with generally accepted accounting standards.

Financial records. FAO shall maintain a separate account in United States dollars for the Project’s GEF resources showing all income and expenditures. FAO shall administer the Project in accordance with its regulations, rules and directives.

The OP shall maintain books and records that are accurate, complete and up-to-date. The OP's books and records will clearly identify all Fund Transfers received by the OP as well as disbursements made by the OP under the OPA, including the amount of any unspent funds and interest accrued.

Financial reports. The BH shall prepare six-monthly project expenditure accounts and final accounts for the project, showing amount budgeted for the year, amount expended since the beginning of the year, and separately, the un-liquidated obligations as follows: i) Details of project expenditures on outcome-by-outcome basis, reported in line with Project Budget (Appendix 3 of this Project document), as at 30 June and 31 December each year; ii) Final accounts on completion of the Project on a component-by-component and outcome-by-outcome basis, reported in line with the Project Budget (Appendix 3 of this Project Document); iii) A final statement of account in line with FAO Oracle Project budget codes, reflecting actual final expenditures under the Project, when all obligations have been liquidated.

The OP will prepare the financial reports in accordance with terms, conditions, formats and requirements of FAO and the signed OPA. The BH will review and approve request for funds and financial reports of the OP. The subsequent installments can be released only based on the BH confirmation that all expenditures are eligible and all OPA requirements are fulfilled to the satisfaction of FAO. The BH will withhold any payment due to the OP in case of non-compliance with the reporting obligations detailed in the OPA.

Financial reports for submission to the donor (GEF) will include both FAO- and OP-managed resources, will be prepared in accordance with the provisions in the GEF Financial Procedures Agreement and submitted by the FAO Finance Division.

Responsibility for cost overruns: As regards resources directly managed by FAO, the BH shall utilize the GEF project funds in strict compliance with the Project Budget (Appendix 3) and the approved AWP/Bs. The BH can make variations provided that the total allocated for each budgeted project component is not exceeded and the reallocation of funds does not impact the achievement of any project output as per the project Results Framework (Appendix 1). At least once a year, the BH will submit a budget revision for approval of the LTO and the FAO/GEF Coordination Unit through FPMIS. Cost overruns shall be the sole responsibility of the BH.

As regards resources managed by CONABIO, the OP shall utilize the funds received from FAO in strict compliance with provisions of the signed OPA and its Annexes, including approved work plan and budget. The OP can make variations not exceeding 10 percent on any budget heading. Any variations above 10 percent on any budget heading that may be necessary will be subject to prior consultations with and approval by FAO.

Audit. The Project shall be subject to the internal and external auditing procedures provided for in FAO financial regulations, rules and directives and in keeping with the Financial Procedures Agreement between the GEF Trustee and FAO.

The audit regime at FAO consists of an external audit provided by the Auditor-General (or persons exercising an equivalent function) of a member nation appointed by the Governing Bodies of the Organization and reporting directly to them, and an internal audit function headed by the FAO Inspector-General who reports directly to the Director-General. This function operates as an integral part of the Organization under policies established by senior management, and furthermore has a reporting line to the governing bodies. Both functions are required under the Basic Texts of FAO which establish a framework for the terms of reference of each. Internal audits of imprest accounts, records, bank reconciliation and asset verification take place at FAO field and liaison offices on a cyclical basis.

Specific provision for auditing the OP managed funds are included in the project document. During implementation, assurance activities will be undertaken by FAO to determine whether the progress has been made and whether funds transferred to Operational Partners were used for their intended purpose, in accordance with the work plan and relevant rules and regulations. This may include, but is not limited to, monitoring missions, spot checks, quarterly progress and annual implementation reviews, and audits on the resources received from FAO.

3.4 PROCUREMENT

At the request of the Government of Mexico, FAO will procure the equipment and services foreseen in the budget (Appendix 3) and the AWP/Bs, in accordance with FAO rules and procedures.

Careful procurement planning is necessary for securing goods, services and works in a timely manner, on a “Best Value for Money” basis, and in accordance with the Rules and Regulations of FAO. It requires analysis of needs and constraints, including forecast of the reasonable timeframe required to execute the procurement process. Procurement and delivery of inputs in technical cooperation projects follow FAO’s rules and regulations for the procurement of supplies, equipment and services (i.e. Manual Sections 502 and 507). Manual Section 502: “Procurement of Goods, Works and Services” establishes the principles and procedures that apply to procurement of all goods, works and services on behalf of the Organization, in all offices and in all locations, with the exception of the procurement actions described in Appendix A – Procurement Not Governed by Manual Section 502. Manual Section 507 establishes the principles and rules that govern the use of Letters of Agreement (LoA) by FAO for the timely acquisition of services from eligible entities in a transparent and impartial manner, taking into consideration economy and efficiency to achieve an optimum combination of expected whole life costs and benefits (“Best Value for Money”).

The FAO Representative will prepare an annual procurement plan for major items which will be the basis of requests for procurement actions during implementation. The plan will include a description of the goods, works, or services to be procured, estimated budget and source of funding, schedule of procurement activities and proposed method of procurement. In situations where exact information is not yet available, the procurement plan should at least contain reasonable projections that will be corrected as information becomes available.

Before commencing procurement, the NPC will update the project´s Procurement Plan (Appendix 5) for approval by the Project Steering Committee. This plan will be reviewed during the inception workshop and will be approved by the FAO Representative in Mexico. The PC will update the Plan every six months and submit the plan to the FAO Representative in Mexico for approval.

3.5 MONITORING AND REPORTING

The monitoring and evaluation of progress in achieving the results and objectives of the project will be based on targets and indicators in the Project Results Framework (Appendix 1 and descriptions in sub-section 1.3.2). Project monitoring and the evaluation activities are budgeted at USD 167,550 (see Table 3.4). Monitoring and evaluation activities will follow FAO and GEF policies and guidelines for monitoring and evaluation. The monitoring and evaluation system will also facilitate learning and replication of the project’s results and lessons in relation to the integrated management of natural resources.

3.5.1 Oversight and monitoring responsibilities

The monitoring and evaluation roles and responsibilities specifically described in the Monitoring and Evaluation table (see Table 3.4 below) will be undertaken through: (i) day-to-day monitoring and project progress supervision missions (PCU); (ii) technical monitoring of indicators to measure global environmental benefits (PCU in coordination with partners); (iii) mid-term and final evaluations (FAO Evaluation Office); and (v) monitoring and supervision missions (FAO).

At the beginning of the implementation of the GEF project, the PCU will establish a system to monitor the project progress. Participatory mechanisms and methodologies to support the monitoring and evaluation of performance indicators and outputs will be developed. During the project inception workshop (see section 3.5.3 below), the tasks of monitoring and evaluation will include: (i) presentation and explanation (if needed) of the project Results Framework with all project stakeholders; (ii) review of monitoring and evaluation indicators and their baselines; (iii) preparation of draft clauses that will be required for inclusion in consultant contracts, to ensure compliance with the monitoring and evaluation reporting functions (if applicable); and (iv) clarification of the division of monitoring and evaluation tasks among the different stakeholders in the project. The project **M&E Specialist** will be placed in the OP premises (see TORs in Appendix 6). The project M&E Specialist will prepare a draft monitoring and evaluation matrix that will be discussed and agreed upon by all stakeholders during the inception workshop. The **M&E matrix** will be a management tool for the NPD, the Local Project Coordinators, and the Project Partners to: i) six-monthly monitor the achievement of output indicators; ii) annually monitor the achievement of outcome indicators; iii) clearly define responsibilities and verification means; iv) select a method to process the indicators and data.
The **M&E Plan** will be prepared by the M&E Specialist in the three first months of the PY1 and validated with the PSC. The M&E Plan will be based on the M&E Table 3.4 and the M&E Matrix and will include: i) the updated results framework, with clear indicators per year; ii) updated baseline, if needed, and selected tools for data collection (including sample definition); iii) narrative of the monitoring strategy, including roles and responsibilities for data collection and processing, reporting flows, monitoring matrix, and brief analysis of who, when and how will each indicator be measured. Responsibility of project activities may or may not coincide with data collection responsibility; iv) updated implementation arrangements, if needed; v) inclusion of the tracking tool indicators, data collection and monitoring strategy to be included in the mid-term review and final evaluation; vi) calendar of evaluation workshops, including self-evaluation techniques.

In addition, a **Social and Environmental Risk Monitoring Specialist** will be hired and placed in FAO with GEF resources, to ensure and oversee the OP's compliance with the Risk Mitigation Action Plan prepared and agreed for this specific project (see Appendix 5). In order to ensure the segregation of duties and compliance with FAO and GEF fiduciary standards, the Social and Environmental Risk Monitoring Specialist will follow-up on the environmental and social safeguards triggered during project preparation, will lead the implementation of mitigation actions, identify potential new risks and conduct an adaptive risk management in close coordination with the OP and the project partner. His/her TORs will be further developed and agreed in PY1.

The day-to-day monitoring of the project's implementation will be the responsibility of the NPD – whose duty station will be the OP's premises. The NPD will prepare and lead the implementation of an Annual Work Plan and Budget (AWP/B) followed up through six-monthly Project Progress Reports (PPRs) and other reports detailed in the OPA and its annexes. The preparation of the AWP/B and six-monthly PPRs will represent the product of a unified planning process between main project stakeholders. As tools for results-based-management (RBM), the AWP/B will identify the actions proposed for the coming project year and provide the necessary details on output and outcome targets to be achieved, and the PPRs will report on the monitoring of the implementation of actions and the achievement of output and outcome targets. Specific inputs to the AWP/B and the PPRs will be prepared based on participatory planning and progress review with all stakeholders and coordinated and facilitated through project planning and progress review workshops. These contributions will be consolidated by the NPD in the draft AWP/B and the PPRs.

An annual project progress review and planning meeting should be held with the participation of the project partners to finalize the AWP/B and the PPRs. Once finalized, the AWP/B and the PPRs will be submitted to the FAO LTO for technical clearance, and to the Project Steering Committee for revision and approval. The AWP/B will be developed in a manner consistent with the Project Results Framework to ensure adequate fulfilment and monitoring of project outputs and outcomes.

Following the approval of the Project, the PY1 AWP/B will be adjusted (either reduced or expanded in time) to synchronize it with the annual reporting calendar. In subsequent years, the AWP/Bs will follow an annual preparation and reporting cycle as specified in section 3.5.3 below.

3.5.2 Indicators and sources of information

In order to monitor project outputs and outcomes including inputs to global environmental benefits, specific indicators have been established in the Project Results Framework (see Appendix 1). The Results Framework indicators and means of verification will be applied to monitor both project performance and impact. Following FAO monitoring procedures and progress reporting formats, data collected will be sufficiently detailed to be able to track specific outputs and outcomes, and alert on risks for project management. Output target indicators, if any, will be monitored every six months, and outcome target indicators will be monitored on an annual basis, if possible, or at least, in the mid-term and final evaluations.

The project output and outcome indicators have been designed to monitor advance towards the project objective of developing policies and mechanisms that support agrobiodiversity conservation, sustainable use and resilience in Mexico.

Project outcome indicators are:

<u>Outcome 1.1:</u> Comprehensive knowledge about globally-important agrobiodiversity, its values, the traditional practices, the scientific and technological research and development activities, associated knowledge base and capacities that maintain the diversity in Mexico, has been generated and made available for its use.

- N° of existing **data bases** for agroBD species converted / transformed according to a Comprehensive Agrobiodiversity Information System (SIAgroBD)
- N° of **analysis and synthesis** based on the SIAgroBD and on results of research projects to guide decision making
- A **communication strategy** for building awareness on the values of agroBD among producers, political decision-makers and consumers is designed and made available for its use under project components 2, 3 and 4.

<u>Outcome 2.1</u>: Local capacities have been strengthened to support long-term plans and actions for agroBD conservation and sustainable use, developing strategies for revaluating traditional knowledge, and supporting continuous adaptation to climate change.

- Area in hectares where the knowledge, practices and/or management derived from capacity-building projects for agroBD conservation are applied

<u>Outcome 3.1:</u> The protection and promotion of traditional knowledge, practices and production systems have been mainstreamed into public policies and planning, generating effective partnerships with the communities, and disseminating values associated with agroBD and local cultures.

- The 2019-2024 **National Development Plan** incorporates agroBD into one or more goals, strategies or lines of action

- Number of **sectoral programmes** that incorporate agroBD into one or more of their goals, strategies or lines of action
- Number of budget programmes whose operating rules incorporate regulations, rules, criteria or incentives aimed at the conservation and sustainable use of agroBD

Outcome 4.1: The marketing and consumption of agroBD products have been enhanced through new strategies of agroBD valuation and market incentives, with a short value chain approach.

- **Accessibility of agroBD products** to local and regional markets, measured through a compound index of 7 indicators of marketing facilities delivered by project outputs for strengthening market linkages (sum of values of 7 output indicators)
- **Strategy for agroBD product promotion** and marketing campaigns designed and implemented

Main information sources to support the monitoring and evaluation programme are: i) the Comprehensive Agrobiodiversity Information System (SIAgroBD); ii) reports and publications of agroBD research projects; iii) annual progress reports of regional coordinators; iv) reports of consultants on subjects relevant for agroBD conservation and sustainable use at the local, regional and national level; v) National Development Plan 2014-19, 4 sector programs and their operational rules concerning policies, plans and programs for agroBD conservation; vi) the Agrobiodiversity Value Awareness Index (to be developed by the project).

3.5.3 Reporting schedule

Specific reports that will be prepared under the monitoring and evaluation programme are: (i) Project inception report; (ii) Annual Work Plan and Budget (AWP/B); (iii) Project Progress Reports (PPRs); (iv) Annual Project Implementation Review (PIR); (v) Technical reports; (vi) Co-financing reports; and (vii) Terminal Report. In addition, the GEF[76] tracking tool for biodiversity will be completed and will be used to compare progress with the baseline established during the preparation of the project. In addition, the OP will prepare and submit the reports described in the OPA and its annexes, and will submit them to the FAO Representation in Mexico periodically - as agreed in the OPA.

Project Inception Report. Within the first 6 months after project operationalization, an inception workshop will be held. Immediately after the workshop, the NPD will prepare a project inception report in consultation with the FAO Representation in Mexico and other project partners. The report will include a narrative on the institutional roles, responsibilities and coordination actions with project partners, progress to date on project establishment and start-up activities. In addition, it will include an update of any changes in external conditions that may affect project implementation. The report will also include a detailed first year AWP/B and the M&E Matrix (see above). The draft inception report will be circulated to FAO, the PSC, and the federal entities for review and comments before its finalization, no later than 1 month after the inception workshop. The report will be cleared by the FAO Budget Holder (BH), LTO and FAO Project Task Force. The BH will upload it in FPMIS.

Annual Work Plan and Budget(s) (AWP/Bs). The NPD will present a draft AWP/B to the PSC no later than 10 December of each year. The AWP/B should include detailed activities to be implemented by project outcomes and outputs and divided into monthly timeframes. It should include targets and milestone dates for output and outcome indicators to be achieved during the year. A detailed annual project budget should also be included together with all required monitoring and supervision activities. The FAO Representation in Mexico will circulate the draft AWP/B to the FAO Project Task Force and will consolidate and submit FAO comments by 1 December each year. The AWP/B will be reviewed by the PSC and the PCU will incorporate any comments. The final AWP/B will be sent to the PSC for approval and to FAO for final no-objection.

[76] *GEF LD Tracking Tool.*

Project Progress Reports (PPR). The PPRs are used to identify constraints, problems or bottlenecks that impede timely implementation and take appropriate remedial action. PPRs will be prepared based on the systematic monitoring of output and outcome indicators identified in the Project Results Framework (Appendix 1), AWP/B and M&E Plan. Each semester the National Project Director (NPD) will prepare a draft PPR, and will collect and consolidate any comments from the FAO PTF and partner institutions. The NPD will submit the final PPRs to the FAO Representative in every six months, prior to 10 June (covering the period between January and June) and before 10 December (covering the period between July and December). The July-December report should be accompanied by the updated AWP/B for the following Project Year (PY) for review and no-objection by the FAO PTF. The OP has the responsibility to coordinate the preparation and finalization of the PPR, along with other reports detailed in the OPA and its annexes. FAO LTO, and BH will clear the PPRs. The FAO FLO will upload the PPRs to FPMIS.

Annual Project Implementation Review (PIR). The NPD, in consultation with the FAO LTO and BH, and in coordination with the project partners, will prepare a draft annual PIR report[77] covering the period July (the previous year) through June (current year) no later than June 15th every year. The LTO will finalize the PIR and will submit it to the FAO-GEF Coordination Unit for review by July 1st. The FAO-GEF Coordination Unit, the LTO, and the BH will discuss the PIR and the ratings[78]. The LTO is responsible for conducting the final review and providing the technical clearance to the PIR(s). The LTO will submit the final version of the PIR to the FAO-GEF Coordination Unit for final approval. The FAO-GEF Coordination Unit will then submit the PIR(s) to the GEF Secretariat and the GEF Independent Evaluation Office as part of the Annual Monitoring Review of the FAO-GEF portfolio. The PIR will be uploaded to FPMIS by the FAO-GEF Coordination Unit.

Technical reports. The technical reports will be prepared as part of the project outputs and will document and disseminate lessons learned. Drafts of all technical reports must be submitted by the NPD to the PSC and FAO Representation in Mexico, which in turn will be shared with the LTO for review and approval and to the FAO-GEF Coordination Unit for information. Copies of the technical reports will be distributed to the PSC and other project stakeholders, as appropriate. These reports will be uploaded in FAO FPMIS by the BH.

Co-financing reports. The NPD will be responsible for collecting the required information and reporting on in-kind and cash co-financing provided by all the project co-financiers and eventual other new partners not foreseen in this Project Document. Every year, the NPD will submit the report to the FAO Representation in Mexico before June 15th covering the period July (the previous year) through June (current year). This information will be used in the PIRs.

GEF Biodiversity Tracking Tool. In compliance with GEF policies and procedures, tracking tools of the Biodiversity focal area should be sent to the GEF Secretariat in three stages: (i) with the project approval document by the GEF Chief Executive Officer (CEO); (ii) with the mid-term evaluation of the project; and (iii) with the final evaluation of the project.

Final Report. Within two months prior to the project completion date, the NPD will submit to the PSC and FAO Representation in Mexico a draft final report. The main purpose of the final report is to give guidance to authorities (ministerial or senior government level) on the policy decisions required for the follow-up of the Project, and to provide the donor with information on how the funds were utilized. Therefore, the terminal report is a concise account of the main **products, results, conclusions and recommendations** of the Project, without unnecessary background, narrative or technical details. The target readership consists of persons who are not necessarily technical specialists but who need to

[77] Prior to the preparation of the PIR report, the FAO-GEF Coordination Unit will provide the updated format as every year some new requirements may come from the GEF.

[78] The NPD, the BH, the LTO and the FAO/GEF Coordination Unit should assign ratings to the PIR every year. The ratings can or cannot coincide among the project managers.

understand the policy implications of technical findings and needs for ensuring sustainability of project results. Work is assessed, lessons learned are summarized, and recommendations are expressed in terms of their application to the conservation and sustainable use of agrobiodiversity and traditional agroecosystems in the context of the development priorities at federal and local levels, as well as in practical terms. This report will specifically include the findings of the final evaluation as described in section 3.6 below. A project evaluation meeting will be held to discuss the draft final report with the PSC before completion by the NPD and approval by the BH, LTO, and FAO-GEF Coordination Unit.

3.5.4 Monitoring and Evaluation summary

Table 3.4 summarizes the main monitoring and evaluation reports, parties responsible for their publication and time frames.

Table 12. Summary of main monitoring and evaluation activities (*example*)

M&E Activity	Responsible parties	Time frame/Periodicity	Budget
Inception workshop	NPD – OP (CONABIO)	Within 3 months of project operationalization.	USD 4,500
Project Inception report	NPD, M&E Specialist and FAOMX with clearance by the FAO LTO	Immediately after the workshop.	
Field-based impact monitoring	NPD; project partners, local organizations	Continuous (10% of the NPD's time, technical workshops to identify indicators, monitoring and evaluation workshops).	USD 27,973
Supervision visits and rating of progress in PPRs and PIRs	NPD; FAO (FAOMX, LTO). FAO-GEF Coordination Unit may participate in the visits if needed.	Annual, or as needed FAO visits will be borne by GEF agency fees. Project Coordination visits shall be borne by the project travel budget.	
Project Progress Reports (PPRs)	NPD, with stakeholder contributions and other participating institutions	Six-monthly (3.5% of the NPD's, M&E Specialist and Social and Environmental Risk Mitigation Specialist's time).	USD 11,400
Project Implementation Review (PIR)	Drafted by the NPD, with the supervision of the LTO and BH. Approved and submitted to GEF by the FAO-GEF Coordination Unit	Annual FAO staff time financed though GEF agency fees. PCU time covered by the project budget.	
Co-financing reports	NPD with input from other co-financiers	Annual	USD 7,127
Technical reports	NPD, FAO (LTO, FAOMX)	As needed	
Mid-term Evaluation	FAO Independent Evaluation Unit in consultation with the project team, including the FAO-GEF Coordination Unit and others	Mid-term of the project implementation An external consultancy. FAO staff time and travel costs will be financed by GEF agency fees.	USD 50,000

M&E Activity	Responsible parties	Time frame/Periodicity	Budget
Final Evaluation	FAO Independent Evaluation Unit in consultation with the project team, including the FAO-GEF Coordination Unit and others	At the end of the project An external consultancy. FAO staff time and travel costs will be financed by GEF agency fees.	USD 60,000
Terminal Report	NPD; FAO (FAOMX, LTO, FAO-GEF Coordination Unit, TCS Reporting Unit)	Two months prior to the end of the project.	USD 6,550
Total budget			USD 167,550

3.6 EVALUATION PROVISIONS

At the end of the first 24 months of the project, the BH will arrange an independent **Mid-Term Evaluation (MTE**) in consultation with the PSC, the PCU, the LTO and the FAO-GEF Coordination Unit. The MTE will be conducted to review progress and effectiveness of implementation in terms of achieving project objective, outcomes and outputs. The MTE will allow mid-course corrective actions, if needed. The MTE will provide a systematic analysis of the information provided under the M&E Plan (see above) with emphasis on the progress in the achievement of expected outcome and output targets against budget expenditures. The MTE will refer to the Project Budget (see Appendix 3) and the approved AWP/Bs for PY1 and PY2. The MTE will contribute to highlight replicable good practices and main problems faced during project implementation and will suggest mitigation actions to be discussed by the PSC, the LTO and FAO-GEF Coordination Unit.

An independent Final Evaluation (FE) will be carried out six months prior to the terminal report meeting. The FE will aim to identify the project impacts, sustainability of project outcomes and the degree of achievement of long-term results. The FE will also have the purpose of indicating future actions needed to expand on the existing Project in subsequent phases, mainstream and up-scale its products and practices, and disseminate information to management authorities and institutions with responsibilities in food security, conservation and sustainable use of natural resources, small-scale farmer agricultural production and ecosystem conservation to assure continuity of the processes initiated by the Project. Both the MTE and FE will pay special attention to outcome indicators and will be aligned with the GEF Tracking tool (BD focal area).

3.7 COMMUNICATION AND VISIBILITY

Project visibility is essential for obtaining a good impact over public policies. The Project will have a Communication Strategy that will be refined in the first six months of PY1 by the OP. This Strategy will aim to promote the conservation of agrobiodiversity in Mexico. Communication and dissemination are transversal to all project components, each of them targeting a different range of audience and target population.

Component 1, focused on Information and Knowledge Management, will use communication to disseminate the new information that will be collected, processed and systematized by the Project. The objective is to make this information useful for national and local stakeholders, as needed. In particular, this data will inform decision-making processes. Data users will also be reached, including academia, social organizations, producer organizations and private sector. The **Social and Environmental Risk Mitigation Specialist** will ensure that any information-sharing follow a risk mitigation plan and have been agreed with the indigenous populations through a proper and dynamic Free, Prior and Informed Consent (FPIC) process. The project will also coordinate actions with the Nagoya Protocol project mentioned above.

Component 2 addressed capacity strengthening. Gender- and cultural-sensitive dissemination materials targeting traditional farmers will seek to revitalize the information exchange between local populations. This will support cultural valuation and use of agrobiodiversity information, and management practices, borne from local knowledge and traditions. As explained in Section 1, many of this traditional knowledge is being lost due to new food consumption patterns, social problems, and/or inadequate public policies. The **Social and Environmental Risk Mitigation Specialist** will support the NPD in ensuring that any socio-cultural risk is duly addressed when component 2 is implemented at field level.

Component 3 will adopt a communication methodology to reach decision- and policy-makers. Public policy has a great impact in the conservation of agrobiodiversity in Mexico. The project visibility will be central to influence plans and programs that the partner institutions are designing for the next 5-10 years. The PSC has a key role in this awareness-raising process.

Last, Component 4 will reach consumers. Information-sharing and communication strategy will aim to re-valuate the Mexican agrobiodiversity and its cultural processes. Component 4 will support product differentiation, making agrobiodiversity visible for urban consumers in the local and regional markets.

In sum, the communication actions and strategy will have a great deal in achieving project impacts.

SECTION 4 – SUSTAINABILITY OF RESULTS

Sustainability, understood as the probability of continued long-term project-derived outcomes and impacts on agroBD conservation and use, will be achieved by a project approach that relies on the interaction of the social, environmental and economic-financial dimensions. Cross-cutting factors that have an impact on these three dimensions are capacity development, gender and generational equity, appropriateness of technologies used, cost-effectiveness, innovativeness and capacity for replication and up-scaling. A fourth dimension to be mentioned are enabling or disabling conditions for agroBD conservation and sustainable use derived from project impacts on the political and institutional context.

4.1 SOCIAL SUSTAINABILITY

Social sustainability of results beyond project end will be attained by applying principles of: building on and strengthening initiatives and ongoing processes of agroBD conservation; ownership of practices and technologies; contributions by social target groups for promoting, planning and implementing agroBD conservation actions; environmental governance; gender and generational equity.

- **Building on ongoing processes:** From the outset, the project will cooperate with and strengthen existing projects and initiatives of local organizations and groups in the six project regions, as well as other stakeholders in academic and governmental institutions, introducing and enhancing innovations for agrobiodiversity and ecosystem service conservation aspects. The main advantage of working with existing initiatives for agroBD is that they are already rooted in functioning social networks. This increases the likelihood of a lasting commitment of farmers, organizations and communities with new projects and practices of agroBD conservation driven forward by this project. During the full project preparation phase, such initiatives and project partners at the local, regional and national level were identified and their collaboration with the project has been confirmed (see subsection 1.2.2 Baseline initiatives). As the project advances, new initiatives will be detected and included in nearby areas through exchange of experiences between farmers, thus enlarging the acceptance and social sustainability of project achievements.
- **Ownership of new practices and technologies:** Traditional farmers are already the "owners" of their practices of agroBD conservation and use. Nevertheless, the question of ownership is relevant because it concerns *innovations* aimed at strengthening these practices technologically and for achieving socio-economic and environmental benefits. Innovations to be introduced by this project are presented in detail under section 4.6 Innovativeness, Replication and Scale-Up; in summary, they refer to broadened knowledge; better information; integrated valuation; lessons learned; new capacities and skills; improved self-management; improvement of the milpa and other agroforestry systems; policy mainstreaming; market incentives for agroBD products. - Apparently there is a contradiction between supporting traditional practices and promoting innovations in agroBD conservation and sustainable use. The project will meet the challenge to bring these seemingly irreconcilable goals together through a participatory approach promoting dialogue and exchange between technical expertise and traditional and ancestral knowledge. The idea is applying a method of mutual learning between scientists and technicians, on one side, and farmers and rural communities, on the other, bridging the gap between the two worlds.[79] For example, the knowledge base over landraces and crop wild relatives will be broadened through participatory research and involvement of local communities in the compilation and analysis of information; new capacities and skills are built among farmers for managing agroBD, through frequent field visits of local technicians and exchange of experiences between producers to disseminate good practices of

[79] See Robert Chambers (1997). *Whose reality counts? Putting the first last*, p.180

production and commercialization in the region; values of agroBD for food and nutritional security are based on focused assessments of small producers and their families, with a particular emphasis on women and the young; food security will be enhanced by promoting the adoption of sustainable land management (SLM) practices and taking local preferences as a starting point. All these are ways of enhancing ownership of new practices of agroBD conservation.

- **Contributions of social stakeholders for implementing agroBD conservation actions:** Social sustainability of project achievements depends also on the degree in which social stakeholders contribute to promoting, planning and implementing agroBD conservation actions. In the present project, these contributions will consist mainly in working hours (including time spent in meetings, workshops and similar events), usually a scarce resource in small farmers economies or land for demonstration plots; also in other in-kind resources, like working time of local extension workers, civil society organizations, scientists and civil servants. From the point of view of sustainability, it is important that the project will not position itself as delivering things, but supporting own initiatives and self-management.

- **Organizational feasibility:** Project partners in the areas of intervention will analyse carefully the social-organizational feasibility of the agroBD conservation projects, taking steps to prevent organizational risks. One of the risk prevention measures will consist in involving women in the projects and train them to assume roles in the administration and management of local organizations.

- **Environmental governance:** Good environmental governance is a potent driver of social sustainability of projects results as it refers to the interaction of different governmental and social stakeholders for managing natural resources. In the context of this project, interaction of stakeholders will be characterized by the principles of transparent rules, effective and efficient management of natural resources of agroBD and the fair and equitable distribution of benefits derived from these resources.[80]
- **Gender and generational equity:** Inclusion and participation of women and youth in activities of the four project components will make a crucial contribution to the social sustainability of project results. In component 1: Information and knowledge management, women and youth will be integrated in field-based and participatory research on agroBD management and use at local level to generate new information; through their participation, research results will receive more social validity. In component 2: Strengthening of local capacities for agrobiodiversity conservation and sustainable use, the inclusion of women and youth will contribute to obtaining and making sustainable the outputs of (i) increased local knowledge and skills for managing regional agroBD; (ii) seed conservation projects (community and family seed banks, networks of seed custodian, seed exchange, and others) are implemented; (iii) the milpa and other agroforestry systems are improved and diversified, increasing productivity and adapting these systems to climate change. Under component 3: Improvement of public policies, gender and generational aspects will be part of the incorporation of agroBD considerations into the National Development Plan 2019-2024 and the Sector Programs of Environment, Agriculture, Social Development and Indigenous Peoples. In component 4: Valuation of agrobiodiversity and market linkages, women and youth will play a prominent role in activities for (i) developing a participative rural valuation of agroBD for food and nutritional security of family households; (ii) designing a communication strategy for disseminating agroBD values among small producers and their families, rural communities, consumers and policy decision-makers; (iii) strengthening market linkages between small-scale farmers (family farmers and indigenous communities) and local and regional markets through sustainable production of food and goods with agrobiodiversity characteristics; (iv) introducing innovative market incentives that promote the conservation of agroecosystems and generate a transformational change in business-as-usual rural production.

[80] FAO - PROFOR (2011). *Framework for Assessing and Monitoring of Forest Governance* Rome

4.2 ENVIRONMENTAL SUSTAINABILITY

The project strategy is directed to environmental sustainability in several respects:

- Project component 1 will contribute to strengthening capacities of the research and extension communities and institutions through participatory research and involvement of local communities in the compilation and analysis of information on agroBD conservation and sustainable use. This includes identifying and mapping crop wild relatives and native crop's distribution at national level that will complement global level assessments undertaken by FAO.
- Through its component 2, the project will maintain and strengthen different agriculture practices based on local and traditional knowledge, introducing innovations that allow continued evolution and adaptation of agroBD population sizes and seed systems. Capacities of communities and farmers (both men and women) for developing and implementing local agroBD conservation projects will enhance the sustainability of such initiatives.
- Under its policy mainstreaming component, the project will develop policies, strategies, legislation, and regulations that seek to shift the balance in agricultural production in favour of diversity rich approaches. These include support for the adoption of appropriate fiscal and market incentives to promote or conserve diversity on-farm and across the production landscape.
- Environmental sustainability of agroBD conservation initiatives will further be reinforced by awareness-building on the values and services of agroBD and by linking the genetic diversity maintenance to improved food security and economic returns for rural communities and farmers, including local market access (see outcomes 4.1 and 4.2 of the project component 4 Valuation and market linkages).

4.3 FINANCIAL AND ECONOMIC SUSTAINABILITY

The project will provide support that will yield high environmental and socio-economic benefits undertaking relatively small investments for opening bottlenecks, for example in capacity building, agroBD valuation, promoting short-circuit, local and regional markets and adequate SLM practices.

4.4 SUSTAINABILITY OF CAPACITY DEVELOPMENT

The project will make sustainable the technical, administrative and organizational capacities of participating groups, by applying methods that favour training and learning in the field.

Capacity-building and strengthening will follow principles that

- place emphasis on processes of capacity building of local actors (producers, organizations) with methods of peasant-to-peasant learning, field schools, exchange of experiences;
- insist that the community technicians who work in the projects provide direct technical assistance in the field and continue to do so after project closure;
- ensure that the logistic conditions for the operation of the projects are given, especially for visits and work of community technicians in the field;
- generate spaces for the exchange of experiences between farmers and communities so that they know best production and marketing practices for agroBD products.

The project will also strengthen the capacity of all intervening actors (government agencies, CSOs, universities, communities, farmers, consumers, etc.) for enabling the country to effectively manage agroBD conservation.

Transfer of knowledge about the status and dynamics of landraces and crop wild relatives to farmers, planners and policy-makers will occur on a more regular basis as relevant actors will develop a broader knowledge base about these themes. This will occur as the project will contribute to institutionalize knowledge transfer among producer organizations, technical service providers and policy decision-makers. Providing them with regular, reliable and updated information about agroBD tendencies will increase the chances that they will make a practice of integrating such knowledge into their decision-making.

4.5 APPROPRIATENESS OF TECHNOLOGIES INTRODUCED and COST/EFFECTIVENESS

Technologies

Technologies – and, in a wider sense, also new methodologies – promoted by the project will be adapted to culture and cultural diversity of participating communities and stakeholders promoting dialogue and exchange between technical expertise and traditional and ancestral knowledge. These technologies include: Participatory-based research on agroBD; design and implementation of a protocol and information system for knowledge management; seed conservation technologies; participatory plant breeding and other agronomic and SLM practices to improve, diversify, and increase productivity; dietary characteristics of species of interest; participatory rural assessment; establishment of short marketing circuits; installation of web pages for agroBD products, and others.

Cost-effectiveness

The project will make sure that cash and in-kind (labour) costs, as well as transactional costs for participating communities and families stand in a reasonable proportion to economic, social and environmental benefits. Cost-effectiveness of agroBD conservation actions will be improved by aligning them to local development priorities and public financing mechanisms increasing the use of local resources from institutions and social actors, to reduce dependence on external funding. The systematization of experiences and lessons learned made available to project partners and key stakeholders will also contribute to a cost/effective replication of project results throughout the country. The proposed intervention strategies are profitable and acceptable for small-scale producers. These interventions and methodological proposals will enable small-scale producers to increase their production levels and to improve the environmental quality of their property.

4.6 INNOVATIVENESS, REPLICATION and SCALE-UP

Innovativeness

This project will focus on *innovations* to current production systems and practices aimed at strengthening these practices technologically and with regard to their socioeconomic and environmental benefits. Innovations introduced by this project include: (i) broadened knowledge base over the landraces and crop wild relatives generated through participatory research and involvement of local communities in the compilation, generation, systematization and analysis of information; (ii) better informed and integrated *valuation* of socioeconomic and environmental services and benefits from agroBD conservation and sustainable use; (iii) deepened information and lessons learned on *agroBD management and use* at local level, in particular the role of traditional women farmers; (iv) *new capacities and skills* are built among farmers for managing agroBD, through field visits, exchange of experiences and information materials; (v) improved self-management and control of local and regional *seed conservation* for agroBD conservation; (vi) genetic improvement of the *milpa and other agroforestry systems* through participatory plant breeding , adapted sustainable land management (SLM) practices and improvement of *traditional seed storage* techniques; (vii) incorporation of agrobiodiversity considerations into *public policies*, legislation and programs, in particular the National

Development Plan 2019-2024 and the Sector Programs of Environment, Agriculture, Social Development and Indigenous Peoples, as well as the implementation of the National Strategy and Action Plan for Biodiversity in Mexico 2016-2030; (viii) generation and systematization of knowledge on the *values of agroBD for food and nutritional security*, focused on families of small producers, but not limited to them; (ix) strategic and differentiated communication of these *values of agroBD for food and nutritional security* among the stakeholders, including small producers and their families, consumers, and policymakers, with a particular emphasis on young women and peasant women; (x) implementation of *market incentives* for farmers implementing improved traditional practices of agroBD use.

Replication and up-scaling

The project will scale up lessons learned in local processes within the project intervention areas towards new communities and other relevant actors in the region and beyond, adding social and institutional acceptance and sustainability to the proposed agroBD conservation strategy. Field exchanges to share lessons learned and promote adoption of best practices for agroBD conservation and sustainable use will be organized between project communities and other communities in the project area and in adjacent regions. Through the regional networks of project partners and community technicians, the project will seek to generate interest from additional local communities, paving the road for scaling up during the project lifetime and beyond. The project approach to work directly with rural producers permits a high degree of flexibility to adapt it to local circumstances.

The project will also provide insights and methodological inputs for the world´s agricultural production, as global agricultural systems depend on agrobiodiversity for their continuous adaptation to new necessities and challenges. National efforts like this project to support agrobiodiversity conservation, sustainable use and resilience, will thus provide new lessons that can be scaled up and employed on a global level.

APPENDICES

Appendix 1: RESULTS FRAMEWORK

* *Acronyms*: PCU: Project Coordinating Unit; PD: Project Director; PT: Project Team; LPC: Local Project Coordinator; PSC: Project Steering Committee; ROC: Regional Operational Committees; BOC: Budget and Operations Officer; FLO: Funding Liaison Officer

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Responsible for data collection *	Assumptions
Component 1: Information and knowledge management							
Outcome 1.1 Comprehensive knowledge about globally-important agrobiodiversity, its values, the traditional practices, the scientific and technological research and development activities, associated knowledge base and capacities that maintain the diversity in Mexico, has been generated, communicated and made available for its use.	- Direct project coverage: Number of hectares of globally important landraces (traditional varieties) -N° of existing data bases for agroBD species converted / transformed according to a Comprehensive Agrobiodiversity Information System (SIAgroBD) -N° of analysis and synthesis based on the SIAgroBD and on results of research projects to guide decision making	None None None	350,000 ha 12 databases currently being processed 1	700,000 ha 12 converted databases 3	Project reports and records in data bases 12 databases included in the Information System Analysis and synthesis published	PCU PCU PCU	-Key stakeholders (institutional and social) have access to and are aware of the information generated. -Partnerships are created between key stakeholders and they are willing to participate in decision-making processes

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Responsible for data collection *	Assumptions
	-Level of awareness of the economic and cultural values of agroBD among key stakeholders, measured through an AgroBD Value Awareness Index to be developed at the beginning of the project	Baseline to be determined during first 6 project months (e.g., 30 from 100 points)	TBD depending on baseline (e.g., 60 from 100 points)	TBD depending on baseline (e.g., 80 from 100 points)		PCU	
<u>Output 1.1.1</u> New knowledge generated through participatory research	-N° of participatory research projects -N° of implementation areas with ongoing projects -N° of publications	0 projects 2 areas None	10 projects started 4 areas 1	10 projects concluded 6 areas 3	Project reports		-Different stakeholders (communities, institutions and others) have an opportunity and are willing to participate in research projects
<u>Output 1.1.2</u> A Comprehensive Agrobiodiversity Information System (SIAgroBD) has been developed through a protocol designed, approved, and adopted by key stakeholders to facilitate its public access	-Protocol designed, approved and adopted - Comprehensive Agrobiodiversity Information System (SIAgroBD) adopted	None Experience in linking distributed databases	Protocol designed SIAgroBD designed	-Protocol approved and adopted -SIAgroBD implemented	Protocol approval letters Information provided by SIAgroBD		-Key stakeholders are open to collaborating in the design and implementation of the protocol

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Responsible for data collection *	Assumptions
	and used by key project stakeholders -N° of key institutional stakeholders that have adopted and are using the SIAgroBD	None 0	 0	 At least 75%	 Register of SIAgroBD users		-Key stakeholders are open to sharing information and to participate in database conversion
<u>Output 1.1.3</u> Strategy of participatory economic valuation and communication/ dissemination of agroBD values between the different stakeholders, aimed at small producers and their families (in coordination with output 2.1.1), policymakers (see output 3.1.1) and consumers (see output 4.1.1), designed and implemented	-Protocol for participatory rural valuation (including suburban areas) of agroBD services for the food security of small producers and their families -Protocol for the economic valuation of the nutritional, health and other functional values of agroBD products -No of materials for the communication and dissemination of agroBD values -A communication strategy for building awareness on the values of agroBD among	0 0 Baseline to be deter-mined None	1 1 12 Strategy designed	1 1 30 Strategy implemented in project	-Reports on focus group meetings in the six project working areas -Reports on the systematic implementation of communication and dissemination campaigns -Register of SIAgroBD users -Materials with different content appropriate for disseminating agroBD values in components 2 and		-Communities in the working areas are willing to participate in evaluation sessions. -Support for the three levels of government and key stakeholders for the design and implementation of dissemination strategies

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Responsible for data collection *	Assumptions
	producers, political decision-makers and consumers is designed and made available for its use under project components 2, 3 and 4			components 2, 3 and 4	3 and for the component 4 promotion and marketing campaign		

Component 2: Strengthening of local capacities							
Results chain	**Indicators**	**Baseline**	**Mid-term target**	**Final target**	**Means of verification**	**Responsible for data collection**	**Assumptions**
Outcome 2.1 Local capacities have been strengthened to support long-term plans and actions for agroBD conservation and sustainable use, to develop	1. Area in hectares where knowledge, practices and/or management derived from capacity-building projects for	604 hectares	1,090 hectares	2,180[81] hectares	Annual project progress reports	LPC and ROC	-Some farmers in the target locations are interested in adopting knowledge stemming from long-term agroBD

[81] The indirect target of more tan 4 millon hectares is to us extremely relevant because it translates into what we consider to be the relevant areas in the country where traditional agriculture still takes place. It will be achieved through the combination of actions of the whole project both through the work in the specific implementation sites, but also by integrating data and information at a larger scale in the Agrobiodiversity Information System to generate knowledge useful to inform decision making generally in this topic, and future agricultural developments, by targeting to influence public policy and markets.

strategies for revaluating traditional knowledge, and to support continuous adaptation to climate change.	agroBD conservation are applied 2. Number of producers having received different benefits for conserving and sustainably using agroBD (market incentives, subsidies for conserving agroBD and related traditional practices) 3. Number of globally significant species (cultivated and wild) is maintained in the agroecosystems described in the specific implementation areas	2,268 168 species/described agroecosystems	2,900 168 species/described agroecosystems	4,100 168 species/described agroecosystems			conservation programmes and actions
<u>Output 2.1.1</u> Capacity building programs to increase local knowledge and skills for managing regional agroBD through participatory research and information sharing among farmers, developed and implemented.	1. Number of annual events for exchanging knowledge about agroBD 2. Number of materials per year for disseminating knowledge about agroBD (catalogues, books, posters, murals, radio programmes, etc.)	1. 25 2. 22	1. 50 2. 44	1. 75 2. 66	Project progress reports Examples of materials for dissemination		- Previous agroBD conservation events and initiatives have been organized in working regions and this has made farmers aware of the topic - Some farmers and their families in working regions are interested in taking part in capacity-building

							programmes for regional agroBD management
<u>Output 2.1.2</u> Seed conservation projects (community and family seed banks, networks of seed custodians, seed exchange initiatives, and others) for improving self-management and control of local and regional agroBD by farmers, implemented	1. Total number of projects (broken down into n° of seed banks, n° of exchange networks, n° of exchanges, n° of custodians) 2. N° of locations where seed conservation projects are implemented 3. Number of farmers participating in seed conservation projects 4. Percentage of women participating in seed conservation projects 5. Percentage of young people participating in seed conservation projects.	1. 7* 2. 31 3. 133 4. 43% 5. 14% *(Baseline data of component 2 taken from table 1 of the ProDoc)	1. 14 2. 43 3. 266 4. 50% 5. 30%	1. 21 2. 54 3. 400 4. 50% 5. 30%	Project progress reports by region		- Some farmers and their families (women and young people) in working regions are interested in taking part in regional seed conservation projects
<u>Output 2.1.3</u> Milpa and other agroforestry systems improved, diversified, more productive and better adapted to climate change	1. Total number of projects, differentiated by project type 2. Number of locations where milpa and other	1. 98 2. 63 3. 2260	1. 200 2. 120 3. 4500	1. 300 2. 180 3. 6750	Project progress reports by region	LPC and ROC	- Some farmers and their families (women and young people) in working regions are interested in

	agroforestry systems (MoAS) are improved 3. Number of farmers participating in improvement of MoAS 4. Percentage of women participating in improvement of MoAS 5. Percentage of young participating in improvement of MoAS.	4. 39% 5. 22%	4. 50% 5. 30%	4. 50% 5. 30%			improving their milpa by adopting appropriate techniques and knowledge

Component 3: Improvement of public policies							
Results chain	**Indicators**	**Baseline**	**Mid-term target**	**Final target**	**Means of verification**	**Responsible for data collection**	**Assumptions**

<u>Outcome 3.1</u> The protection and promotion of traditional knowledge, practices and production systems have been mainstreamed into public policies and planning, generating effective partnerships with the communities, and disseminating values associated with agroBD and local cultures.	-The 2019-2024 National Development Plan incorporates agroBD in one or more objectives, strategies or lines of action -Number of sectoral programmes incorporating agroBD in one or more objectives, strategies or lines of action -Number of budget programmes whose operating rules incorporate regulations, rules, criteria or incentives aimed at the	The 2013-2018 NDP did not include agroBD in objectives and lines of action 2019-2024 sectoral programmes have not been formulated 2 budget programmes	The NDP incorporates agroBD in one or more objectives, strategies, lines of action or cross-cutting strategies (1) Environmental, (2) Farming development, (3) Social development and (4) Special Indigenous People's sectoral programmes incorporate agroBD 6 budget programmes	The NDP incorporates agroBD in one or more objectives, strategies, lines of action or cross-cutting strategies (1) Environmental, (2) Farming development, (3) Social development and (4) Special Indigenous People's sectoral programmes incorporate agroBD 9 budget programmes	National Development Plan published in the Federation Official Journal Sectoral Programmes published in the Federation Official Journal Operating rules and/or guidelines published in the Federation Official Journal		The stakeholders perceived and assessed the effects of conserving and promoting knowledge, practice and traditional production systems designed to maintain agroBD in a positive manner

	conservation and sustainable use of agroBD						
<u>Output 3.1.1</u> A communication and awareness-building strategy aimed at decision-makers on the value and importance of the conservation and sustainable use of agroBD, formulated and implemented	-Communication and awareness-building strategy formulated and implemented Public officials´ awareness of agroBD values, to be measured with the AgroBD Value Awareness Index developed under output 1.1.3	No communication and awareness strategy is present XX points (out of 100) in the awareness index Baseline to be determined after having developed the Index	Communication and awareness strategy formulated and implemented 50 points in the awareness index	Communication and awareness strategy formulated and implemented 85 points in the awareness index	Communication and awareness strategy document Tool for measuring the awareness of public officials		
<u>Output 3.1.2</u> Inter-institutional strategy for integrating the conservation and	-Number of policies (regarding NDP, sector programmes and budget programmes) prioritized	- 0 prioritized policies	- 15 prioritized policies	- 15 prioritized policies	Inter-institutional strategy document		- Institutional representatives are willing to listen, debate, negotiate

use of agrobiodiversity, agreed and implemented.	-Number of policies negotiated -Number of policies amended	- 0 negotiated policies - 0 policies amended	- 6 negotiated policies - 3 amended policies	- 12 negotiated policies - 9 amended policies			and agree and are sufficiently senior to implement agreements in their own institutions - Agreements reached by representatives are legally binding.

Component 4: Valuation of agrobiodiversity and market linkages							
Results chain	**Indicators**	**Baseline**	**Mid-term target**	**Final target**	**Means of verification**	**Responsible for data collection**	**Assumptions**
Outcome 4.1 The marketing and consumption of agroBD products have been enhanced through new strategies of agroBD valuation and market incentives, with a short value chain approach	-Strategy for agroBD product promotion and marketing campaigns designed and implemented -Accessibility of agroBD products to local and regional markets, measured through a compound index of 4 indicators of marketing access facilities identified under project output 4.1.2 for strengthening market linkages (sum of values of these 4 output indicators).	None 2	Strategy designed 19	Strategy implemented 52	Strategy paper Reports by Local Project Coordinator and Regional Operational Committees	PCU and PD LPC and ROC	-Support of federal and local governments -Cooperation of producers and traders and their organizations in organizing corresponding activities
Output 4.1.1 Dissemination and education campaigns directed to consumers on the specific nutritional, health, wellbeing and other values of agroBD products (values identified in participatory economic	-Number of market studies -Number of agroBD valuation and marketing campaigns	0 0	4 3	6 6	- Reports by LPC and ROC -Audiovisual and printed materials	LPC and ROC	Stakeholders coordinate with one another to implement the campaign designed based on biodiversity values

valuation under component 1, output 1.1.3)	-Number of social communication and promotion materials on agroBD values aimed at consumers for positioning brands, geographical designations and other marks of local identity -Number of campaign and material evaluations at the intermediate and final project stages	TBD during first 6 project months 0	TBD depending on baseline 1	TBD depending on baseline 2	Evaluation reports		Advisers have the capability to design materials. Advisers have the capability to carry out diagnostic and impact assessments on marketing campaigns and evaluate consumer perceptions.
<u>Output 4.1.2</u> Strengthened market linkages between small-scale farmers (family farmers and indigenous communities) and local and regional markets, to support conservation through sustainable production of food and goods based on agrobiodiversity.	-Number of marketing premises and outlets in short marketing chains or circuits -Number of agrobiodiversity fairs -Number of special gastronomic fairs or meetings between traditional cooks and chefs -Number of contracts in local supermarkets -Number of pivot businesses set up	0 1 0 1 0	6 3 3 3 4	12 20 (at least) 6 (at least) 6 (at least) 8	Reports by Local Project Coordinators and Regional Operational Committees	LPC and ROC	Coordination of local governments in each area of intervention, coordination between producers, CONABIO and the various local stakeholders.
<u>Output 4.1.3</u> Innovative market incentives that promote the conservation of	-A collective brand	0	1	1	-Documents of brand registration procedure		Coordination has been established between CONABIO,

agroecosystems and generate a transformational change in business-as-usual rural production	-Number of participatory guarantee systems -Number of websites for encouraging product promotion and marketing -An agroBD gastronomy App	Baseline to be determine d in the first semester 0 None	Base line plus 30% 3 App installed and in use	Base line plus 60% 6 App improved	-Participatory guarantee system registers -Web pages installed and in use -App in use		producer organizations and government bodies (such as the Mexican Institute of Industrial Property – IMPI) and civil associations for setting up producer associations, registering brands and establishing regulations for use. -Agreements are in place between producers and consumers for establishing agroBD product guarantee systems. -Technical capabilities are present among producer organizations for the dissemination of e-commerce.

APPENDIX 2: WORK PLAN

Acronyms: PSC: Project Steering Committee; EAC: External Advisor Council; PCU: Project Coordinating Unit; PD: Project Director; LPC: Local Project Coordinator; ROC: Regional Operational Committee; FO: Farmers' organizations

Output	Activities	Responsible	Year 1				Year 2				Year 3				Year 4				Year 5			
			C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
Component 1: Information and knowledge management																						
Output 1.1.1 New knowledge generated through	1.1.1.1 Collect and generate relevant information for inclusion in SIAgroBD	PCU, LPC, ROC		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Output	Activities	Responsible	Year 1				Year 2				Year 3				Year 4				Year 5			
			C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
participatory research **Indicators:** 1. N° of participatory research projects 2. N° of implementation areas with ongoing projects 3. N° of publications	1.1.1.2 Add information generated by research projects to SIAgroBD	PCU							x	x	x	x	x	x	x	x	x	x	x	x	x	x
	1.1.1.3 Analyse and summarize information generated by research projects	PCU									x	x	x	x	x	x	x	x	x	x	x	x
	1.1.1.4 Disseminate and publish information and knowledge generated based on the system, which will also serve as an input for output 1.1.3 Communication and dissemination strategy	PCU, LPC, ROC			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Output 1.1.2 A Comprehensive Agrobiodiversity Information System (SIAgroBD) has been developed through a protocol designed, approved, and adopted by key stakeholders to facilitate its public access. **Indicators:** -Protocol designed, approved and adopted -SIAgroBD adopted and	1.1.2.1 Identify existing information sources and their characteristics	PCU, LPC, ROC	x	x	x																	
	1.1.2.2 Involve key stakeholders in protocol design and adoption once a working group has been established	PCU, LPC, ROC		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	1.1.2.3 Set up a working group with key stakeholders for the design, creation and adoption of SIAgroBD	PCU, LPC, ROC			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Output	Activities	Responsible	Year 1				Year 2				Year 3				Year 4				Year 5			
			C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
used by key project stakeholders -N° of of key institutional stakeholders that have adopted and are using the SIAgroBD																						
Output 1.1.3 Strategy of participatory economic valuation and	1.1.3.1 Develop a participatory rural appraisal protocol for agroBD services for food security	PCU, ROC	x	x																		

Output	Activities	Responsible	Year 1				Year 2				Year 3				Year 4				Year 5			
			C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
communication/dissemination of agroBD values between the different stakeholders, aimed at small producers and their families (in coordination with output 2.1.1), policymakers (see output 3.1.1) and consumers (see output 4.1.1), designed and implemented **Indicators**: - Protocol for participatory rural appraisal (including suburban areas) of agroBD services for the	1.1.3.2 In cooperation with other strategic partners, develop an economic valuation protocol for agroBD product nutritional, health and other functional values	PSC, PCU, ROC			x	x	x	x														
	1.1.3.3 Organize and facilitate focus group work or other participatory approaches approved for the implementation of participatory rural appraisal.	PCU, LPC, ROC																				
	1.1.3.3 Identify the most important messages for the agroBD value communication and dissemination strategy differentiated by stakeholder and area, in coordination with those responsible for components 2, 3 and 4	PCU, LPC, ROC					x	x	x	x												

Output	Activities	Responsible	Year 1				Year 2				Year 3				Year 4				Year 5			
			C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
food security of small producers and their families -Protocol for the economic valuation of the nutritional, health and other functional values of agroBD products -N° of materials for the communication and dissemination of agroBD values -Level of awareness about the economic and cultural values of agroBD among project stakeholders, measured through an AgroBD Value Awareness Index to be developed at the beginning of the project	1.1.3.5 Design a mechanism for communicating and disseminating the value of agroBD for producers in project intervention areas, with particular emphasis on young people, women and children (in coordination with output 2.1.1); for policymakers (in coordination with output 3.1.1) and for consumers (in coordination with output 4.1.1)	PCU, LPC, ROC, FO							x	x	x	x											
	1.1.3.6 Produce relevant materials (graphs, audiovisual material, policy papers, event programs, etc.) to aid dissemination	PCU							x	x	x	x											
	1.1.3.7 Support regional coordinators in the implementation of the dissemination strategy. This strategy for communicating and disseminating the value of agroBD will be implemented within the framework of components 2, 3 and 4 addressing participating communities, policymakers and consumers, respectively.	PCU, LPC, ROC										x	x	x	x	x	x	x	x	x	x	x

Acronyms: EAC: External Advisor Council; PCU: Project Coordinating Unit; PD: Project Director; LPC: Local Project Coordinator; ROC: Regional Operational Committee; LAT: Local advisory teams (made up of local technicians, extension agents, researchers); FO: Farmers' organizations

Output	Activities	Responsible	Year 1				Year 2				Year 3				Year 4				Year 5			
			C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
Component 2: Strengthening of local capacities																						
Output 2.1.1 Capacity building programs to increase local knowledge and skills for managing regional agroBD through participatory research and information sharing among farmers, developed and implemented. **Indicadores:** 1. Number of annual events for exchanging knowledge about agroBD 2. No of materials per year for disseminating knowledge about agroBD (catalogues, books, posters, murals, radio programmes, etc.)	2.1.1.1 Design programmes to build capacities for the conservation and sustainable management of agroBD through regional and inter-regional exchange events, participatory research, participatory research projects, dissemination materials and other methods	LPC and ROC	x				x				x				x				x			
	2.1.1.2 Produce and distribute materials for disseminating knowledge and appreciation of agroBD (brochures, books, posters, murals, radio programmes and so on)	LPC, ROC and FO		x				x				x				x				x		
	2.1.1.3 Arrange regional and inter-regional events for information exchange and participatory research and other methods. These events will include regional agroBD fairs.	LPC, ROC and FO				x				x				x				x				x
	2.1.1.4 Systematize and disseminate lessons learned from capacity-building programmes for the	LPC and ROC				x				x				x				x				x

Output	Activities	Responsible	Year 1				Year 2				Year 3				Year 4				Year 5			
			C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
	conservation and sustainable use of agroBD																					
Output 2.1.2 Seed conservation projects (community and family seed banks, networks of seed custodians, seed exchange initiatives, and others) for improving self-management and control of local and regional agroBD by farmers, implemented. **Indicators:** 1. Total number of projects (broken down into n° of seed banks, n° of exchange networks, n° of exchanges, n° of custodians) 2. Number of locations where seed conservation projects are implemented 3. Number of farmers participating in seed conservation projects	2.1.2.1 Establish principles and conditions for conserving seeds in target regions, including technical rules and specifications.	PCU, LPC and ROC		x																		
	2.1.2.2 Identify, diagnose and select seed management initiatives that are in progress of planned by local and external stakeholders such as farmers, farmers' organizations, local entrepreneurs, researchers or civil society organizations	LPC and ROC		x																		
	2.1.2.3 Implement seed conservation projects by establishing: Seed custodian and exchange networks; community seed banks	LPC and ROC		x			x				x				x				x			
	2.1.2.4 Build and/or upgrade the local infrastructure for community seed banks when it has been established that this is the most appropriate strategy.	FO and ROC			x			x				x				x				x		
	2.1.2.5 Provide direct technical and organizational assistance to community seed bank and seed exchange projects	LAT			x	x		x	x	x		x	x	x		x	x	x		x	x	x

Output	Activities	Responsible	Year 1				Year 2				Year 3				Year 4				Year 5			
			C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
4. Percentage of women participating in seed conservation projects 5. Percentage of young people participating in seed conservation projects.																						
Output 2.1.3 Milpa and other agroforestry systems improved, diversified, more productive and better	2.1.3.1 Identify and diagnose initiatives underway or planned for participatory genetic improvement or milpa improvement carried out by local or outside stakeholders.	LPC and ROC		x																		

Output	Activities	Responsible	Year 1				Year 2				Year 3				Year 4				Year 5			
			C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
adapted to climate change **Indicators:** 1. Total number of projects, differentiated by project type 2. Number of locations where milpa and other agroforestry systems (MoAS) are improved 3. Number of farmers participating in improvement of MoAS 4. Percentage of women participating in improvement of MoAS 5. Percentage of young participating in improvement of MoAS.	2.1.3.2 Select participatory genetic or milpa improvement projects to be supported by this project.	LPC and ROC		x			x				x				x				x			
	2.1.3.3 Implement participatory genetic improvement or milpa improvement projects by carrying out the following specific actions: Participatory genetic improvement; milpa diversification and improvement; improvement of traditional seed storage techniques.	LPC, ROC and FO			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	2.1.3.4 Provide technical and organizational assistance to projects through ongoing support by local technicians and project and scientific advisers.	ROC and FO			x	x		x	x	x		x	x	x		x	x	x		x	x	x
	2.1.3.5 Periodically assess the acquisition and application of acquired knowledge and skills by farmers participating in genetic improvement and/or milpa improvement projects	LPC, ROC and FO				x				x				x				x				x

Notes: 1) We suggest introducing an annual call for the addition of other projects but we must prioritize projects requiring continuity such as participatory genetic improvement, seed bank or custodian network projects. 2) We suggest setting up a regional operational committee (ROC) for each region with the participation of farmers, NGOs, academics and institutional representatives for the evaluation of projects and the selection of new projects.

Acronyms: EAC: External Advisor Council; PCU: Project Coordinating Unit; LPC: Local Project Coordinator; ROC: Regional Operational Committee; LAT: Local advisory teams (made up of local technicians, extension agents, researchers); FO: Farmers' organizations

Output	Activities	Responsible	Year 1				Year 2				Year 3				Year 4				Year 5			
			C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
Component 3: Improvement of public policies																						
Output 3.1.1 A communication and awareness-building strategy aimed at decision-makers on the value and importance of the conservation and sustainable use of agroBD, formulated and implemented **Indicators:** 1. Communication and awareness-building strategy formulated and implemented 2. Public officials´ awareness of agroBD values, to be measured with the AgroBD Value Awareness Index developed under output 1.1.3	3.1.1.1 Determine the knowledge, perceptions and awareness levels of decision-makers	PCU	x	x																		
	3.1.1.2 Formulate communication and awareness objectives	PCU			x																	
	3.1.1.3 Define key messages and the call to action, in coordination with components 1, 2 and 4	PCU				x	x	x		x				x								
	3.1.1.4 Identify and select communication channels and prepare the corresponding products	PCU					x	x	x				x			x			x			
	3.1.1.5 Monitor and evaluate the effectiveness of messages	PCU								x	x	x	x	x	x	x	x	x				

Output 3.1.2 Inter-institutional strategy for integrating the conservation and use of agroBD, agreed and implemented. **Indicators**: 1. Number of policies (regarding NDP, sector programmes and budget programmes) prioritized 2. Number of policies negotiated 3. Number of policies amended	3.1.2.1 Prioritize legislation, policies and programmes that we seek to influence	PCU/EAC	x	x	x																	
	3.1.2.2 aw up an analysis of policies and formulate alternative policies	EAC				x	x															
	3.1.2.3 Negotiate and agree on proposals	EAC/ CONABIO							x	x	x	x	x	x	x	x	x	x				
	3.1.2.4 Incorporate proposals in the relevant instruments									x				x				x				
	3.1.2.5 Develop the capabilities of institutions responsible for implementing changes	PCU/ CONABIO									x	x	x	x	x	x	x	x	x	x	x	x
	3.1.2.6 Monitor and evaluate changes	PCU/ CONABIO									x	x	x	x	x	x	x	x	x	x	x	x

Acronyms: EAC: External Advisor Council; PCU: Project Coordinating Unit; LPC: Local Project Coordinator; ROC: Regional Operational Committee; LAT: Local advisory teams (made up of local technicians, extension agents, researchers); FO: Farmers' organizations

Output	Activities	Responsible	Year 1				Year 2				Year 3				Year 4				Year 5			
			C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
Component 4: Valuation of agrobiodiversity and market linkages																						
Output 4.1.1 Dissemination and education campaigns directed to consumers on the specific nutritional, health, wellbeing and other values of agroBD products (values identified in participatory economic valuation under component 1, output 1.1.3) **Indicators:** -Number of market studies -Number of agroBD valuation and marketing campaigns -Number of social communication and promotion materials on agroBD values aimed at consumers for positioning brands,	4.1.1.1 Carry out market studies in intervention areas to map stakeholders, identify needs and understand consumers.	CONABIO, EAC, ROC, FO				x	x	x			x	x			x	x			x			
	4.1.1.2 Implement agroBD valuation and marketing campaigns in each project working area in accordance with the overall agroBD evaluation strategy indicated in output 1.1.3.	EAC, ROC, FO			x	x	x	x			x	x			x	x			x	x		
	4.1.1.3 Design and produce social communication and promotion materials on the values of agroBD aimed at consumers	CONABIO, EAC, ROC, FO		x	x	x	x	x	x	x												
	4.1.1.4 Evaluate the impact of communication campaigns and materials among consumers at intermediate and final project stages in project working areas s and at national level, if possible	ROC									x	x								x	x	

Output	Activities	Responsible	Year 1				Year 2				Year 3				Year 4				Year 5			
			C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
geographical designations and other marks of local identity -Number of campaign and material evaluations at the intermediate and final project stages																						
Output 4.1.2 Strengthened market linkages between small-	4.1.2.1 Set up and strengthen marketing premises and outlets in short food chains or circuits	PCU, LPC, ROC, FO				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		

Output	Activities	Responsible	Year 1				Year 2				Year 3				Year 4				Year 5			
			C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
scale farmers (family farmers and indigenous communities) and local and regional markets, to support conservation through sustainable production of food and goods based on agrobiodiversity. Indicators: -No of marketing premises and outlets in short marketing chains or circuits -Number of agrobiodiversity fairs -Number of special gastronomic fairs or meetings between traditional cooks and chefs -Number of contracts in local supermarkets -Number of pivot businesses set up	4.1.2.2 Promote and organize agrobiodiversity fairs	PCU, LPC, ROC, FO				x				x				x				x				x
	4.1.2.3 Promote and organize special gastronomic fairs or meetings between traditional cooks and chefs	PCU, LPC, ROC, FO				x				x				x				x		x		x
	4.1.2.4 aw up contracts with public and private sector self-service stores	LPC, FO					x					x			x		x		x		x	
	4.1.2.5 Strengthen community organizational and business administration and support for family business start-ups	PCU, LPC					x	x				x	x			x	x			x		

Output	Activities	Responsible	Year 1				Year 2				Year 3				Year 4				Year 5			
			C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
Product 4.1.3 Innovative market incentives that promote the conservation of agroecosystems and generate a transformational change in business-as-usual rural production **Indicators:** -A collective brand -Number of participatory guarantee systems -Number of websites for encouraging product promotion and marketing -An agroBD gastronomy App	4.1.3.1 Help to register and operate a collective brand.	PCU, EAC, FO	x	x	x	x	x	x	x	x	x	x	x	x								
	4.1.3.2 Cooperate in establishing participatory guarantee systems (PGS)																					
	4.1.3.3 Set up and supply social network websites to promote and marked products	LPC, FO					x	x														
	4.1.3.4 Develop, distribute and add to an agroBD gastronomy App	PCU			x	x	x	x														

Appendix 3: PROJECT BUDGET

Project Budget final
SAGARPA.xlsx

Appendix 4: RISK MATRIX[82]

* *Acronyms*: PSC: Project Steering Committee; PCU: Project Coordinating Unit; PD: Project Director; PT: Project Team; LPC: Local Project Coordinator; ROC: Regional Operational Committees

	Description of risk	Impact[83]	Probability of occurrence[1]	Degree of incidence	Mitigation actions	Responsible party
1	**Environmental:** Genetic erosion and loss of agrobiodiversity has likely already reduced the capacity to face extreme circumstances caused by climate change.	MH. Losing genetic diversity of cultivars for which Mexico is the centre of origin and diversification, as well as of their wild relatives, making them unable to respond to extreme climate change events. In the short term, the population that depends on traditional agriculture will be affected, and in the medium-long term this will limit the ability of breeding programmes to obtain new varieties capable of facing this type of challenge. This will therefore also have a general effect on agriculture (and intensive agriculture in particular), which depends on such varieties for production, potentially affecting the entire population.	**ML**	Amber	The project will contribute to protect genetic resources that may address climate change challenges in Mexico through: • The generation and promotion of knowledge. • Valuation of the millenary processes (including the relationship between humans and plants) behind the diversification of these resources. • Capacity building for those who manage the resources directly and also for other decision makers that can have a positive impact on the conservation of agrobiodiversity. • Attention to local and regional markets Public policies related to reinforcing the conservation and sustainable use of the resources.	PSC
2	**Environmental / climate:**	ML: Extreme climate events linked to climate change can cause sudden loss of	**ML**	Amber	The project will identify and promote the conservation and sustainable use of materials that have already adapted to	PSC PD LPC

[82] Please consult available corporate guidelines and training for information on how to complete the risk log on the ERM website.
[83] H: High; MH: Moderately High; ML: Moderately Low; L: Low

	Description of risk	Impact[83]	Probability of occurrence[1]	Degree of incidence	Mitigation actions	Responsible party
	Accelerated loss of elements of agrobiodiversity due to drastic climate change.	crops/stocks that do not have traits of resistance to such events (but may exhibit diversity in other traits of interest)			extreme abiotic and biotic conditions and which most certainly include genetic combinations that have contributed to their resilience. The Project also covers the setting up of projects aimed at local seed conservation (output 2.1.2) Project areas of intervention are distributed in geographic regions with very different characteristics, which decreases the likelihood of extreme events occurring in all chosen locations	
3	**Social:** Target communities may lack disposition to participate in the project in the terms that it is formulated	**ML:** Project outcomes will not be achieved with regard to conservation of agrobiodiversity and project progress concerning the capacity to influence and carry out participatory activities such as information gathering, evaluation, capacity building and this will affect the link with markets planned in locations involved.	**L**	Green	To counter resistance or skepticism, the project will continue to work hand in hand with well-respected local organizations and researchers with strong links to the target communities. They participated in the different regional workshops and their initial concerns where addressed. Throughout the implementation of the project the participative nature of the four components will keep them engaged so as to incorporate their grievances and feedback.	LPC ROC
4	**Social:** Lack of younger people living in the communities and participating in the project, that can be a replacement generation and safeguard continuity	**H:** Abandonment of the countryside is foreseeable and this would lead to loss of native varieties, which would no longer be cultivated. Genetic diversity of cultivars depends on the permanent continuation of this process of evolution through domestication. The absence of young people in communities involved in the	**H**	Amber	The participation of young people is fundamental to achieve a generational replacement not only of farmers, but of all those who hold the knowledge around agrobiodiversity and who live within the communities in which the project will be implemented, or in other regions. The project has included key actors of several academic institutions to assure the involvement and participation of young recent graduates that manifest interest in	PSC PD ROC LPC

	Description of risk	Impact[83]	Probability of occurrence[1]	Degree of incidence	Mitigation actions	Responsible party
		project will weaken the monitoring of agricultural activities linked to maintenance of agrobiodiversity in areas of intervention in the medium and long-term, i.e. more than five years after project implementation.			the projects goals. It has also established the need of youth involvement in most of its components, especially in capacity building, valuation and markets. A communication campaign will also be launched with youth leadership. All of these actions target youth in general, including the inclusion of digital tools.	
5	**Political/social:** Insecurity in some rural areas as a result of organized crime.	**MH**. This sociopolitical phenomenon can cause transit through some working areas to become dangerous and difficult for project officials, which would lead to non-compliance with project goals in those areas.	**ML**	Amber	Agree with working area local partners over transit protocols in working areas in order to minimize risk. When the area is definitely very unsafe, work will no longer be carried out in that area and, in recompense, efforts will be increased in another project area offering greater safety.	PSC PD ROC LPC
6	**Political/institutional:** The government agencies lack disposition towards participation in the project and sharing information.	ML. The Project will not achieve the established goals because the area, population and species covered by the project are supposed to be increased through the participation of government agencies. It will also be difficult to improve public policies for traditional agriculture.	**ML**	Amber	The role that will be performed by all of the participating agencies in the project has been set during full project preparation and agreed through the Project Document. This role has been assigned according to the legal attributes and capacities of each agency.	PD PSC
7	**Institutional:** Researchers lack disposition to share information and form exchange networks.	ML: The information contained and made available through SIAgroBD will be less than expected.	**(ml)**	Amber	Initial contact has been established to the most important researchers on national agrobiodiversity. Through meetings, workshops and general sharing of ideas, an intention of collaboration has been asserted. CONABIO has previous experience of involving researchers in	PD PSC

	Description of risk	Impact[83]	Probability of occurrence[1]	Degree of incidence	Mitigation actions	Responsible party
					information-gathering projects (see global maize project http://www.biodiversidad.gob.mx/genes/proyectoMaices.html)	

Appendix 5. ENVIRONMENTAL AND SOCIAL ASSESSMENT

Appendix 5
Environmental and S

Appendix 6. Tracking tools

See separate file.

Appendix 7. TERMS OF REFERENCE (**Draft**[84] for PCU personnel)

Project Director

Under the overall supervision of the National Coordination of CONABIO, the Project Director (PD) will act as the leader of the Project's Coordination Unit (PCU) and will be responsible for leading, supervising and coordinating all activities aimed at the successful implementation of the four components of the project, budget execution, team management, and maintenance of institutional relationships with project partners. The Project Director will be responsible for overall and annual planning, the preparation of contracts and agreements with organizations and consultants, technical supervision of the PCU members and advisers, and the daily management of the project.

Main responsibilities

- Coordinating and closely monitoring the implementation of project activities
- Day-to-day management
- Coordination with related initiatives
- Tracking the project's progress and ensuring timely delivery of inputs and outputs
- Direct the execution of the project's technical and administrative activities, in cooperation with the Local Project Coordinators (LPC).
- Coordinate and participate in the start-up workshop, and the planning workshops with local stakeholders and project partners for the preparation of the Annual Work Plan (s) and Budget(s) (AWP/B).
- Provide technical assistance and guide project partners and consultants in the implementation of activities related to the project.
- Periodically conduct supervisory visits in the field and advise the technical personnel of the project partners.
- Permanent coordination and communication with project partners' personnel in charge of project activities.
- Monitor risks according to the risk matrix (see APPENDIX 4) and ensure the implementation of mitigation measures.
- Prepare the Project Progress Reports (PPRs) and the Terminal Report (TR) in coordination with the project team and submit it for the consideration and review of the LTO, and the Project Steering Committee (PSC).
- Prepare a draft version of Annual Project Implementation Review(s) (PIR) to be finalized by the LTO, and cleared by the PSC and the FAO Representative in Mexico, and submitted to the FAO/GEF Coordination Unit.
- Submitting the OP six-monthly technical and financial reports to FAO and facilitate the information exchange between the OP and FAO
- Advise project partners in the preparation of reports on in-kind and in-cash cofinancing provided by co-financiers and other partners that were not foreseen in the Project Document.
- Supporting the organization of the mid-term and final evaluations in close coordination with FAOMX and the FAO Independent Office of Evaluation (OED).
- Coordinate the review and approval of the terms of reference and technical specifications, in order to proceed to the corresponding contracts.
- Coordinate work plans with the consultants hired to implement the project.

[84] Consultants' Terms of Reference will be revised and validated during the project's inception.

- Organize and serve as Secretary for the Project Steering Committee PSC.
- Ensuring a high level of collaboration among participating institutions and organizations at the national and local levels.
- Make the necessary arrangements to facilitate—through agreements and interagency partnerships with local or national government bodies, as well as the private sector—the development of the project and the achievement of its outcomes.
- Conduct, in cooperation with the regional project coordinators, inventories of the contracts agreed to for the implementation of project activities.
- Ensure technical compliance with project objective, outcomes and outputs, and follow the monitoring and evaluation plan prepared by the M&E Expert.
- Coordinate the implementation of the project's communication strategy and the institutional strengthening activities.

Required professional profile

- Professional with an advanced degree in the agricultural or environmental engineering fields.
- Minimum of five years' experience in the management of rural development projects with a focus on the conservation and sustainable management of native plant genetic resources and its wild relatives.
- Minimum of five years' experience in coordinating development projects or components financed by international and national organizations.
- Minimum ten years' experience in the coordination of multidisciplinary teams.
- Knowledge and experience in results-based management, development and implementation of budgets, preparation of technical and financial reports, and monitoring and evaluation of projects.
- Ability to prepare concise reports according to United Nations standards.
- Knowledge and use of participatory planning tools.
- Extensive knowledge of the socioeconomic reality of Mexican rural and indigenous areas and the problems of gender equality.
- Proven ability to lead a team and capacity for teamwork.
- Excellent oral and written skills in Spanish; very good written skills in English.
- Experience managing GEF projects desired.
- Experience in implementation and evaluation of FAO projects desired.
- Availability to travel frequently to the areas covered by the project.

Duration: 58 months

Location: Headquarters of CONABIO in the Mexico City and with frequent travel to the areas covered by the project.

Languages: Spanish and English.

Local Project Coordinator (6)

Working under the general supervision of the Project Director (PD), the Local Project Coordinators (LPCs) will be part of the Project Coordination Unit (PCU) and will plan, implement and follow up on the three project field components within their respective specialist areas. They will also manage co-financing with representatives of the project's strategic partners at local level and will encourage the active participation of key stakeholders such as producer organizations, representatives of state institutions, municipal and agricultural authorities, CSOs and universities, as appropriate for effective project progress in the respective regions.

Main responsibilities and functions:

1) Contribute information on the region concerned in order to formulate key documents for project management, as follows:

i. Provide information and specific data on the region to add to the Annual Budget and Work Plan (AWP/B), track the co-financing log and monitor the activity schedule in the respective regions.

ii. Prepare and monitor the AWP/B at individual region level

iii. Help implement the project monitoring and evaluation (M&E) system in the respective region, including preparation of a weekly project progress report (PPR) and an annual project implementation review (PIR).

iv. Help implement the project communication strategy in the respective region.

2) Coordinate project implementation, manage and monitor co-financing at individual region level.

i. Ensure appropriate implementation of PTA/P activities for the three project field components.

ii. Ensure timely preparation and submission of technical dossiers, training projects, productive development, investment and research to the corresponding strategic partner programmes at individual region level.

iii. Carry out direct management with strategic project partners at individual region level.

iv. Acts as technical secretary of the Regional Operating Committee

v. Open communication channels and ensure transparency regarding information generated by the project with government institutions, municipal and agricultural authorities, producer organizations, universities and civil society organizations.

vi. Facilitate the work of consultants hired by the project when carrying out their duties in the respective region.

vii. Look after and provide information to technical and supervisory staff sent by FAO to the respective region.

3. Project administration

i. Draw up physical and financial progress reports on the respective region in accordance with formats established for this purpose.

ii. Help obtain financial information on investments and any project or action implementation carried out by the project's strategic partners and applied as co-financing in the respective region.

Professional profile required

- Professional with a degree in biology, agriculture or related fields.
- Minimum of five years' experience in multidisciplinary team work in rural areas involved in community development projects.
- Experience in dealing with government officials
- Preferably with work experience in one of the regions where the project will be implemented
- Experience in managing funding through public programmes, and preparing technical dossiers or project financing proposals
- Knowledge and use of participatory planning tools
- Demonstrated ability in the development of work plans and in monitoring and evaluation systems

Duration: 56 months

Location: any of the federal entities to be covered by the project

Language: Spanish

Bioinformatics

Qualifications

Computer Science or similar academic discipline. Candidate must have strong understanding of core Computer Science academic theory regardless of degree. Practical experience building applications using standards and technologies falling within the semantic web stack. Proficiency with Resource Description Framework (RDF), Resource Description Framework Schema (RDFS) and SPARQL Graph Query Language. Strong understanding Web Ontology Language (OWL), language profiles, consistency checking, and logical inference. Familiarity with Ontology engineering practices and modeling tradeoffs. Familiarity with and willingness to adopt upper ontology principles of Basic Formal Ontology (BFO) in systems design. Intermediate to advanced level of proficiency in object-oriented software engineering principles and including proficiency in software development using one or more modern languages such as Java and Python. Ability to creatively contribute towards developing new requirements by identifying customer needs and applying expertise and knowledge of available methods, tools, and concepts to those needs. Ability to own a task and take responsibility for completion with minimal supervision. Ability to clearly express oneself both orally and in writing.

Main responsabilities

- Work with senior software engineers, semantic web technologists, ontologists, physicists, chemists, biologists, and related field subject matter experts to implement and deploy systems for analyzing big data within the realm of intelligence analysis.
- Conceive and design innovative methods for employing semantic technologies to intelligence analysis problem sets.
- Intersect semantic web / ontology based approaches with Natural Language Processing, Information Retrieval, and Data Mining techniques to make novel advancements in practical application and research of data science and analysis.
- Support system deployment, troubleshooting and user training.
- Author and present papers on current research activities.

Supervision

Under the General Coordinator of Information and Analysis and the Coordinator of Ecoinformatics.

Informatics processor

Qualifications

Computer Science or similar academic discipline, Candidate must have understanding on statistical analyst, bioinformatics, data management and report automation support.

Main responsabilities

- Coordinating the operations, collecting, managing, and analyzing the data and assist in varying stages of development, implementation, and analysis.
- Processing high volumes of data and helps in maintaining and updating databases.
- Supports in the preparation of technician manuals and other documents that may be.
- Quantitative and statistical data analysis and automating reports that are basically concerned.

Supervision

Under the General Coordinator of Information and Analysis and the General Direction of Systems.

Capacity-building specialist for *in situ* conservation

Under the supervision of the Project Director, the capacity-building specialist for *in situ* conservation will work in conjunction with farmers, their organizations and other regional stakeholders to coordinate implementation in the working area of the component “Strengthening local capacities for conservation and sustainable use of agrobiodiversity” as part of the project *Securing the Future of Global Agriculture in the face of climate change by conserving the Genetic Diversity of the Traditional Agroecosystems of Mexico.*

Main responsibilities and duties

- Coordinate the implementation of the component “Strengthening local capacities for the conservation and sustainable use of agrobiodiversity”.
- Work in conjunction with farmers, their organizations, CSOs and researchers from the region in order to develop a plan to strengthen local capacities for the conservation and sustainable use of agrobiodiversity.
- Help increase the knowledge of farmers and their families about the local and global importance of agrobiodiversity through participatory research projects.
- Help increase the appreciation and use of local agrobiodiversity.
- Propose actions to improve the conservation, access to and distribution of seeds in the region and promote the use of little-used local varieties.
- Promote actions to improve agricultural activity such as participatory improvement, diversification or improvement of *milpa*.
- Develop strategies for the reassessment of traditional knowledge and actions for ongoing adaptation to climate change.

- Report on project progress in the region according to indicators established in the project results framework.

Duties and activities

i. Design a programme to build capacities for the conservation and sustainable management of agrobiodiversity in the region, in conjunction with the regional advisory committee, farmers, their organizations, CSOs and strategic partners working in the area. This programme will take into account agrobiodiversity-related projects present in the region. Work will also be conducted in conjunction with corresponding activities under the “Management of Information and Knowledge” component.
ii. Coordinate the development of regional and interregional exchange events and participatory research projects. These events will include regional agrobiodiversity fairs.
iii. Coordinate the production and distribution of materials for disseminating knowledge and appreciation of agrobiodiversity, namely: brochures, books, posters, murals, radio programmes and so on.
iv. Systematize and disseminate lessons learned from capacity-building programmes for the conservation and sustainable use of agrobiodiversity.
v. Establish principles and conditions for conserving seeds in target regions, including technical rules and specifications.

vi. Identify, diagnose and select seed management initiatives that are in progress or planned by local or external stakeholders, such as farmers, farmers' organizations, local entrepreneurs, researchers or civil society organizations; these must involve young people and particularly women.
vii. Implement seed conservation projects by establishing one or more actions under the following options: a) seed custodian networks, b) seed exchange networks, c) community or family seed banks.
viii. Coordinate the building and/or upgrading of the local infrastructure for community seed banks when it has been established that this is the most appropriate strategy.
ix. Provide direct technical and organizational assistance to community seed bank and seed exchange projects, through ongoing support.
x. Select participatory genetic or *milpa* improvement projects to be supported by the project.
xi. Implement participatory genetic or *milpa* improvement projects through strategies described in the project or others appropriate to the region.
xii. Provide technical and organizational assistance to projects through ongoing support by local technicians, project consultants and scientists.
xiii. Identify and coordinate the necessary training in any areas where you lack experience for the purposes of project implementation.
xiv. Periodically assess the acquisition and application of acquired knowledge and skills by farmers participating in participatory genetic improvement and/or *milpa* improvement projects, through participatory assessment methods.
xv. Report on project progress in the region according to indicators established for each result at the intervals requested by the national coordination team.

Professional profile required

- Professional with a bachelor’s degree and preferably a postgraduate degree in any of the following areas: agriculture, agroecology, agronomy, genetic resources, rural development, environmental sciences or related areas.
- At least five years of proven experience in participatory agricultural and rural development projects, preferably agroecology and *in situ* conservation of genetic resources.
- Experience working with civil society organizations and academic institutions.
- Experience in participatory training and research techniques.
- Experience in results-oriented projects, with a focus on gender and youth inclusion.
- Experience with indigenous communities and their institutions.

Duration: 12 months.

Location: CONABIO office in Mexico City, with trips to project regions.

Language: Spanish

Agrobiodiversity conservation programme local technician

Under the direct supervision of the Local Project Coordinator (LPC) and with technical guidance from the Capacity-Building Specialist for *in situ* conservation, to support implementation of the “Strengthening local capacities for the conservation and sustainable use of agro biodiversity” component in your working area as part of the Agrobiodiversity-MEX project.

Main responsibilities and duties

- Support the Local Project Coordinator in all activities for implementation of the component: "Strengthening local capacities for the conservation and sustainable use of agrobiodiversity" as part of the Agrobiodiversity-MEX project.
- Agree a detailed working plan with the LPC including week-by-week activities and monthly outcomes
- Support all projects developed in the working area
- Draw up minutes of meetings and keep records of activities in the field.

Duties and activities

i. Help design a programme for strengthening conservation capacities and sustainable management of agrobiodiversity in the region.
ii. Support the development of regional and interregional exchange events and participatory research projects.
iii. Support the production and distribution of materials for disseminating knowledge and appreciation of agrobiodiversity, namely: brochures, books, posters, murals, radio programmes and so on.
iv. Support the systematization and dissemination of lessons learned from capacity-building programmes for the conservation and sustainable use of agrobiodiversity.
v. Support seed conservation projects
vi. Support the building and/or upgrading of the local infrastructure for community seed banks when it has been established that this is the most appropriate strategy.
vii. Support participatory genetic improvement or *milpa* improvement projects through strategies described in the project or others appropriate to the region.
viii. Support the obtaining of data for periodically assessing the acquisition and application of acquired knowledge and skills by farmers participating in participatory genetic improvement and/or *milpa* improvement projects.
ix. Support field data collection to report on project progress in the region in accordance with indicators established for each outcome.

Professional profile required

- Professional technician or a candidate who has gone on to further education, preferably with a bachelor's degree in rural development.
- You should live in the project implementation area or even in one of the working communities.
- Experience with civil society organizations is preferable.
- You should preferably be a bilingual indigenous woman if your working area is an indigenous region.

Duration: 36 months.

Location: Any of the following regions: Chiapas Highlands, Ocote Chiapas Reserve, Guachochi Chihuahua, Purepecha Plateau, San Juan Bautista National Valley, Villa de Tututepec, Santa Catarina Juquila, Santiago Yaitepec or Silacayoapam in Oaxaca, Chinampera area of Mexico City or *milpera* region of Yucatan.

Language: Spanish and preferably an indigenous language, depending on the region.

Public Policy Mainstreaming Expert

Under the overall supervision of the Project Director, the Public Policy Expert, along with the environmental officials, and producers and civil organizations will advise the Project Coordination Unit (PCU) in the protection and promotion of traditional knowledge, practices, and production systems through its mainstreaming into national and federal laws and public policies.

Main responsibilities and functions

- Identify and prioritize, together with other stakeholders, the national and federal laws and public policies que that have to be created, modified or improved.
- Promote the participation of different stakeholders in the discussion and negotiation of policy alternatives to integrate conservation and sustainable use of agrobiodiversity.
- Contribute substantially to the design of systems and instruments to monitor the activities and results related to the implementation of the communication and mainstreaming strategies.
- Promote the project within federal institutions and key actors at national level.
- Report in a timely manner to the Project Director of the PCU the obstacles or difficulties that the project may encounter during the mainstreaming and contribute to finding solutions.

Functions and activities

i. Update the public policy diagnosis made in the preparatory phase of the project contemplating the latest modifications to the current laws and public policies that affect agrobiodiversity.
ii. Form work groups with the different stakeholders to prioritize the laws and policies to be mainstreamed.
iii. Coordinate the preparation of policy analysis that allows formulating alternatives for the integration of criteria and measures that ensure the conservation and sustainable use of agrobiodiversity.
iv. Participate in intersectoral coordination and negotiation mechanisms to promote and agree on modifications of prioritized legal instruments and public policies, in order to ensure the conservation and sustainable use of agrobiodiversity.
v. In coordination with the Specialist in capacity development for *in situ* conservation, provide evidence, from the demonstration models implemented in the microregions, of the positive effects derived from the integration of conservation and sustainable use of agrobiodiversity in public policies.
vi. Monitor and evaluate that the modifications agreed to the legislation and public policies are carried out and that the agencies involved develop the necessary capacities to effectively implement the changes made.
vii. Advise the Regional Project Coordinators to strengthen interagency coordination mechanisms, monitor the effective implementation of modified policies and the search for mainstreaming agrobiodiversity in local public policies.

Required professional profile

- Professional with a degree in social sciences, environmental, agricultural or a related area of study.
- Experience in negotiation and participatory engagement to bring the right agrobiodiversity champions and antagonists to the table.

- Advanced analytical skills to address agrobiodiversity trends, poverty-agrobiodiversity links and the economics of different options – including foresighting (scenario planning) and future-searching.
- Advanced communication skills to inform, transmit the value of agrobiodiversity and convince decision makers to incorporate it conservation and sustainable use as a decision criterion.
- Monitoring, evaluation and learning skills that enable to handle complex multi-factor changes such as agrobiodiversity-development links.

Duration: 12 months

Location: In Mexico City with trips to the MRs in Chihuahua, Michoacán, Oaxaca, Chiapas and Yucatán.

Language: Spanish.

Promotion and marketing expert.

Under the overall supervision of the Project Director, the strategic analyst and marketing expert, along with the producers, consumers and their organizations, will advise the Project Coordination Unit (PCU) in the design and implementation of Promotion and Marketing Campaigns (PMC) of agroBD products in the six regions covered by PRODOC.

Main responsibilities and functions

- Collaborate with an expert on AbgroBD valuation (outcome 1.1 of PRODOC) to ensure that PMC incorporate the AroBD values.
- Propose PMC that are adapted to the problems and particularities of each Region, the needs of the farmers and their communities, along with consumers according to local experience, FAO's LADA-WOCAT platform, and the project's available resources.
- Ensure that the proposed PMC do not generate negative environmental impacts in the MRs and propose mitigation measures when necessary.
- Develop technical and financial PMC that are feasible and appropriate to the requirements of the project profiles that will be submitted to the co-financing institutions.
- Contribute substantially to the design of systems and instruments to monitor the activities and results related to the implementation of PMC.
- Promote the project with state institutions and key actors in the MR.
- Report in a timely manner to the National Coordinator of the PCU the obstacles or difficulties that the project may encounter during PMC development in the MRs and contribute to finding solutions.

Functions and activities

i. Complete the evaluations made in the preparatory phase of the project with regard to the design of PMC s adapted to the problems and particularities of the six Regions, short circuits of commercialization, or medium (more than 100 km.) and large circuits like national or international markets, where applicable.
ii. In coordination with the Community Planning and AgroBD valuation experts, provide elements for decision-making regarding the prioritization of intervention areas and PMC adapted to the channels of commercialization by information and participative community tools.
iii. Formulate for each Region individual PMC, taking into account the technical aspects for each, financial support needs for producers, and consumers studies assessments
iv. Develop systems of marketing which women and young people in their backyards and regional or national markets as well when applicable aimed at generating short circuits of commercialization such direct sell in the backyard, in the public markets, small retail businesses, fairs, restaurants, e-commerce and other innovative forms of social entrepreneurship.
v. Design training and extension processes for the implementation of PMC intended for developers and technicians in each Region.
vi. In conjunction with the AgroBD evaluation Expert, develop the monitoring and evaluation system for the implementation of PMC that will be disseminated among decision makers through PCU.

vii. Advise the Regional Project Coordinators and the LTAs to strengthen interagency coordination mechanisms and the search for financing for the development of PMC in each Region.
viii. Assist in the identification of experiences at the local and national levels to serve as references for PMC and for the realization of internships and experience exchanges.
ix. Advise on the development of presentation and promotion materials for PMC that can be published through the communication channels used by the project.
x. Report on each Region to the Project Coordinator, regarding recommendations for PMC design, implementation strategies, financing options, and monitoring systems.

Required professional profile

- Professional or researcher with an advanced degree in agricultural, environment, economics, sociology, administration or a related area of study.
- Minimum of 5 years' experience in collaborating with research centers, government institutions, farmers' organizations, and consumers oriented campaigns in the implementation of projects for sustainable management of natural resources, social enterprises management.
- Preferably will have work experience in the states of Chihuahua, Michoacán, Oaxaca, Mexico City, Chiapas and Yucatán.
- Experience in Promotion and marketing of agroBD products.
- Experience in the implementation of methodologies to promote gender equality and for the participation of indigenous peoples.
- Knowledge and use of tools for participatory planning, marketing marks promotion, and accountability.

Duration: 12 months

Location: In Mexico City with trips to the Regions (Chihuahua, Michoacán, Oaxaca, Chiapas and Yucatán).

Language: Spanish.

Monitoring & Evaluation Expert

Under the overall supervision of the Project Director, the Monitoring & Evaluation Expert, along with the producers and their civil organizations, will advise the Project Coordination Unit (PCU) in the design and implementation of the M&E System of the project.

Main responsibilities and functions

- Set up the joint development of M&E system, through the involvement of key stakeholders.
- Guide the overall M&E strategy and implementation of related activities within the project and via partners, plus providing timely and relevant information to project stakeholders.
- Communicate to all stakeholders the outputs of M&E findings to identify the adaptations needed for the implementation of the project.

Functions and activities

i. Help revise the project logframe matrix, particularly in the areas of the objective hierarchy, indicators and monitoring mechanisms.
ii. Develop the overall framework for project M&E, for example, annual project reviews, participatory impact assessments, process monitoring, operations monitoring and lessons learned workshops.
iii. Guide the process for identifying and designing the key indicators for each component, to record and report its physical progress.
iv. Guide the process for identifying the key performance questions and parameters for monitoring project performance and comparing it to targets.
v. Clarify the core information needs of Project Coordination Unit, Regional Operational Committees and Project Steering Committee.
vi. With stakeholders, set out the framework and procedures for the evaluation of project activities.
vii. Based on the project budgets, design the framework for the physical and process monitoring of project activities.
viii. Guide staff and implementing partners in preparing their progress reports. Together, analyze these reports in term s of problems and actions needed. Prepare consolidated progress reports for project management to submit to the relevant bodies, in accordance with approved reporting formats and timing.
ix. Review monitoring reports, analyze them for impact evaluation and to identify the causes of potential bottlenecks in project implementation.
x. Collaborate with staff and implementing partners on qualitative monitoring to provide relevant information for ongoing evaluation of project activities, effects and impacts.
xi. Foster participatory planning and monitoring by training and involving primary stakeholder groups in the M&E of activities.
xii. Identify the need and draw up the TORs for specific project studies.
xiii. Ensure that, in general, project monitoring arrangements comply with the project loan agreement and, in particular, the provisions of this agreement are fully observed in the design of project M&E.
xiv. Inform and join external supervision and evaluation missions by screening and analyzing monitoring reports as well as by furnishing direct personal knowledge of the field situation.
xv. Plan for regular opportunities to identify lessons learned and implications for the project's next steps. Participate in these events when possible.

xvi. Prepare reports on M&E findings, as required, working closely with financial controller, technical staff and implementing partners.

xvii. Undertake regular visits to the field to support implementation of M&E and to identify where adaptations might be needed.

xviii. Guide the regular sharing of the outputs of M&E findings with project staff, implementing partners and primary stakeholders.

xix. In collaboration with the financial controller, provide the project director with management information that may require.

xx. Make regular reports to the Project Steering Committee, highlighting areas of concern and preparing the documentation for review at meetings.

xxi. Check that monitoring data are discussed in the appropriate forum and in a timely fashion in terms of implications for future action. If necessary, create such discussion forums to fill any gaps.

xxii. Participate in extern al missions and facilitate mission team members' access to M&E data and to stakeholders.

Required professional profile

- Professional with an advanced degree in social sciences, public policy, economics, agricultural, forestry or environmental engineering, or a related area of study.
- Minimum of 3 years of experience in the logical framework approach and other strategic planning approaches; M&E methods and approaches (including quantitative, qualitative and participatory); planning and implementation of M&E systems; training in M&E development and implementation; facilitating learning-oriented analysis sessions of M&E data with multiple stakeholders; and information analysis and report writing.
- A solid understanding of rural development, with a focus on participatory processes, joint management, and gender issues.
- Familiarity with and a supportive attitude towards processes of strengthening local organizations and building local capacities for self-management.
- Willing to undertake regular field visits and interact with different stakeholders, especially primary stakeholders.
- Leadership qualities, personnel and team management (including mediation and conflict resolution).

Duration: 20 months (8 months the first year, and 3 months in each of the subsequent years).

Location: In Mexico City with trips to the MRs in Chihuahua, Michoacán, Oaxaca, Chiapas and Yucatán.

Language: Spanish.

Economic Valuation of Agrobiodiversity Expert

Under the direct supervision of the Project Director, the Expert on the Economic Valuation of Agrobiodiversity (agroBD), will advise the Project Coordination Unit (PCU) in the development of an economic valuation strategy in order to understand and value links between agroBD and food and nutrition security, and a communication and outreach strategy to disseminate its findings.

Main responsibilities and functions

- Together with the Project Coordination Unit (UCP), Regional Advisory Committee, the producers, and other strategic partners, design, propose, and implement an economic valuation strategy of agroBD
- Together with the communication specialist, design a communication and outreach strategy to promote well-informed private and public decision-making regarding the conservation and sustainable use of agroBD.
- Support the implementation of the communication and outreach strategy
- Report in a timely manner to the National Coordinator of the PCU the obstacles or difficulties that the project may encounter during the economic valuation and contribute to finding solutions.

Functions and activities

i. Design the economic valuation to estimate the role of agroBD in increasing the food security of small producers and their families through a Rural Participatory Appraisal
ii. Organize and facilitate the focus groups or any other participatory and deliberative approach to implement the Rural Participatory Appraisal in the areas of intervention
iii. Design, together with other strategic partners, the economic valuation of the nutritional values of agroBD products
iv. In coordination with the Public Policy Mainstreaming Expert, the *In situ* Conservation Capacity Building Specialist, and the Promotion and Marketing Expert, identify the key messages to be disseminated through the communication and outreach campaign
v. Support the communication specialist to design the most adequate mechanisms and products to communicate and disseminate the values of agroBD among different audiences, including the different rural and suburban communities of intervention (women, children and the youth), policy makers, and consumers.
vi. Support the Public Policy Mainstreaming Expert, the *In situ* Conservation Capacity Building Specialist, and the Promotion and Marketing Expert to implement the communication and outreach strategy of the valuation of agroBD.
vii. Advice the Project Coordination Unit in the design of the valuation framework of additional attributes of agroBD, as requested.

Required professional profile

- Professional with postgraduate studies in economics, environmental economics, environmental sciences, agricultural economics, or a related field of study.
- Proven experience in the development of economic valuation studies.
- Proven fieldwork experience and a thorough understanding of the socio-economic, cultural and environmental context of the areas of intervention
- Experience in the study of the eco-agri-food system, agrobiodiversity, climate change, and other concepts related to food security
- Advanced research and analytical skills

- Advanced reading comprehension in English
- Advanced communication skills to inform, transmit the value of agrobiodiversity to different audiences
- Ability to work with interdisciplinary teams

Duration: 12 months

Location: In Mexico City with trips to the Regions in Chihuahua, Michoacán, Oaxaca, Chiapas and Yucatán.

Language: Spanish.

Operations Officer

Under the overall supervision FAO Representative in Mexico, and in close coordination with the Financial Monitoring Specialist, the incumbent will provide operational support to the implementation, and will be responsible for operational support to the implementation, monitoring and evaluation of the project for timely delivery of its outcomes and outputs. In particular, he/she will perform the following tasks:

- Ensure smooth and timely implementation of project activities in support of the results-based work plan, through operational and administrative procedures according to FAO/GEF rules and standards;
- Coordinate the project operational arrangements through contractual agreements with key project partners;
- Arrange the operations needed for signing and executing Letters of Agreement (LoA) and Government Cooperation Programme (GCP) agreements with relevant project partners;
- Maintain inter-departmental linkages with FAO units for donor liaison, Finance, Human Resources, and other units as required;
- Day-to-day manage the project budget, including the monitoring of cash availability,
- Ensure the accurate recording of all data relevant for operational, financial and results-based monitoring;
- Execute accurate and timely actions on all operational requirements for personnel-related matters, equipment and material procurement, and field disbursements;
- Participate and represent the project in collaborative meetings with project partners and the Project Steering Committee, as required;
- Be responsible for results achieved within her/his area of work and ensure issues affecting project delivery and success are brought to the attention of higher level authorities through the BH in a timely manner,
- In consultation with the FAO Evaluation Office, the LTU, and the FAO-GEF Coordination Unit, support the organization of the mid-term and final evaluations, and provide inputs regarding project budgetary matters.
- Receive and review the proposal of budget revision for approval of the Budget Holder.

Required Qualifications and Skills

1. University Degree in Economics, Business Administration, or related fields.
2. Five years of experience in project experience in planning, project implementation and management/administration of development programmes including the

preparation, monitoring and evaluation of development projects and operations procedures

4. Knowledge of FAO's project management systems will be an asset.

5. Fluency in English (written and oral);

6. Good computer skills and proficiency in standard computer applications (MS Word, Excel, PowerPoint, etc).

Competencies

- Good understanding of, and experience in, public sector or international organization, private sector environment; demonstrated experience in administrative duties include diverse organizational tasks;
- Excellent interpersonal skills and ability to establish and maintain effective working relationships with colleagues and counterparts;
- Capable of working fairly independently; excellent organizational skills; good inter-personal skills and the ability to establish and maintain effective working relations with colleagues and stakeholders.

Financial Monitoring Specialist

Under the overall supervision FAO Representative in Mexico, the Project Coordinator and in close coordination with the Financial Monitoring Specialist, the incumbent will provide operational support to the implementation, and will be responsible for operational support to the implementation, monitoring and evaluation of the project for timely delivery of its outcomes and outputs. In particular, he/she will perform the following tasks:

- Will be responsible for delivering training in the areas where the OP needs to improve (as identified by the Capacity Assessment);
- Reviewing the quarterly Financial Reports that the OP (CONABIO) will submit to FAO;
- Checking that the Financial Reports are in line with the approved AWP/Bs and the Project Results Framework and the conditions of the signed OP for eligibility of expenditures;
- Advising the Operations officer on the report approval;
- Prepare and reviewing the quarterly Request for Funds from the OP; advising the Operations Officer on the request for funds approval and disbursement of the quarterly transfer of funds to the OP.
- Budget preparation and budget revisions to be reviewed by the Project Coordinator and Operations Officer;
- Ensure that relevant reports on expenditures, forecasts, progress against work plans, project closure, are prepared and submitted in accordance with FAO and GEF defined procedures and reporting formats, schedules and communications channels, as required.

Expected outcomes:

(a) Budget allocated in implementation against outputs and outcomes.
(b) Budget revisions prepared under FAO/GEF rules and standards.
(c) Monthly budget reports accordingly under FAO/GEF standards.
(d) Products and budget monitored in terms of coherent and and effective delivery

Required Qualifications and Skills

1. University Degree in Economics, Business Administration, or related fields.
2. Five years of experience in project experience in planning, project implementation and management/administration of development programmes including the preparation, monitoring and evaluation of development projects and operations procedures
4. Knowledge of FAO’s project management systems will be an asset.
5. Fluency in English (written and oral);

6. Good computer skills and proficiency in standard computer applications (MS Word, Excel, PowerPoint, etc).

Competencies

- Good understanding of, and experience in, public sector or international organization, private sector environment; demonstrated experience in administrative duties include diverse organizational tasks;
- Excellent interpersonal skills and ability to establish and maintain effective working relationships with colleagues and counterparts;
- Capable of working fairly independently; excellent organizational skills; good inter-personal skills and the ability to establish and maintain effective working relations with colleagues and stakeholders.

Environmental and Social Risk Management Specialist

Under the overall supervision of the FAO Representative in Mexico, and the direct supervision of the Lead Technical Officer (LTO), and in close coordination with the Environmental and Social Management Unit the Environmental and Social Risk Management Specialist will be responsible for monitoring the Environmental and Social Risk Management Plan of the project and ensure the stakeholders engagement is pursued throughout the project.

Main responsibilities:

- Coordinate the overall implementation of the plan and related monitoring.
- Train the project team on FAO Environmental and Social Safeguards
- Review the Environmental and Social Risk Management Plan, including the indicators, and propose amendments and updates, if appropriate.
- Set up the Free Prior and Informed Consent (FPIC) process, train the project team based in the field on FPIC related matters and support the key phases of the process.
- Coordinate the set-up of a locally appropriate grievance mechanism.
- Identify concrete coordination mechanisms with the UNDP project
- Include grievance mechanism in M&E system
- Support the Budget Holder in the record of grievances and identification of actions to address them. Prepare periodic reports.
- In close coordination with the M&E specialist, identify tools and indicators to capture the monitoring of the Environmental and Social Risk Management Plan and the Stakeholder Engagement in the overall M&E system of the project.
- Conduct periodic supervision missions to the project sites.

Required Qualifications and Skills

- University Degree in Social Sciences, or related fields.
- Five years of experience in participatory processes with rural communities, indigenous communities, grassroots organizations.
- Excellent knowledge of the national context.
- Knowledge of international environmental and social safeguards standards. Knowledge of FAO's Environmental and Social Safeguards and related policies will be an asset.
- Fluency in English (written and oral);
- Good computer skills and proficiency in standard computer applications (MS Word, Excel, PowerPoint, etc).

Competencies

- Good understanding of, and experience in, public sector or international organization, private sector environment; demonstrated experience in administrative duties include diverse organizational tasks;
- Excellent interpersonal skills and ability to establish and maintain effective working relationships with colleagues and counterparts;

- Capable of working fairly independently; excellent organizational skills; good inter-personal skills and the ability to establish and maintain effective working relations with colleagues and stakeholders.

Appendix 8: Descriptive factsheets of project intervention areas

Descriptive factsheet

AGROBIODIVERSITY PROJECT INTERVENTION AREA

General data

Name of intervention area: Mexico City chinampa farming system
State: Mexico City
Municipalities included: (boroughs) Xochimilco and Tláhuac
Baseline locations*: Three in Xochimilco borough: Xochimilco, *San Gregorio Atlapulco and San Luis Tlalxialtemalco, and two in Tláhuac borough: * San Pedro Tláhuac and San Andrés Mixquic.

* Locations where the project will start its work in the first year of implementation.

Statistical data on the intervention area

No of inhabitants per location (2010):

BOROUGH	LOCATION	INHABITANTS	WOMEN
Xochimilco	Xochimilco	42.000	21,500
	San Gregorio Atlapulco	25,000	13,000
	San Luis Tlaxialtemalco	6,500	3,900
Tláhuac	San Pedro Tláhuac	22,500	11,300
	San Andrés Mixquic	13,500	6,800
Total		109,500	35,000

Height in m asl; orography:

The average elevation in this area is 2,242 m asl. It is predominantly flat because it is located in an ancient lake bed within the Valley of Mexico endorheic basin. It is located in the lacustrine area and represents the last remnant of the five lakes that made up this basin.

Climate type: Sub-humid temperate with annual average rainfall of 700 mm and annual average temperature of 16.2 °C.

Economic data:

The main economic activities in these areas are chinampa farming (vegetables and ornamental), tourism, services and urban employment.
In particular, chinampa farming is a very dynamic activity in terms of economic flow as gross income. A single chinampa can produce at least 4 to 5 harvests per year; (Torres Lima, 2014).

It is estimated that the chinampa agroecosystem has a monetary value of between $15.6 million and $31.5 million USD/year (Aguilar *et al.*, 2013).

Sociodemographic data (no of farmers; no of people under 30; percentage of indigenous population):

BOROUGH	**LOCATION**	**PRODUCERS**	**UNDER 30s**	**INDIGENOUS PEOPLE**
Xochimilco	Xochimilco	4,200	600	1,100
	San Gregorio Atlapulco	7,500	450	750
	San Luis Tlaxialtemalco	2,150	78	130
Tláhuac	San Pedro Tláhuac	2,350	600	1,000
	San Andrés Mixquic	1,500	350	550
Suma		17,700	2,078	3,530

It has been estimated that the number of inhabitants classified as agricultural producers in the five chinampera areas amounts to 17,700 producers, of whom 11.7 per cent (2,078) are aged under 30 and 20 per cent (3,530) are indigenous.

Others:

Some 60 per cent of the farmers are descendants of the original indigenous inhabitants. Between 5 per cent and 10 per cent of them still understand or speak the Náhuatl language of the Aztecs (Rodríguez-Alegría and Nichols, 2016).

It has been calculated that the chinampa system is almost 2000 years old. It arose around 200 BC and its greatest extent dates back to the foundation of Tenochtitlan in 1325. It was most popular between the 14th and 16th centuries (Sanders, Parsons and Stanley, 1979). The Aztecs began to build artificial islets with the aim of gaining land for cultivation, thus developing a unique form of intensive agriculture. Xochimilco and Tláhuac represented the area of greatest production. This system was used to produce maize, various types of bean, chili peppers, amaranth, marigold, pumpkins, chayote squash, peas, chia, various fruits and many flowers (Armillas, 1971).

Short description of intervention area:

A rural area is located in Mexico City classified as Conservation Land. It consists of an area of 85,000 ha distributed throughout seven boroughs including 36 rural villages that are more than 500 years old. This area is the location of the *"World Natural and Cultural Heritage Zone in Xochimilco, Tláhuac and Milpa Alta",* covering an area of 7,534 ha, with three boroughs and 12 rural villages. Thirty per cent of this is occupied by the Mexico City chinampa farming system, made up of five areas that altogether cover 2,215 ha and conserve a total of 3,586 actively-producing chinampas (2015 chinampas census, UAM-X).

Borough	Chinampa locations or zones	Number of active chinampas	Area (Ha)
Xochimilco	Xochimilco	864	1,059
	San Gregorio Atlapulco	1,530	484
	San Luis Tlaxialtemalco	430	103
Tláhuac	San Pedro Tláhuac	474	165
	San Andrés Mixquic	288	404
Total		3,586	2,215

There is still an extensive canal network around this area, covering a length of more than 402.6 km. This distributes water for agricultural activities. More than 169.7 km of the canals are navigable and are crucial for the transport of people and products. The soils are predominantly lacustrine or palustrine. They have a high content of organic matter (45 per cent) and are deep and discontinuous. They are influenced by the presence of a nearby water table and because they originated as small islets surrounded by water, some authors classify these soils as anthrosols (González Pozo, 2015). Because the chinampas form part of a wetland ecosystem, they have excellent yields: they are derived from fertile soils with constantly available moisture.

Chinampas have their own historic heritage as well as great value in productive and environmental terms. Following international urban trends in the metropolitan area of Mexico City, chinampas now face the rapid encroachment of urban sprawl into rural areas, abandonment of primary farming activities to be replaced by the service sector and new generations taking up urban employment.

Project selected species present in the intervention area

The cultivated species include: maize (*Zea mays*) with different landraces from the Cónico group, beans (*Phaseolus vulgaris and P. coccineus*), pumpkins (*Cucurbita pepo and C. ficifolia*), chili pepper (*Capsicum annuum*), amaranths (*Amaranthus cruentus and A. hypochondriacus*), tomatillo (*Physalis philadelphica*), Agaves (Agave spp.) and cactus pear (*Opuntia* spp.).

The most important quelites are: amaranths and quintonils (*Amaranthus* spp.), anodas (alache, *Anoda cristata*), goosefoot and the quelites (huauzontle *Chenopodium berlandieri*, *C. macrospermun*), chipilin (*Crotalaria pumila*), epazote (*Dysphania ambrosioides*), seepweed (romerito, *Suaeda edulis*, *S. nigris*), purslane (verdolaga, *Portulaca oleracea*) and Mexican dock (lengua de vaca, *Rumex mexicanus)*.

Wild species related to crops and managed species are as follows: *Zea* spp., *Tripsacum* spp. (wild relatives of maize), *Phaseolus* spp., *Amaranthus* spp., *Cucurbita radicans, Physalis* spp., *Agave* spp. *and Opuntia* spp.

Note: The listed species have database records inside the intervention area polygon plus a 5 km buffer. The information was obtained from the National Biodiversity Information System (SNIB) complemented with the knowledge of experts consulted.

Agro-ecosystems covered:

Chinampa is the Aztec name for an ancestral production system comprising artificially constructed plots of land in the lake. It is an island surrounded by three or four small canals, which function as a body of water and drainage. It is a type of architecture allowing five harvests a year (González-Pozo, 2015). Pre-Hispanic techniques are used, such as cultivation in traditional *chapines* or seedbeds made out of nutrient-rich organic sludge from the lake bottom, which act as nurseries. A chinampa agro-ecosystem corresponds to a temperate agro-ecological area with vegetables and ornamentals (Torres Lima, 2014).

Background and existing initiatives in the intervention area

The chinampa areas of Tláhuac and Xochimilco have been studied from various perspectives: biological, anthropological, agricultural, heritage, cultural, social and political. This has involved the participation of various research centres and universities, such as the Autonomous Metropolitan University and the National Autonomous University of Mexico. Civil society organizations have also conducted campaigns to promote and conserve chinampa agriculture. In addition to international organizations such as UNESCO and FAO, Local and federal organizations also participate with their own programmes to support traditional farming activities. These are mainly aimed at seasonal farming.

At local level, in 2012 the Mexico City Government set up an organization in charge of coordinating institutional efforts in the Heritage Zone with the aim of consolidating and extending the policies, programmes and actions of all departments and entities involved in this area. The organization is called: *Autoridad de la Zona Patrimonio Mundial Natural y Cultural de la Humanidad en Xochimilco, Tláhuac y Milpa Alta* [Authority of the World

Natural and Cultural Heritage Zone in Xochimilco, Tláhuac and Milpa Alta].

Local and regional markets:

Traditional marketing: This marketing strategy is most common among chinampa producers. The most common sales outlets are the CDMX Supply Centre (70 per cent) followed by the 11 public markets in Xochimilco borough and the 19 in Tláhuac borough, particularly the markets of San Gregorio, Xochimilco, Nativitas and Mixquic (SAGARPA, 2015). Part of the production is also marketed in the "markets on wheels" in Mexico City. In these sales outlets, producers act as suppliers and are not therefore central to the value network because they have to sell their products to intermediaries who retain most of the profits. In all cases, the products are marketed without any differentiation and little or no traceability.

Direct marketing: Some chinampa producers have chosen to move toward marketing strategies based on the concept of short food supply chains (SFSCs) or short circuits. These markets are very specialized and emphasize the geographical and social proximity between producer and consumer. They highlight attributes that are not valued in traditional chains and stand out due to their geographical origin, freshness, contribution to biocultural heritage and conservation of natural, biological and genetic resources (FAO, 2016). Some chinampa producers have succeeded in establishing direct marketing relationships by adopting the following SFSC procedures: a) sales in producers' markets; b) sales to restaurants; and c) sales with home delivery.

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Regional partners of the GEF project on agroBD

Universidad Autónoma Metropolitana, Xochimilco, UAM-X
Universidad Nacional Autónoma de México, UNAM
UNESCO, United Nations Organization for Education, Science and Culture
ICOMOS Mexico, UNESCO advisory body
Civil society: Chinampayolo producers group, Carnaval del Maíz collective, REDES A.C. [Networks for diversity, equality and sustainability]
Humedalia A.C., Vivarium, Permaciudad, Humbral Axochiatl
Marketing: De la Chinampa a tu mesa [from the Chinampa to your table], Yolcan, Huella Chinampera, La Canoa tu despensa alternativa [La Canoa your alternative larder]

Others

The working area is located within the Mexico City World Natural and Cultural Heritage Zone (previously the Federal District), occupying the lacustrine area, the last remnant of the five original lakes of the Valley of Mexico basin, which gave life to Mexico Tenochtitlan, now Mexico City.

Due to their productive value and cultural importance, the chinampas were declared a World Cultural Heritage Site by UNESCO in 1987; the Mexican government decreed that they were a Protected Natural Area in 1992, which was endorsed at local level by the Mexico City Government in 2006; the Ramsar Convention named them as a Western Site of International Importance in 2004 when it recognized the chinampas as a form of wetland agriculture.

They were also granted international recognition through the North American Bird Conservation Initiative (NABCI) as an IBA (Important Bird Area).

The chinampa agricultural production system was recently named as a *Globally Important Agricultural Heritage System* (GIAHS), which is recognition that FAO grants to ancestral farming systems to ensure that they do not disappear and can still be handed down to future generations.

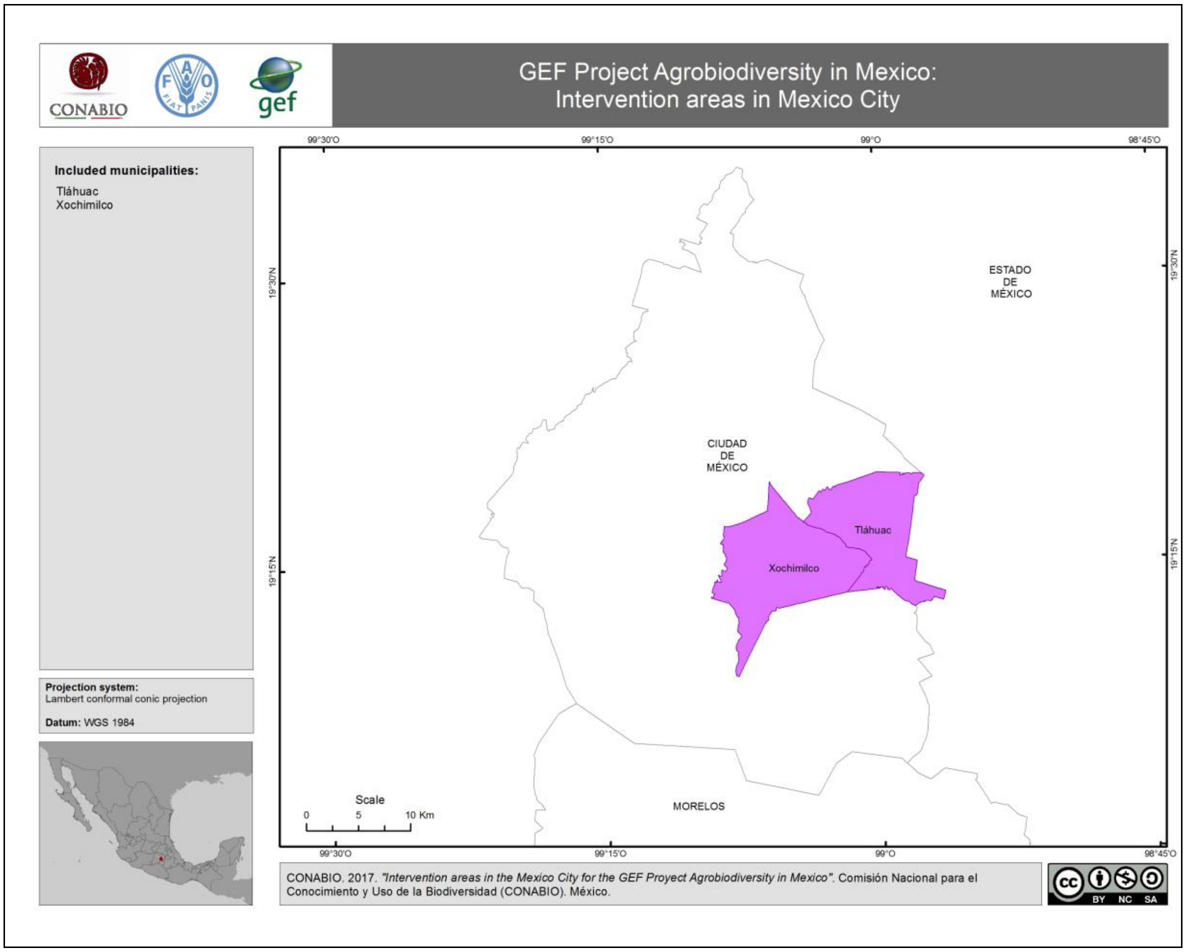
Prepared by

Authority of the Xochimilco, Tláhuac and Milpa Alta World Natural and Cultural Heritage Zone: Dr Norma Ruz Varas, Executive Director of AZP Special Projects

FAO Mexico: Mauricio García de la Cadena; Jorge Liber Saltijeral Giles

Quetzalcóatl Orozco Ramírez

Map(s)



CONABIO
gef
GEF Project Agrobiodiversity in Mexico:
Intervention areas in Mexico City
Included municipalities:
Tláhuac
Xochimilco
Projection system:
Lambert conformal conic projection
Datum: WGS 1984
99°30'O
99°15'O
99°O
98°45'O
19°30'N
19°15'N
ESTADO DE MÉXICO
CIUDAD DE MÉXICO
Tláhuac
Xochimilco
MORELOS
Scale
0 5 10 Km
CONABIO. 2017. "Intervention areas in the Mexico City for the GEF Proyect Agrobiodiversity in Mexico". Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO). México.
BY NC SA

Descriptive factsheet

AGROBIODIVERSITY PROJECT INTERVENTION AREAS

General data

Name of intervention areas: Selva el Ocote-Sumidero canyon complex and *Los Altos* Region
State: Chiapas
Municipalities included: Ocozocuatla de Espinoza, Cintalapa de Figueroa, Tecpatán de Mezcalapa, Jiquipilas, Berriozábal, San Fernando, Osumacinta, San Juan Cancuc, Pantelhó and Santiago El Pinar
Baseline locations*: Nuevo San Juan Chamula and Emilio Rabasa in the municipality of Ocozocuatla de Espinosa; Efraín Gutiérrez and Divisadero in the municipality of Berriozábal; Vicente Guerrero in the municipality of San Fernando; Libertad Campesina in the municipality of Osumacinta; Tsutotel, Río Tanate'el and Chacté in the municipality of San Juan Cancuc; Pusilhó in the municipality of Santiago El Pinar; El Roblar Chishtontic, San Fernando and San Carlos Corralito in the municipality of Pantelhó.

* Locations where the project will start its work in the first year of implementation.

Statistical data on the intervention areas

No of inhabitants per location:

Municipality	Location	Inhabitants	Women	Indigenous people
Ocozocoautla de Espinosa	Nuevo San Juan Chamu	506	247	506
Ocozocoautla de Espinos	Emilio Rabasa	91	42	28
Berriozábal	Efraín Gutiérrez	576	297	9
Berriozábal	Divisadero	90	41	0
San Fernando	Vicente Guerrero	652	346	0
Osumacinta	Libertad Campesina	580	284	0
San Juan Cancuc	Ts'utot'el	185	97	185
San Juan Cancuc	Río Tanate'el	96	51	96
San Juan Cancuc	Chacté	670	330	670
Santiago El Pinar	Pusilhó	159	75	159
Pantelhó	El Roblar Chishtontic	528	281	528
Pantelhó	San Fernando	240	121	240

Pantelhó	San Carlos Corralito	193	96	193
Total		4566	2308	2614

Geographical data:

The region of Ocote is located within an altitude range of 800 to 1500 m asl; the topography features mountain ranges, with canyons and slopes on the lower parts. The altitude in *Los Altos* region ranges from 800 to 2000 m asl. The topography is formed from sheer limestone folds with karst mountain landscapes and narrow valleys in the form of gullies in lower altitude areas.

In Ocote, the climates are warm humid and sub-humid semi-warm, both with rain in summer, with an average temperature of 18 to 22 °C; average yearly rainfall from 1200 to 2500 mm (SEMARNAT, 2001). In *Los Altos* Region, the climates are sub-humid temperate with rain in summer, humid semi-warm and humid temperate, with heavy rainfall in summer. Average annual rainfall is 1.402 mm and the average annual temperature is 14.8 °C.

Economic data: The main economic activities in Ocote are extensive cattle farming and traditional agriculture in the biosphere reserve buffer zone and area of influence. In *Los Altos* region, the main agricultural activities are the cultivation of maize and beans, in a "milpa" (shifting cultivation) system that provides food for family subsistence for six months. Coffee is the only remunerated crop and in most cases it represents approximately 80 per cent of household income.

Others: Although cattle farming is the main economic activity in the region of Ocote, there is some variation between locations. For example, in one part of the reserve (Emilio Rabasa), the main household activities are as follows: 1) Farming, mainly the planting of maize and beans, which is practised by 37 per cent of producers; 2) 32 per cent are engaged in coffee production; 3) 22 per cent in beekeeping and 4) 9 per cent carry out sheep farming. Maize, beans and sheep are mainly for self-consumption. The amount of land allocated to production by each producer ranges from 2 ha to 3 ha with a yield of 800 kg/ha for maize and 500 kg/ha for beans. Coffee is grown for commercial purposes and the average yield is 700 to 1000 kg/ha of conventional coffee. Beekeeping is an activity that is gaining popularity because it is compatible with conserving the reserve's natural resources (Orantes-García et al. 2013).

According to information collected by IDESMAC (2011) on incomes in *Los Altos*, in Santiago El Pinar, the average income per household of five members is $30,453.01 pesos per year, which means that a person in the municipality lives on approximately $17.02 pesos per day. This suggests a per capita income deficit of $5.46 pesos per day to cover the minimum requirement of $683.82 pesos per month that the National Council for the Evaluation of Social Development Policy (CONEVAL) states is necessary for a person to acquire the basic food basket. This situation places families in this community in a condition of food insecurity, because the basic grain production volumes only last for six months and the financial income is also insufficient to cover minimum family requirements.

Short description of intervention areas

The Selva el Ocote biosphere reserve is located in the west of the state of Chiapas. It extends for a total of 1000 km^2 and forms part of the region with the largest reserve of high evergreen forests in the country, together with the Chimalapas in Oaxaca and Uxpanapa in Veracruz. Its complex physical geography and climate help make it one of the most biodiverse regions in the country and it is remarkable for its great variety of terrestrial mammals and birds. It contains a recorded number of 815 plants and 1150 animals. Many of these fall under various protection categories.

The population in the region is mostly young. Since the 1960s, this region has experienced migration from other regions of Chiapas, mainly the centre and *Los Altos* region. As a result, rural communities are now predominantly Tzotzil. Although the oldest ethnic group in the region are the Zoque people, they have been assimilated into the mestizo culture and very few speakers of the language remain. Some authors report that this recent migration process has led to a decline in natural resources and changes in plant cover have accelerated. The explanation they give is that the new settlers were unfamiliar with the region and it took them several years to understand the new environment and develop strategies to take advantage of natural resources that cause less damage to the environment. For example, they changed the plant cover and opened up fields for cultivation or grassland areas in places that were unsuitable and no use was made of the forest.

Stock-keeping is currently one of the main activities in the region. This is practised extensively. However, in recent years there has been a shift to agroforestry systems, which are more sustainable in terms of protecting soil and water and encouraging a reduction in deforestation rates. The farming system practised is subsistence farming, using the slash-and-burn system. The common pattern is to open up a field for cultivation, work it for two years and then turn it over to pasture for livestock. However, due to the presence of reserve staff and through various development programmes, sustainable agricultural production has been promoted, including the establishment of the “milpa” system, the use of green manures and a transition from conventional coffee plantations and livestock farming to organic farming.

Due to the biological importance of this region, since the reserve was established in 2000, work has been ongoing to protect biodiversity and sustainably manage natural resources. Several organizations are currently carrying out this type of activity and several communities already have advanced processes for organic coffee production, land planning, sustainable “milpa” farming systems and the use and conservation of local varieties, among others.

The Highland region extends for 3,717.08 Km^2, which represents 5.02 per cent of the state area. This makes it the tenth most extensive region in the state. It is home to a total of 601,690 inhabitants (INEGI, 2010). Due to its altitude, the region is the origin of major basins that feed the following hydrological regions: Grijalva–Usumacinta and the Grijalva–Villahermosa, Grijalva–Tuxtla Gutiérrez, Lacantún and Grijalva–La Concordia river basins. Due to the region's topographic conditions, there is no significant surface hydrological network; this has developed underground, surface channels are minimal and the underground networks flow into the above river basins. This region of Chiapas still has a significant portion of mesophyll and conifer forest, which extends in a corridor that runs from the Selva Lacandona to the Selva Negra in the northern part of the state.

The population inhabiting the region is made up of women and men belonging to the following ethnic groups: Tzotzil and Tzeltal, who form part of the ancient Mayan culture. They still retain their customs and traditions, which sustain their culture and identity. The region is one of the main biocultural regions of Mexico where indigenous peoples safeguard biodiversity with little government intervention.

Project selected species present in the intervention area

Cultivated species include: various tropical landraces of maize (*Zea mays*), beans (*Phaseolus vulgaris, P. coccineus, P. dumosus and P. lunatus*), pumpkin (*Cucurbita pepo, C. moschata and C. ficifolia*), Chili peppers (*Capsicum annuum, C. frutescens C. pubescens*), chayote (*Sechium edule*), tomatillo (*Physalis philadelphica*), avocado (*Persea americana*), cactus pear (*Opuntia* spp.) and Agaves (*Agave* spp.).

The most important quelites are: amaranths (*Amaranthus* spp.), anodas (alache, *Anoda cristata*), chipilin (*Crotalaria* spp.), epazote (*Dysphania ambrosioides*) and papalo (*Porophyllum ruderale*).

Wild species related to crops and managed species are as follows: *Tripsacum* spp. (wild relative of maize), *Phaseolus* spp., *Amaranthus* spp., *Capsicum annuum* var. *glabriusculum, C. rhomboideum, Cucurbita argyrosperma* ssp. *sororia, C. okeechobeensis* spp. *martinezii, Physalis* spp., *Persea* spp., *Agave* spp. *and Opuntia* spp.

Note: The listed species have database records inside the intervention area polygon plus a 5 km buffer. The Information was obtained from the National Biodiversity Information System (SNIB) complemented with the knowledge of experts consulted.

Agro-ecosystems covered

The agro-ecosystems covered will be traditional "milpa", mainly composed of maize and beans, and improved "milpa" including fruit trees, with which there is already some experience in the region. Coffee trees will also be included, although coffee is not a native plant, this system includes a great diversity of useful plants that can be classified as quelites.

Background and existing initiatives in the intervention area

Prominent initiatives include those instigated by the Selva el Ocote Biosphere Reserve Management, which has been promoting the sustainable use of natural resources for more than 10 years. Application of a programme for the conservation of Mexican maize (PROMAC) by the reserve management is particularly worthy of mention. Civil society organizations such as AMBIO A. C., DERMAC and Aires de cambio A. C. have also developed initiatives ranging from holistic forest use, improvement of the "milpa" system and conservation of plant genetic resources including conversion to organic production and the use of biological control in coffee plantations.

In the Chiapas *Los Altos* region, various agricultural biodiversity projects have been developed, including a process developed by the Beneficio Majomut Union of Coffee Grower Ejidos [communal landholdings] and Communities. This organization represents more than 1000 small organic coffee producers from 17 indigenous communities belonging to Tzeltal and Tzotzil ethnic groups, as well as the Maya Vinic Union of Producers supplemented by the "Las Abejas" civil organization, who currently produce coffee with organic certification as well as honey and cocoa.

Another initiative is a bioprospecting project entitled Pharmaceutical research and sustainable use of ethnobotanical knowledge and biodiversity in the Maya Region of *Los Altos*, in Chiapas Highlands, Mexico. The project process laid the foundations for the struggle conducted by the Chiapas Council of Traditional Indigenous Midwives and Healers (COMPITCH) against biopiracy.

Local and regional markets

In communities within the Ocote reserve region, product marketing is carried out through intermediaries and only in very few cases through the Álvaro Obregón Ejidos Union. This has led to an improvement in buying and selling conditions due to competition between intermediaries. Marketed products include coffee, maize, beans,"piquín" chili pepper, honey, livestock, milk and dairy products, among others It should be mentioned that trade through intermediaries is disadvantageous for producers who receive less than the commercial price of their products. Most communities in the Reserve have private or DICONSA stores for the supply of foodstuffs. However, when products are scarce or unavailable, they can be obtained in Ocozocoautla de Espinosa, Raudales Malpaso and Cintalapa de Figueroa.

In *Los Altos* region, the most important market is the town of San Cristóbal de Las Casas. This is a centre for the most biodiverse and ethnic products from the region as well as other parts of the country and has become the most important place for exchanging products. There is incipient development of local markets such as that of Yochib in San Juan Cancuc and of San Fernando in Pantelhó, while the municipality of Santiago El Pinar is linked to the market of the nearby municipality of San Andrés Larrainzar. In these markets, there is a significant system for exchanging maize and corn seeds. This even extends to local practices and customs, because the seeds are given as gifts during marriage ceremonies.

Furthermore, the maize market is not a structured market because this product is only marketed for six months of the year. This forces farmers to obtain supplies to cover shortages from elsewhere or through government subsidies and programmes such as the DICONSA stores.

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Regional partners of the GEF project run by agroBD

Selva El Ocote Biosphere Reserve Management. National Committee of Natural Protected Areas. Ocozocoautla de Espinosa.

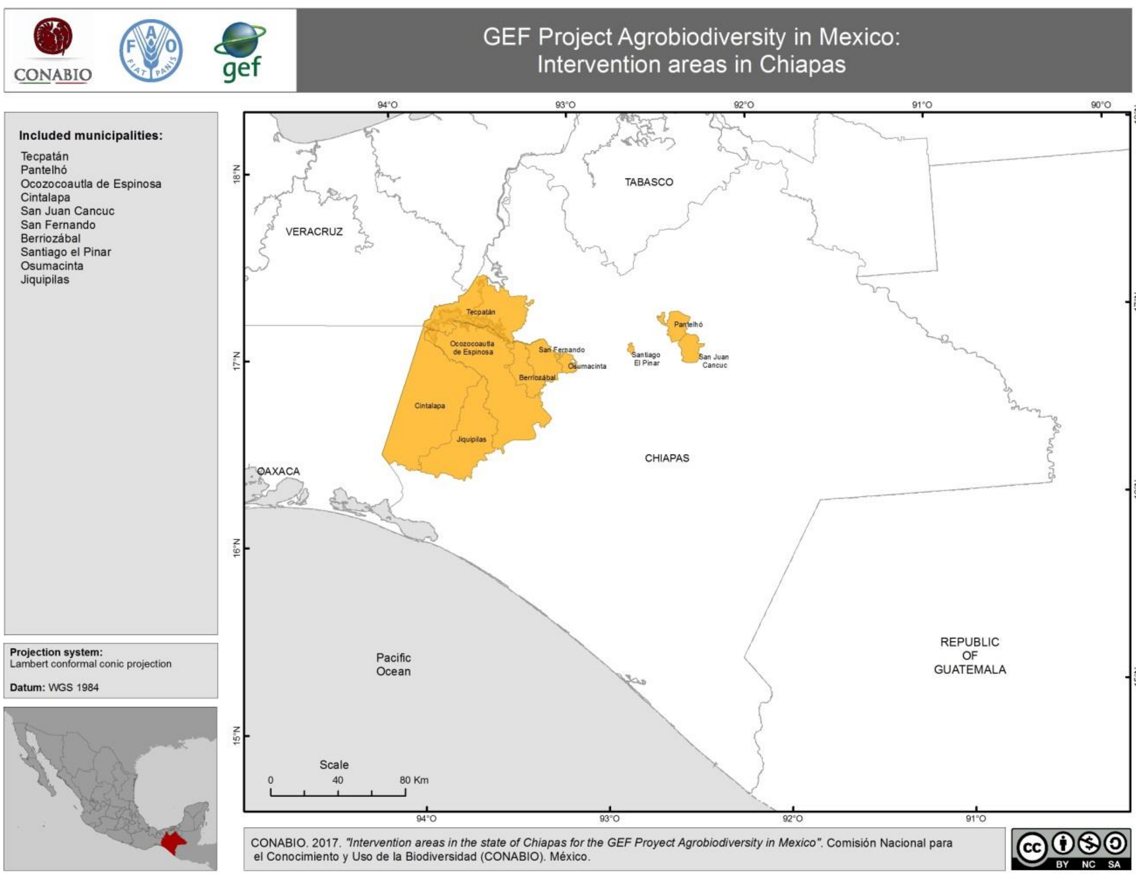
El Colegio de la Frontera Sur, San Cristóbal de las Casas Campus.

Forestry, Agricultural and Livestock Research Institute. Chiapas Centre, Ocozocoautla de Espinosa, Chiapas. AMBIO Co-operative, San Cristóbal de las Casas, Chiapas. Institute for Sustainable Development in Mesoamerica, A.C. (IDESMAC) Mercedes Olivera Women's Collective, A.C. (COFEMO)

Prepared by

Quetzalcóatl Orozco Ramírez, Claudia Mosqueda Lázcares (IDESMAC A. C.)

Map(s)



Descriptive factsheet

AGROBIODIVERSITY PROJECT INTERVENTION AREA

General data

Name of intervention area: Sierra Tarahumara
State: Chihuahua
Municipalities included: Guachochi
Baseline locations*: Norogachi

* Locations where the project will start its work in the first year of implementation.

Statistical data on the intervention area

No of inhabitants per location:

Municipality	Location	Inhabitants	Women	Indigenous people
Guachochi	Norogachi	934	478	471

Geographical data:

With an altitude of 2100 m asl, the land topography is mountainous, with the presence of hills and very narrow valleys running straight down to the river banks.

Climate: sub-humid temperate with rain in summer and semi-cold sub-humid with rain in summer, with an average temperature of 12-16 °C; average yearly rainfall from 700 to 800 mm (INEGI, 2015).

Economic data: the main economic activities are agriculture and logging. Remittances sent by migrants are a very important source of income for families.

Others:

A detailed study on farming economy and natural resource use in one community of the region found that the basic economic unit is the family and that labour is divided according to gender. The main family economic activities are: farming and livestock, which take place on plots and in the backyard; logging for domestic and commercial use – and temporary wage labour or permanent migration. The main aim of farming is production for self-consumption and the main crops are: maize, beans, peas, potatoes, wheat, lentils and oats. A total of 87 processing plants have been recorded for common use by families. These figures show a very broad and comprehensive use of plant resources (Camou, *et al*. 2008).

Short description of intervention area

The Western Sierra Madre, one of the most important mountain chains in the country, is located in north-western Mexico, starting in the state of Jalisco and extending to Sonora, by way of Nayarit, Durango and Chihuahua. The Sierra Tarahumara is part of the Western Sierra Madre in the state of Chihuahua and has earned its name because the majority indigenous group is that of the Rarámuri, also known as the Tarahumara. This region includes 17 municipalities and covers an estimated total area of 53,400 Km^2. The Sierra Tarahumara is divided into Upper Tarahumara and Lower Tarahumara. The indigenous population is made up of four ethnic groups: the Rarámuri or Tarahumara, who form the largest group, the Odami or Tepehuanos, the O'óba or Pima and the Warijios. CONABIO classified the Sierra Tarahumara as a priority region for conservation due to its cultural and biological diversity. More than 1990 vascular plants have been documented in this area.

One of the region's most important economic activities is logging: this is one of the most significant forest regions in the north of the country and the activity has been practised for more than 200 years. The consequences of this practice have been negative, including deforestation, biodiversity loss, erosion and conflicts between communities.

The staple diet of indigenous communities of the Sierra is based on the products they grow: maize, beans and pumpkin. They nevertheless supplement their diet with more than 100 species that grow wild or among their crops. This gives some idea of the knowledge and high agrobiodiversity existing in the region. Ethnobotanical investigations have revealed that indigenous communities of the Sierra use more than 1000 plant species for many purposes, such as food, building, religion, medicines and others. The Sierra Tarahumara and adjacent regions constitute one of six centres of maize diversity in the country. A group of exclusive varieties are found in this area, including: Apachito, Azul, Cristalino de Chihuahua, Gordo and Palomero de Chihuahua, in addition to others that are more generally distributed.

Traditional indigenous knowledge and associated agrobiodiversity are threatened by the fact that young people are migrating and changing their economic activities. The UNAM Biology Institute therefore conducts ethnobotanical research and projects with the aim of holding onto this knowledge.

Project selected species present in the intervention area

The cultivated species include: various maize landraces (*Zea mays*), beans (*Phaseolus acutifolius, P. vulgaris, P. coccineus*), pumpkins (*Cucurbita pepo* and *C. argyrosperma,*), chili peppers (*Capsicum annuum*), chayote (*Sechium edule*), tomatillo (*Physalis philadelphica*), cactus pear (*Opuntia* spp.), and Agave (*Agave* spp.).

The most important quelites are: anodas (alache, *Anoda cristata*), goosefoot (huauzontle, *Chenopodium berlandieri*), chipilin (*Crotalaria incana, C. pumila*), papalo (*Porophyllum ruderale*), wild turnip (quelite mostaza, *Brassica campestris*), quintonil (wasori, *Amaranthus hybridus*), purslane (verdolaga, *Portulaca oleracea*), Virginia pepperweed (rochiwari *Lepidium virginicum*), basiawi (*Arracacia edulis*), sepéke (*Bidens odorata*).

Wild species related to crops and managed species are as follows: *Tripsacum* spp. (wild relatives of maize), *Phaseolus* spp., *Amaranthus* spp., *Capsicum annuum* var. *glabriusculum*, *Cucurbita foetidissima*, *Physalis* spp., *Agave* spp. *and Opuntia* spp.

Note: The listed species have database records inside the intervention area polygon plus a 5 km buffer. The Information was obtained from the National Biodiversity Information System (SNIB) complemented with the knowledge of experts consulted.

Agro-ecosystems covered

Farming activity is carried out in small units of about 2 ha with maize as the main crop. This is combined with beans and pumpkins, and the latter crops can be sowed in furrows interspersed with the maize. Because droughts and early frosts are very common in the region, farming activities can be highly risky. It is estimated that there is some environmental contingency of this type in four out of every 10 years. The average yields in the region are 600 kg/ha for maize and 230 kg/ha for beans. These yields are obtained without the application of chemical fertilizers. Quelites grown in milpa farming systems are very important for the Rarámuris.

Background and existing initiatives in the intervention area

Plant resource research and management initiatives have been present in the Sierra Tarahumara for decades. Current initiatives on agricultural biodiversity in the region stem from work led by Dr Robert Bye. The *Semillatón* project arose from the need to recover native maize seeds after several years of drought. The same research group is currently conducting a project for the conservation and use of Tarahumara milpa biodiversity with the support of CONABIO.

CONANP is promoting a GEF project to foster the sustainable use of natural resources in the Sierra Tarahumara.

Local and regional markets

Local markets and a convenience store

Information sources

Camou-Guerrero, A., Reyes-García, V., Martínez-Ramos, M. et al. 2008. Hum. Ecol. 36: 259-272.

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Regional partners of the agroBD GEF project

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Tarahumara Technological University. Guachochi Chihuahua.

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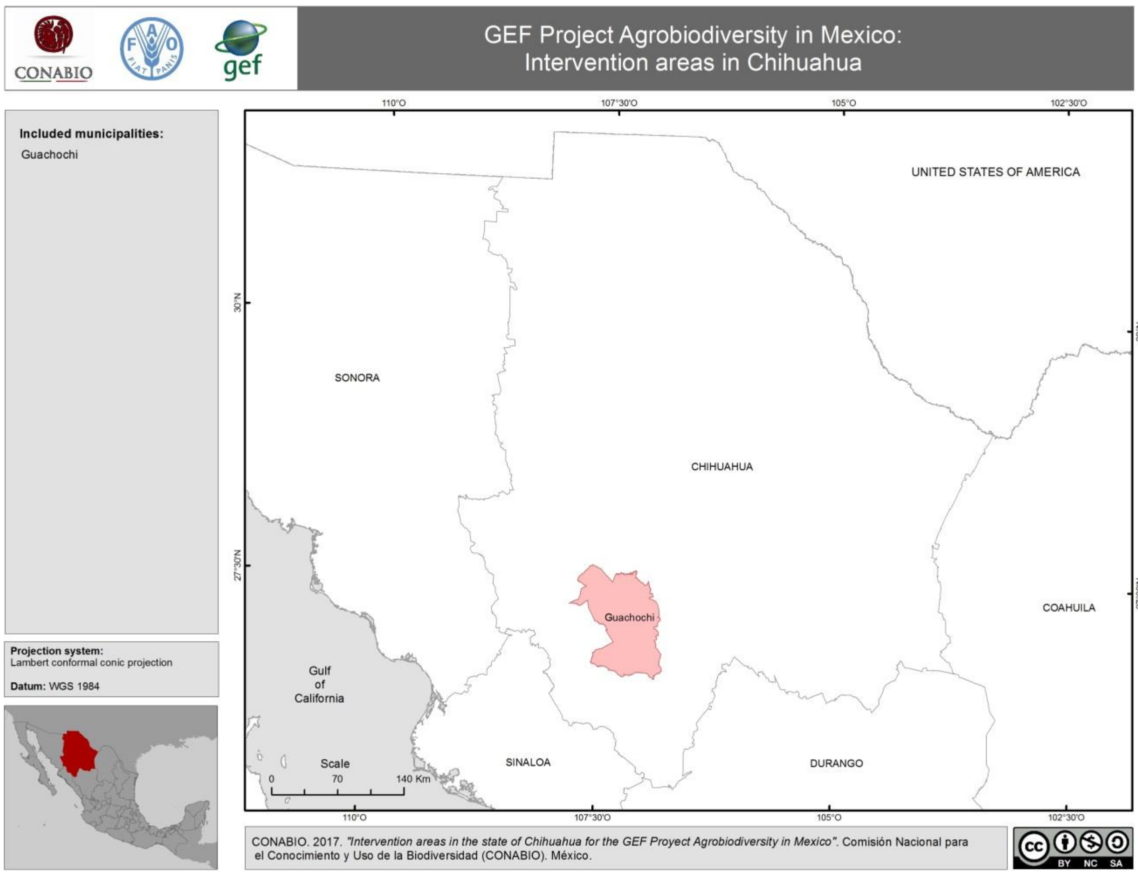
Quetzalcóatl Orozco Ramírez

Map(s)



Descriptive factsheet

AGROBIODIVERSITY PROJECT INTERVENTION AREA

General data

Name of intervention area: *Purépecha* Plateau
State: Michoacán
Municipalities included: Pátzcuaro, Erongarícuaro, Tingambato, Uruapan, Paracho, Cheran and Nahuatzen
Baseline locations*: Napízaro, San Fráncisco Uricho and Arócutin de Erongarícuaro; Santa Ana Chapitiro de Pátzcuaro, San Francisco Pichátaro de Tingambato; and Aranza de Paracho

* Locations where the project will start its work in the first year of implementation.

Statistical data on the working area

No of inhabitants per location:

Municipality	Location	Inhabitants	Women	Indigenous people
Erongarícuaro	Napízaro	520	269	55
Erongarícuaro	San Fráncisco Uricho	1832	920	1153
Erongarícuaro	Arocutin	606	326	130
Pátzcuaro	Santa Ana Chapitiro	1042	551	0
Tingambato	San Francisco Pichátaro	4952	2366	2095
Paracho	Aranza	1881	988	102
Total		10833	5420	3535

Geographical data:

The altitude ranges from 2050 to 2380 m asl. The *Purépecha* Plateau is a relatively flat area that includes a large number of volcanic cones. The orography is characterized by ridges and mountain valleys.

Climate: The climate is temperate subhumid with rains in summer in the lower parts and semi-cold with rains in summer in the high parts. The annual average temperature ranges from 14 to 18 °C; the average yearly rainfall ranges from 1000 to 1200 mm (INEGI 2016).

Economic data: The main activities are agriculture and logging. In some communities the production of handicrafts is a very important activity. In others, where the weather permits avocado production is an important activity.

Sociodemographic data (no of farmers; no of people under 30; percentage of indigenous population)
Others: In the *Purépecha* plateau the population is mostly indigenous, from the purépecha ethnic group.

Short description of intervention area

The *Purépecha* Plateau is located in the centre and northwest of the state of Michoacán. The south is surrounded by the avocado growing strip, with its capital Uruapan and to the north by the valleys of the Bajío where staple grains are intensively farmed. It is part of the physical geographical region known as the Transverse Neovolcanic Belt. The predominant soils are andosols and they lack flowing surface water because of their geological characteristics. All the precipitation infiltrates and gives rise to several rivers and lakes around the edges of the region. The most important are the River Cupatitzio in Uruapan and the River Duero in Zamora, and the lakes of Pátzcuaro and Zirahuen.

It is the most important indigenous cultural area in the state with a wealth of history, festivities and local cuisine based on locally-grown produce. The total population of Purépecha speakers over 5 years of age is estimated to be over 124,000. The boost given to the language over the last 20 years is due to 1980s indigenous movements to reclaim the language. Nowadays it is a region with a very active culture. Higher education establishments have been set up that are instilling cultural principles into a new generation. The Cheran community has been governed by an assembly for more than five years and has abandoned the political party system. This is a sign of the organizational movements present in the region.

Maize growing is the most important activity. All production is for self-consumption and is combined with beans and squash on the plot. It is also very common for fruits and vegetables to be grown on the plots. However, the hills around the region of the *Purépecha* Plateau are ideal for avocado production due to the soil and the climatic characteristics. This is the main avocado-producing region in the world, which has resulted in a large-scale change in land use. In upland areas, deforestation for logging purposes has also led to forest deterioration.

Diversification in the economic activities of families is high. Most of the rural population is engaged in agriculture and combines this with livestock rearing, logging and handicrafts. Foreign remittances and wage labour in the avocado orchards are also an important source of income for communities.

Project selected species present in the intervention area

Cultivated species include: various landraces of maize (*Zea mays*), beans (*Phaseolus vulgaris*, *P. coccineus*,), amaranth (*Amaranthus hypochondriacus*), red chia (*Chenopodium berlandieri*), pumpkins (*Cucurbita pepo*, *C. moschata*, *C. ficifolia*), chili peppers (*Capsicum annuum*, *C. pubescens*), chayote (*Sechium edule*), tomatillo (*Physalis philadelphica*), avocado (*Persea americana*), Agaves (*Agave* spp.).

The most important quelites are: amaranthus species (*Amaranthus* spp.), alaches (*Anoda cristata*), quelites and goosefoot (huauzontle, *Chenopodium* spp.), Chipilin (*Crotalaria* spp.) and epazote (*Dysphania ambrosioides*).

Wild species related to crops and managed species are as follows: *Tripsacum* spp. (wild relatives of maize), *Phaseolus* spp., *Amaranthus* spp., *Cucurbita radicans*, *Physalis* spp., *Agave* spp. *and Opuntia* spp.

Note: The listed species have database records inside the intervention area polygon plus a 5 km buffer. The Information was obtained from the National Biodiversity Information System (SNIB) complemented with the knowledge of experts consulted.

Agro-ecosystems covered

Significant agro-ecosystems include milpas, where maize, beans and pumpkins are grown. A great diversity of native and introduced plants can also be found in plots or allotment gardens.

Background and existing initiatives in the intervention area

Studies have been conducted on maize diversity, including significant works by Mijangos (2005) and by Orozco and Astier (2017). Native maize production has also been encouraged through the efforts of civil society organizations such as GIRA A. C. and cooperatives. However, several thousand hectares are no longer planted with maize due to pressure exerted by commercial crops such as avocado and potatoes.

Local and regional markets

Local markets, alternative product fairs in Morelia, export of native organic maize; Purépecha barter market and Pátzcuaro market.

Information sources

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Regional partners of the GEF project run by agroBD

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Marku Anchecoren Cooperative, Paracho Michoacán.

Michoacán Indigenous Intercultural University, Pichátaro, Michoacán.

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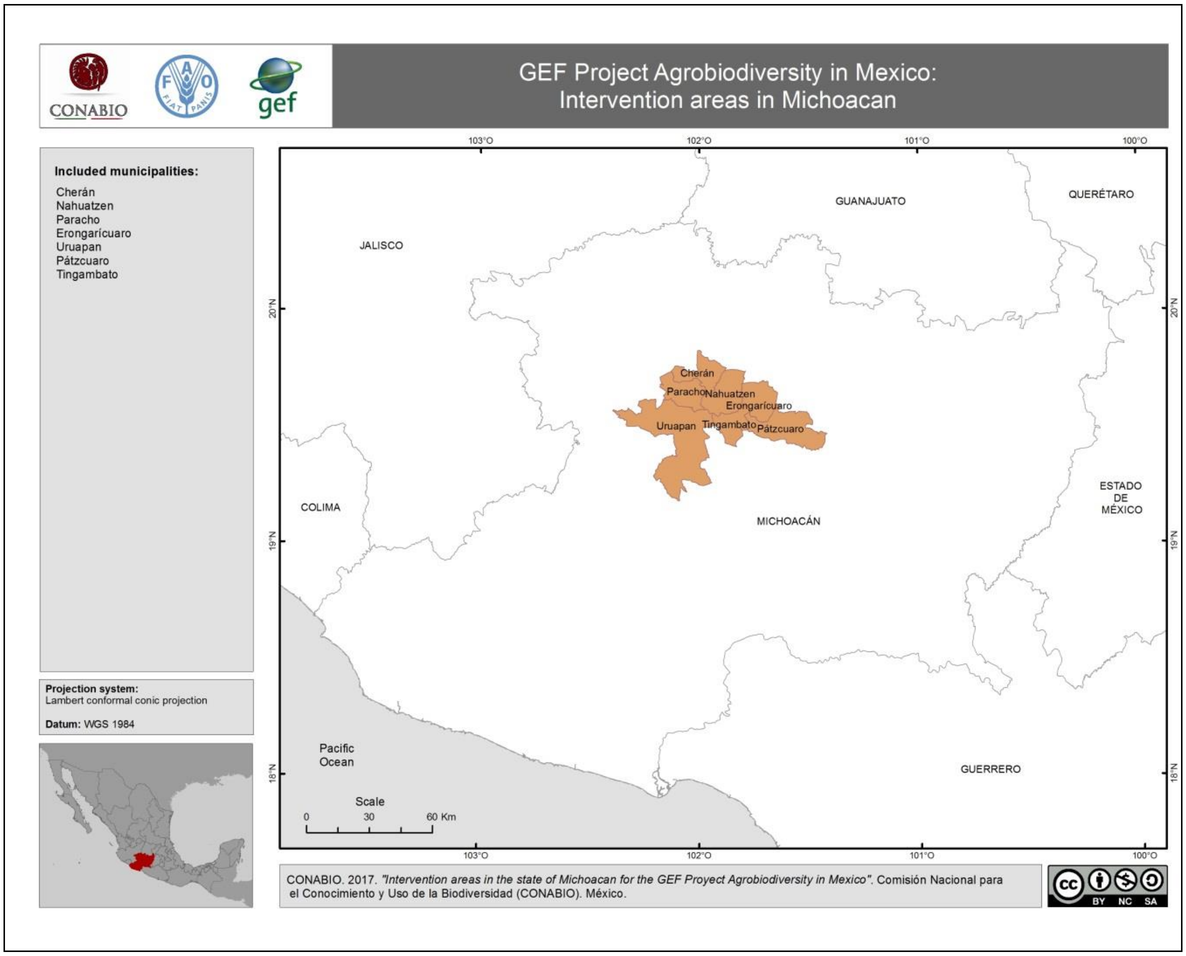
Map(s)


GEF Project Agrobiodiversity in Mexico:
Intervention areas in Michoacan
Included municipalities:
Cherán
Nahuatzen
Paracho
Erongarícuaro
Uruapan
Pátzcuaro
Tingambato
Projection system:
Lambert conformal conic projection
Datum: WGS 1984
JALISCO
GUANAJUATO
QUERÉTARO
COLIMA
MICHOACÁN
ESTADO DE MÉXICO
GUERRERO
Pacific Ocean
Scale
0 30 60 Km
CONABIO. 2017. "Intervention areas in the state of Michoacan for the GEF Proyect Agrobiodiversity in Mexico". Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO). México.

Descriptive factsheet

AGROBIODIVERSITY PROJECT INTERVENTION AREA

General data

Name of intervention area: Oaxaca communities
State: Oaxaca
Municipalities included: San Juan Bautista Valle Nacional (Papaloapan region), Villa de Tututepec (Coast), Silacayoápam (Mixteca), Santa Catarina Juquila and Santiago Yaitepec (Sierra Sur)
Baseline locations*: San Mateo Yetla, San Lucas Arroyo Palomo, Monte Negro, San Rafael Agua Pescadito, Santa Fe y la Mar, Valle Nacional in the Municipality of San Juan Bautista Valle Nacional; Rio Grande, Santa Rosa de Lima, Santa Cruz, Santiago Jocotepec in the Municipality of Villa de Tututepec; Santiago Asunción, San Juan Huastepec in the Municipality of Silacayoápam; San Marcos Zacatepec, Santa Maria Yolotepec del Municipio de Santa Catarina Juquila; and Santiago Yaitepec in the Municipality of Santiago Yaitepec.

* Locations where the project will start its work in the first year of implementation.

Statistical data on the working area

No of inhabitants per location:

Municipality	Location	Inhabitants	Women	Indigenous people
San Juan Bautista Valle Nacional	San Mateo Yetla	709	377	662
San Juan Bautista Valle Nacional	San Lucas Arroyo Palomo	424	230	418
San Juan Bautista Valle Nacional	Monte Negro	205	114	202
San Juan Bautista Valle Nacional	San Rafael Agua Pescadito	842	459	841
San Juan Bautista Valle Nacional	Santa Fe y la Mar	1115	570	516
San Juan Bautista Valle Nacional	Valle Nacional	5488	2907	2510
Villa de Tututepec	Rio Grande	12943	6697	1368
Villa de Tututepec	Santa Rosa de Lima	2200	1095	379

Villa de Tututepec	Santa Cruz Tututepec	971	501	349
Villa de Tututepec	Santiago Jocotepec	1767	888	216
Silacayoápam	Santiago Asunción	256	150	250
Silacayoápam	San Juan Huaxtepec	436	232	406
Santa Catarina Juquila	San Marcos Zacatepec	1034	536	769
Santa Catarina Juquila	Santa Maria Yolotepec	957	464	936
Santiago Yaitepec	Santiago Yaitepec	4120	2229	4115
Total		33467	17449	13937

Geographical data:

The municipalities of Villa de Tututepec and San Juan Bautista Valle Nacional are located low altitude, between 30 and 660 m asl. In Santa Catarina Juquila and Santiago Yaitepec, th altitude ranges from 800 to 1760 m. The communities of Silacayoapam are located at betwee 1800 and 1900 m asl.

In all communities, the topography consists of mountains and hills, although the gradie varies. Villa de Tututepec and Valle Nacional are the only municipalities with flat areas of ar significance.

Climates: The state includes a great variety of climates. The following climates are present in selected municipalities. Warm humid with rain all year round in Valle Nacional; sub-humid warm with rains in summer in Villa de Tututepec; semi-warm humid with rains in summer and temperate sub-humid with rains in summer in Santa Catarina Juquila and Santiago Yaitepec – and semi-warm sub-humid with rains in summer in Silacayoápam (INEGI 2014).

Financial data: the main economic activities are agriculture for self-consumption and livestock keeping for the local market. Cattle ranching is more important in Valle Nacional and in Villa de Tututepec. In the region of Juquila, coffee growing is an important source of income and goat-rearing is important in Silacayoápam.

Others: Maize is the main crop in all communities within the intervention area. This is used for family subsistence. Maize production is not usually sufficient for annual consumption. For this reason, families carry out other activities to supplement their incomes. This includes extensive livestock keeping. This varies from region to region, but it is common for households to have one to five heads of cattle. In the Mixteca region, where Silacayoápam is located, goat keeping is very important and goats are reared for cultural as well as financial purposes.

Migrant remittances are also a major source of income. Migratory flows vary depending on the region, but most rural migrants from Oaxaca go to north-western Mexico or the United States as well as moving from region to region.

Short description of intervention area

The state of Oaxaca is located in the south of the country and extends for approximately 94 000 km^2. It borders with the states of Veracruz and Puebla to the north, Guerrero to the west, Chiapas to the east and the Pacific Ocean to the south. It is the state with the greatest environmental, biological and cultural diversity in the country. Two mountain systems cross the state: the Sierra Madre de Oaxaca to the north and the Sierra Madre del Sur to the south. It includes a great variety of climates due to its position and altitude. The state is home to 16 per cent of plants and 24 per cent of animals classified in Mexico (Llorente-Bousquets and Ocegueda 2008). One hundred and fifty-eight of the 291 languages recognized in the country are also spoken within the state (De Ávila 2008). Oaxaca's culture and history are as rich as its biological and environmental diversity. It is a site of plant domestication and the origins of agriculture according to Flannery (1986). Major Mesoamerican civilizations grew up here (De Ávila 2008).

The state's total population is approximately 3.8 million. Approximately 1.5 million people are indigenous. The main group is Zapotec with 31 per cent speaking the indigenous language, followed by Mixtecos (22 per cent), Mazatecos (15 per cent), Mixes (10 per cent) and Chinantecos (9 per cent). The state population is mainly rural. Seventy-five per cent of the state's total population live in settlements with under 15,000 inhabitants and 52 per cent in villages with under 2500 inhabitants. Compared with other states, Oaxaca is the one with the greatest proportion of rural and indigenous population. It is also the state with the lowest human development indices (INEGI 2012).

Agriculture is the state's most important economic activity. The average area of rural production units is 5 ha. Production is mainly seasonal and only 6 per cent is irrigated. Land ownership is mainly communal, "ejidal" ownership accounts for 33 per cent and public communal ownership accounts for 41 per cent: only 25 per cent is private (INEGI 2012). The most important crops in terms of total seeded area are: maize (42 per cent), pasture (27 per cent), coffee (11 per cent), sugarcane (5 per cent), beans (3 per cent) and sorghum (3 per cent). According to statistics, 118 other crops are grown, but all on very small areas (SIAP 2012).

The region's agrobiodiversity is high. Oaxaca is one of the states with the greatest diversity in terms of maize varieties alone. A total of 28 varieties have been reported, although some authors claim that the number is 35 (Aragón et al. 2006). The diversity of beans and peppers is also high, although there are no general statistics for these and other species.

Project selected species present in the intervention area

Cultivated species include: various landraces of maize (*Zea mays*), beans (*Phaseolus dumosus, P. lunatus, P. coccineus*), pumpkins (*Cucurbita moschata*), chili peppers (*Capsicum annuum*), chayote (*Sechium edule*), tomatillo (*Physalis philadelphica*), cocoa (*Theobroma cacao*), avocado (*Persea americana*) and Agaves (*Agave* spp.).

The most important quelites are: alaches (*Anoda cristata*), rattlepods (chepil, *Crotalaria pumila*) and epazote (*Dysphania ambrosioides*).

Wild species related to crops and managed species are as follows: *Tripsacum* spp. (wild relatives of maize), *Cucurbita argyrosperma* ssp. *sororia, Sechium chinantlensis, S. compositum, Physalis* spp., *Persea* spp., *Agave* spp. *and Opuntia* spp.

Note: The listed species have database records inside the intervention area polygon plus a 5 km buffer. The information was obtained from the National Biodiversity Information System (SNIB) complemented with the knowledge of experts consulted.

Agro-ecosystems covered

Agro-ecosystems covered include traditional milpa farming systems, mainly growing maize and beans. This includes many regional variants because the bean and pumpkin species change. Sowing management and seasons also change. Backyard allotment gardens will also be covered because this is where many species are cultivated such as avocados, tomatillos and even cocoa, and quelites are gathered here.

Background and existing initiatives in the intervention area

INIFAP, and Flavio Aragón in particular, is the driving force behind many conservation projects and plans to exploit agrobiodiversity. The INIFAP centre in Valles Central runs a regional germplasm bank and develops community bank projects in several regions of the state. It has also developed participatory genetic improvement studies and a state agrobiodiversity fair has been held every year for seven consecutive years. CONANP has been another important stakeholder, encouraging native maize variety conservation projects. SAGARPA and FAO have been promoting the Special Programme for Food Sovereignty (SPFS) since 2002. Countless civil organizations have contributed to sustainable community development, including the conservation of native seeds.

Local and regional markets

Agrobiodiversity fair and local markets in the municipalities involved

Information sources

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Llorente-Bousquets, J. and S. Ocegueda. 2008. Estado del conocimiento de la biota [Current knowledge of the biota]. In *Capital natural de México [Mexico's natural capital]*: Conocimiento actual de la biodiversidad [Current knowledge of biodiversity], 283-322. Mexico: CONABIO.

Regional partners of the agroBD GEF project

Forestry, Agricultural and Livestock Research Institute (INIFAP). Valles Centrales, Villa de Etla, Oaxaca

Regional office of the National Committee of Natural Protected Areas. Oaxaca Oax.

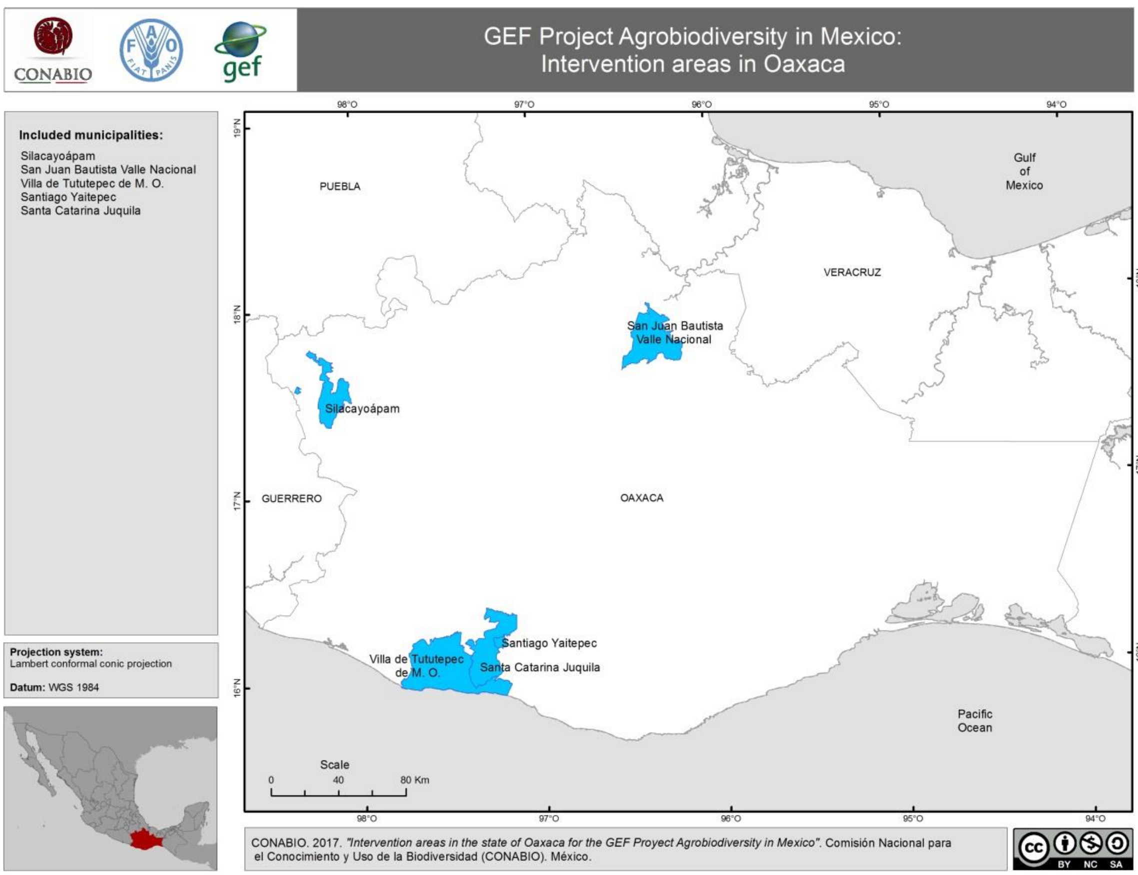
ECOSTA Yutu Cuii, S.S.S.

Grupo Autónomo para la Investigación Ambiental, A.C. [Autonomous Group for Environmental Research]

Prepared by

Quetzalcóatl Orozco Ramírez.

Map(s)



Descriptive factsheet

AGROBIODIVERSITY PROJECT INTERVENTION AREA

General data

Name of intervention area: Region of milpas in Yucatan
State: Yucatan
Municipalities included: Peto, Chacsinkin, Tixmehuac, Tahdziu, Yaxcaba, Tinum, Valladolid
Baseline locations*: 15 locations: Chacsinkín, Xbox, municipality of Chacsinkín; Dzutoh, Sabacché and Sisbic, municipality of Tixméhuac; Kambul and Xoy, municipality of Peto; Tahdziu and Timul, municipality of Tahdziu; Yaxunah, Kancabdzonot and Huechen Balam, municipality of Yaxcabá, Kanxoc and Xocén, municipality of Valladolid and Balantum, municipality of Tinum.

* Locations where the project will start its work in the first year of implementation.

Statistical data on the intervention area

No of inhabitants per location (2010):

Municipality	Location	Inhabitants	Women	Indigenous people
Chacsinkín	Chacsinkín	2555	1272	2555
Chacsinkín	Xbox	220	109	220
Tixméhuac	Dzutoh	132	60	132
Tixméhuac	Sabacché	636	305	636
Tixméhuac	Sisbic	171	91	171
Peto	Kambul	221	110	154
Peto	Xoy	714	361	709
Tahdziu	Tahdziu	3742	1829	3734
Tahdziu	Timul	543	275	543
Yaxcabá	Yaxunah	617	317	617
Yaxcabá	Kancabdzonot	964	468	962
Yaxcabá	Huechen balam	155	76	155

Valladolid	Kanxoc	3126	1554	3121
Valladolid	Xocén	2407	1228	2399
Tinum	Balantum (Research centre)			
Total	Total	16203	8055	16108

Geographical data:

The altitude ranges from 10 to 40 m asl; the orography of this region is flat.

Climate: average annual temperature is 26 °C; average precipitation ranges from 1000 to 1200 mm per year.

Economic data: The main economic activities of these communities are farming using the milpa system and honey production. A study of the region of milpas in the peninsula found that on average 62 per cent of the monetary income of a farming family comes from salaried work or from non-farming-related businesses.

Others: A detailed report on the milpa economy in six communities in the region found that young people (average age of 34) leave their communities to work. However, older men (average age of 52) are in charge of family production units and practise milpa farming (Rodríguez and González 2016).

Short description of intervention area

The region of milpas in Yucatan is located in a strip to the south of the state running from south-west to north-east. This includes several municipalities. The main one is Yaxcabá, where intensive research has been carried out into milpa farming since the 1970s.

Yucatan is characterized by a warm sub-humid climate with summer rains. It experiences little annual temperature fluctuation but a marked seasonality of rainfall. The landforms and geology are specific to the area. This is a flat area, the highest elevation in the state is 210 m asl and it is characterized by sedimentary calcareous rocks. The hydrological system is underground and features characteristic "cenotes", which are openings in the rock giving access to the water table. Soil is the main factor of environmental variation in the region. The main types are rendzina leptosol, lithic leptosol and leptic phaeozem. Because these are generally shallow soils, they require special management in order to conserve and recover fertility. The natural vegetation typical of the region is lowland and mid-elevation forest. The vegetation can be found in different states of succession due to the itinerant agriculture practised. (INEGI 2014).

Traditional Mayan milpa farming is a polyculture system that requires rotation of the land due to soil properties. Problems began to be encountered with this system in the 1970s. The processes that contributed to this crisis were a decrease in the availability of forestland for milpa cultivation, due mainly to the expansion of extensive livestock rearing and the impact of population growth. In order to compensate for low yields due to using forests that had been allowed fewer fallow years, the farmers started to use fertilizer and herbicides to remove the weeds. Workers began to migrate to Cancún, where the tourist industry began to take off during this decade. The demand for building labour was covered by the milpa farmers. The milpa based economy began to be monetized and food self-sufficiency was lost. However, despite the great financial vulnerability into which the milpa producing families were plunged (50 per cent of milpa based households do not achieve a minimum standard of living), peninsular Mayan milpa farming represents a viable option. It occupies 55 per cent of the farming area in the Yucatan peninsula and is the main form of livelihood for the Mayan milpa producing population. Despite the reduction in milpa farming and the erosion of cultivated plant genetic resources, 55 per cent of the value of milpa farming comes from associated crops. The environmental services provided by secondary vegetation, particularly its ability to capture CO_2, must also be considered (Terán and Rabassa, sf).

Project selected species present in the intervention area

Cultivated species include: various tropical landraces of maize (*Zea mays*), beans (*Phaseolus vulgaris, P. lunatus, P. acutifolius, P. coccineus*), pumpkins (*Cucurbita pepo, C. argyrosperma and C. moschata*), chili peppers (*Capsicum annuum, C. chinense, C. frutescens*), chayote (*Sechium edule*), cocoa (*Theobroma cacao*), avocado (*Persea americana*) and agaves (*Agave* spp.).

The most important quelites are: amaranths (*Amaranthus* spp.), anodas (alaches, *Anoda cristata*), goosefoot (huauzontle, *Chenopodium berlandieri*), chipilin (*Crotalaria* spp.), epazote (*Dysphania ambrosioides*) and papalo (*Porophyllum ruderale*).

Wild species related to crops and managed species are as follows: *Amaranthus* spp., *Physalis* spp., *Agave* spp. *and Opuntia* spp.

Note: The listed species have database records inside the intervention area polygon plus a 5 km buffer. The information was obtained from the National Biodiversity Information System (SNIB) complemented with the knowledge of experts consulted.

Agro-ecosystems covered

The agroecosystem to be covered is "Yucatan Mayan milpa". This farming system is typical of the Maya region of the Yucatan peninsula. Traditionally, it is a slash and burn rotation system. It is a complex production system and although maize yield is low compared to high-tech monoculture systems, other products are obtained such as beans, pumpkins, peppers, cassava, tomato, sweet potato, honey, wild animals (hunting), songbirds and ornamental birds as well as feathers, medicinal herbs, building materials such as wood, rock, lime and plaster for masonry, firewood, charcoal and so on.

Agrobiodiversity includes more than 160 cultivated and harvested plant species, more than 40 species of fauna and more than 600 species of medicinal herbs. It essentially constitutes a form of agroforestry management.

Background and existing initiatives in the intervention area

Yucatan milpa farming systems have been systematically studied since the 1970s. Research centres and higher educational establishments are currently working on the topic as well as civil society organizations, which promote agroecological methods and native seed conservation. The most significant actions performed by such groups include participatory maize improvement processes and the seed fairs held annually since 2003.

Current initiatives cooperating with the project include the Interdisciplinary Mayan Milpa Programme developed by the state government, which includes a workcentre in the former Balantún estate in the municipality of Tinum and support for a network of seed custodians and expert milpa farmers. Another important initiative by state government is to nominate peninsular Mayan Milpa for recognition as a Globally Important Agricultural Heritage System (GIAHS) by the Food and Agriculture Organization of the United Nations (FAO).

Local and regional markets

Mayan milpa fairs incorporating Mayan seed fairs; meetings for the exchange of knowledge between Mayan cabañuelas [weather forecasters] – and local markets in the municipalities considered.

Information sources

Fenzi, M., Jarvis, D. I., Reyes, L. M. A., Moreno, L. L., & Tuxill, J. (2015). Longitudinal analysis of maize diversity in Yucatan, Mexico: influence of agro-ecological factors on landraces conservation and modern variety introduction. Plant Genetic Resources, 1-13.

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Regional partners of the agroBD GEF project

Department of Urban Development and Environment (SEDUMA) and Department of Innovation, Research and Higher Studies (SIIES) of the Yucatan State Government

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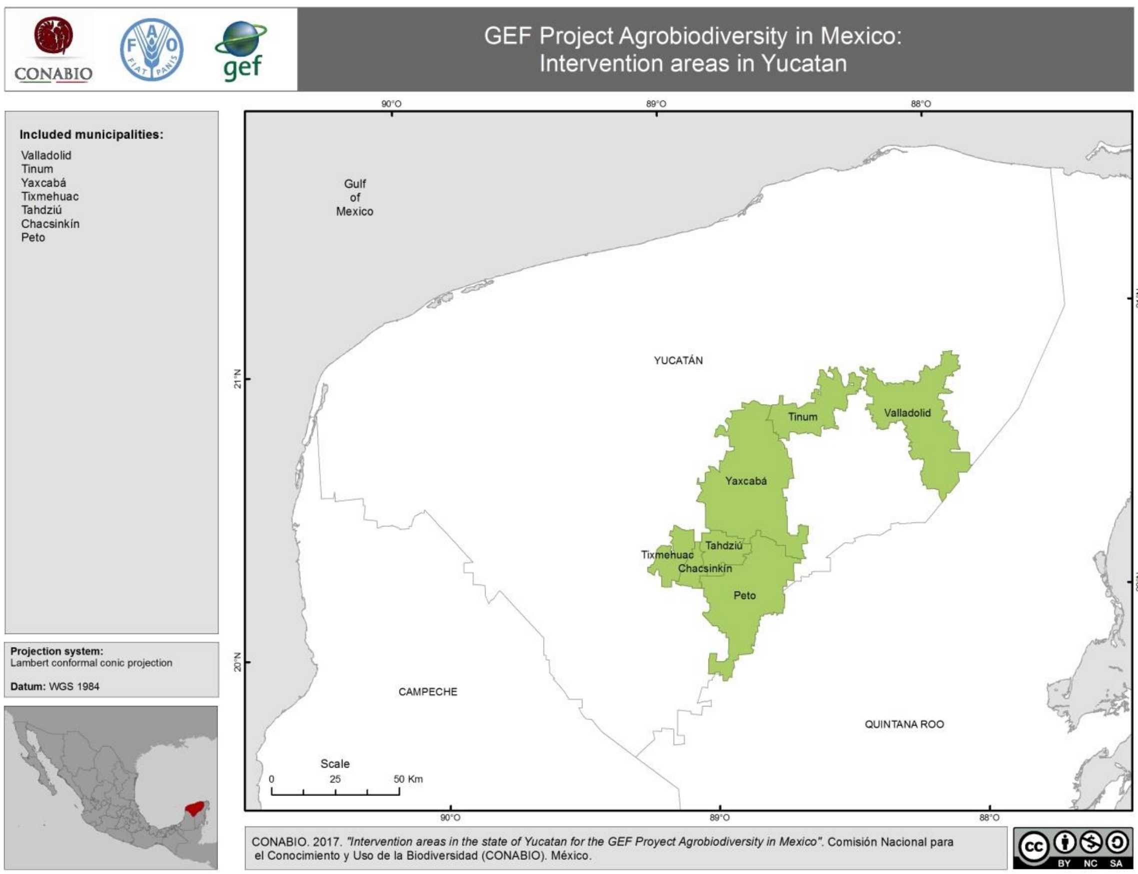
Map(s)



Appendix 9. Descriptive factsheets of the crops and species selected in the project

Agave

Agave spp.

1. General description of the species	Species of the *Agave* genus are referred to as maguey. They are widely distributed in arid climates. They are herbaceous plants with a basal rosette growth habit and long fleshy leaves with spiny edges adapted to store water in climates with low rainfall. Most develop flowers on branches and others grow in an inflorescence made up of an elongated main stalk. Pollination is mediated by insects, birds and bats. Vegetative reproduction also occurs by means of bulbs and suckers.
2. Centre of origin / Centre of diversity	The *Agave* species is endemic to America. Approximately 200 species are known, of which 150 (75 per cent) are found exclusively in Mexico. The country is therefore acknowledged to be the centre of greatest diversity and of the greatest number of endemic species as well as the plant's centre of domestication.
3. Presence of wild relatives in Mexico	Each of the agave gene pools is dependent on the cultivated-managed species considered: it has been reported that approximately 72 species are used in some way (Bellón, 2009). For example, in the case of *Agave tequilana*, the species used to produce tequila, its relatives *A. angustifolia and A. rhodacantha* form part of the primary species pool (Vargas-Ponce, 2007). Examples of wild relatives considered to form part of the agave gene pool include: *A. cocui, A. subsimplex, A. xylonacantha, A. difformis, A. cerulata, A. celsii, A. potatorum, A. lechuguilla, A. garciae-mendozae, A. angustifolia, A. striata, A. victoriae-reginae, A. salmiana* and *A, murpheyi* (Eguiarte *et al*., 2013).
4. Threatened wild relative (or species)	Official Mexican Standard NOM-059-SEMARNAT-2010 lists the species *Agave bracteosa*, *A. dasylirioides, A. guiengola, A. impressa, A. parviflora, A. polianthiflora* as threatened; *Agave lurida, A. nizandensis, A. victoriae-reginae* at risk of extinction, and *Agave chiapensis, A. congesta, A. gypsophila, A. kewensis, A. ornithobroma, A. parrasana, A. peacockii, A. titanota, A. vizcainoensis*, subject to special protection. CITES lists two species in Appendix 1 (*A. arizonica* and *A. parviflora*) and one species in appendix II (*A. victoriae reginae*; a species endemic to Mexico). No species from the Agavaceae family are included on the IUCN red list.
5. Uses in Mexico	According to ethnobotanical studies, it has been reported that 74 species and 28 infraspecific taxa are used for human food, producing fermented and distilled beverages, honeys and syrups, obtaining fibre and forage, producing terraces, ornamental use and so on.
6. Historical and cultural importance	Diversification of the genus *Agave* in Mexico due to human cultivation and selection began approximately 9000 years ago. *Magueyes* were initially the main source of carbohydrates for the inhabitants of western Mexico and the south-west of the United States of America. In central Mexico, fermented beverages were produced using sap obtained by cutting the flower stalk. A wide range of Agave spirits or distillates is currently produced in Mexico. These are generically known as "mezcals". Fibre production from henequen was particularly successful in the Yucatán peninsular region in the late nineteenth and early twentieth centuries.
7. Uses and importance at world or regional level	Three designations of origin (DO) are currently recognized for Mexican Agave distillates. "Tequila", "Mezcal" and "Bacanora". Of the 56 taxa used to produce mezcal, only eight taxa in seven states of the Mexican Republic are recognized in the DOs.

8. Importance in nutritional, medicinal, nutraceutical and other terms	Agaves are used in traditional Mexican medicine and contain various compounds with neutraceutical properties, for example fructans (López and Urías-Silvas, 2007).
9. Reported use of wild relatives or local varieties for genetic improvement, or their potential use.	No specific information was found in this regard, but the need for genetic improvement of certain Agave species has been reported.
10. Worldwide production	During 2014, 41,336 tons of agave fibre were produced: Colombia was the biggest producer (6,010 ton) followed by Mexico (5,430 ton) (FAOSTAT, 2017); other statistics indicate that Mexico accounts for 85 per cent of worldwide agave production.
11. Production level in Mexico	In 2015, the sown area amounted to 108,119 ha., and the production volume was 1,846,345 tons of Agave; 4,971 of henequen; 6,760 of green henequen; 12,141 of green forage maguey and 303,770 thousand litres of pulque (SIAP, 2016).
12. Existing cultivation in traditional agroecosystems	Most of the genetic resource diversity of this genus is used by traditional farmers, both for self-consumption and marketing. Three types of agro-ecosystems are recognized with regard to the use of Agave for distillation purposes in Mexico: • harvesting in wild populations • traditional agro-ecosystems • modern agro-ecosystems (intensive use with agrochemicals)
13. Registration of commercial varieties/hybrids in Mexico	The CNVV (SNICS, 2016) includes 11 registered varieties. Institutions such as CIATEJ, CICY, CINVESTAV and UACh as well as companies such as Tequila Sauza are financing programmes to improve henequen and tequila by selecting elite lines and propagating them on a very small scale.
14. Description of landraces/varieties produced locally in Mexico	Traditional farmers generally use a great number of local varieties and maintain a broad genetic base for those varieties. Agribusinesses, by contrast, make very limited use of diversity and maintain a narrow genetic base.
15. Research efforts or groups working with the crop species in Mexico	Institutions such as UNAM, CIATEJ, CINVESTAV, CICY, INIFAP, University of Guanajuato, UACh, SINAREFI Agave network and companies such as Tequila Sauza have worked with these species.
16. Potential contribution to climate change resilience	Agaves are adapted to environments with low rainfall
17. Studies on Genetic diversity in the genus in Mexico	Few studies have been conducted on the genetic diversity of the *Agave*. The available data indicate that traditionally grown varieties maintain a level of genetic diversity similar to that found in wild populations. By contrast, the genetic diversity of commercial plantations has decreased to the extent that they are considered genetically homogeneous populations. This has been encouraged by vegetative or clonal propagation, particularly in the case of henequen and the maguey used for tequila production.
18. Studies required	Further studies on the genetic diversity of species in this genus. Defining areas of greatest diversity in cultivated varieties. Further characterization of the crop's phenotypic diversity. Development of germplasm genetic conservation and improvement programmes.
19. Species or crop conservation problems or obstacles	Traditional farmers have mainly been responsible for actions to generate and conserve diversity. Farmers maintain diversity in their plots by continuously selecting the wild germplasm, managing populations on the wild-domesticated gradient and conserving old cultivars. Keeping up this process is essential in order to maintain the genetic diversity of this genus.

Amaranth

Amaranthus cruentus L. and *A. hypochondriacus* L.

1. General description of the species	The Amaranthaceae family includes 60 genera and some 800 annual or perennial grasses that produce small grains in sets of ears. The main grain-producing species are: *A. hypochondriacus* and *A. cruentus*
2. Centre of origin / Centre of diversity	The grain-producing species *A. hypochondriacus* and *A. cruentus* are of American origin (Guatemala and south-eastern Mexico).
3. Presence of wild relatives in Mexico	Grain-producing species coexist with the wild species that gave rise to them, *A. hybridus* and *A. powelli* respectively; these make up the primary pool of both cultivated species, although the pool may also include *A. retroflexus*, which also hybridizes with the wild species mentioned above. *A. spinosus* is part of the secondary pool, since it is more difficult for crosses to form hybrids. It has been reported that species within the *Amaranthus* subgenus are more likely to form crosses with fertile progeny (Mapes-Sánchez and Espitia-Rangel, 2010; Trucco and Tranel, 2011).
4. Threatened wild relative (or species)	None are under threat
5. Uses in Mexico	Used for food, medicines and cosmetics (amaranth oils include squalene, which is very useful as a lubricant and for cosmetic use).
6. Historical and cultural importance	In pre-Hispanic times, as well as being used as a food, the seeds were used as a tribute to Mexico Tenochtitlán. During religious ceremonies and festivities, an image of Huitzilopochtli was sculpted out of dough made from amaranth and honey (Zoale).
7. Uses and importance at world or regional level	Amaranth has been used by many cultures around the world. In Asia, it is eaten in various ways, in sweet dishes such as *ladoos*, or savoury bread patties and *phambra*. In South America, it is eaten in the form of cornmeal and flour in various dishes such as *tulpo de chacliá* in Argentina. In Africa, amaranth flour is mixed with cornmeal to make a dish known as *ugali* (Costea and Tardif, 2003).
8. Importance in nutritional, medicinal, nutraceutical and other terms	Amaranth contains amino acids (such as lysine), flavonoids, soluble and insoluble dietary fibres as well as vitamins and minerals (linoleic acid, zinc, iron, phosphorus, calcium, vitamins E and B). The nutritional substrates it provides can reduce the risk of cardiovascular, coronary, colon and rectal diseases; they also help reduce cholesterol levels in the blood and act as chemopreventive agents in contaminated industrial regions (e.g., it can remove toxic remnants of caesium-137 and copper).
9. Reported use of wild relatives or local varieties for genetic improvement, or their potential use.	*A. hybridus* has been used in genetic improvement with the aim of benefiting from some advantageous characteristics such as precocity and height Brenner et al., 2000).
10. Worldwide production	Two decades ago, Asia was the largest producer of amaranth. In the United States, New Zealand, Japan, Germany and Spain there is interest in including amaranth in various products.
11. Production level in Mexico	According to SIAP, amaranth production was 6,052.41 tons in 2016, with an average yield of 1.33 Ton/ha.
12. Existing cultivation in traditional agroecosystems	Amaranth is cultivated as a monoculture or combined with other maize, beans or pepper crops. However, it is also grown in milpa systems and harvested for consumption.
13. Registration of commercial varieties/hybrids in Mexico	Ten varieties are registered in the National Catalogue of Plant Varieties (SNICS, 2016)

14. Description of landraces/varieties produced locally in Mexico	Three varieties of *Amaranthus hypochondriacus* have been described (Azteca, Mercado and Mixteca) and one variety of *Amaranthus cruentus* (Mexicano).
15. Research efforts or groups working with the crop species in Mexico	Some of the Mexican specialists are listed below: Cristina Mapes Sánchez (IB UNAM), Eduardo Espitia-Rangel (INIFAP) (See report Mapes-Sanchez y Espitia-Rangel, 2010), and the SINAREFI amaranth network have carried out activities related to this crop.
16. Potential contribution to climate change resilience	All amaranths exhibit very varied phenotypes and adapt to a huge variety of climatic conditions. They are widely distributed in Asia, Africa and America.
17. Studies on genetic diversity in the genus in Mexico	Hybridization is present between several species of the genus. This factor contributed to the wide variation within species, which in turn made genus taxonomy very complex. The intra-specific variation in amaranth species mainly exists between accessions with isoenzymes and random amplified polymorphic DNA (RAPDs). Intra-specific genetic variation is very narrow in cultivated species.
18. Studies required	Further genetic diversity studies into the crop and wild relatives. Crop phenotype diversity characterization studies are also required as well as studies encouraging amaranth production, marketing and consumption.
19. Species or crop conservation problems or obstacles	Priority conservation areas must be defined and we must gain a clearer idea of how domesticated species originated from wild species.

Avocado

Persea americana Mill.

1. General description of the species	The avocado (or aguacate in Spanish, from the Nahuatl word ahuacatl meaning testicle) belongs to the Lauraceae family. The *Persea* genus is made up of some 190 species, 90 of which can be found in the neotropics. The genus *Persea* is made up of trees that can grow up to 20 m in their natural habitat and up to approximately 5 m when cultivated (http://www.biodiversidad.gob.mx/usos/alimentacion/aguacate.html). The fruit is an oval or pear-shaped berry.
2. Centre of origin / Centre of diversity	The avocado is believed to originate from Mesoamerica and particularly the cloud forests. Species of the subgenus *Persea* to which *P. americana* belongs can be found from central Mexico southward through most of Central America (Jardón *et al.*, 2012).
3. Presence of wild relatives in Mexico	Approximately 20 related species have been documented in Mexico (other authors report that there are 26 species in the genus) (Campos Rojas *et al.,* 2008., and http://www.biodiversidad.gob.mx/usos/alimentacion/aguacate.html). The primary gene pool for *P. americana* are wild and cultivated variants (local and commercial varieties) of the same species (*P. americana*). The tertiary pool is made up of the following species: *P. schiedeana, P. pallescens, P. albida, P. cinerascens, P. donnell-smithii* and *P. parvifolia* (Vincent *et al*., 2013; CWR).
4. Threatened wild relative (or species)	The IUCN red list includes *Persea schiedeana, P. floccosa, P. liebmanni,* which are catalogued as vulnerable. IUCN factsheets are currently being drawn up for the wild relatives of *P. americana* in Mesoamerica (Darwin Initiative Project).
5. Uses in Mexico	The fruit is eaten fresh, the leaves are valued as a seasoning and avocado oil is used to prepare concentrated foods; it is used in the manufacture of cosmetics and several medicinal applications are known for the treatment of intestinal parasites, gynaecological diseases and conditions treated by Mexican folk healing remedies such as "el susto" [fear], "mal aire" [bad air], and so on.
6. Historical and cultural importance	It has been used by human groups for about 9000 years. In Mexico, the oldest reports of its use come from the Coxcatlán Cave in Tehuacán, Puebla. The Florentine Codex refers to 3 types of avocado: aoacaquauitl, tlacacoloatl and quilaoacatl. Based on their descriptions, these could correspond to recognized strains in the country: *Persea americana* var. *drymifolia* (Mexican strain), *P. americana* var. *americana* (West Indian strain) and *P. americana* var. *guatemalensis* (Guatemalan strain).
7. Uses and importance at world or regional level	The avocado is a food with a high content of protein, lipids and vitamins that are part of the diet in many parts of the world. Its cultivation has now spread to 71 countries throughout all continents (Faostat data, 2017).
8. Importance in nutritional, medicinal, nutraceutical and other terms	In folk medicine, due to its high vitamin E content, it is considered an aphrodisiac and it is also used as an antidysenteric to eliminate parasitic microbes and restore balanced bowel functions. Its leaves and flower buds are also applied as expectorants in hot infusions (http://www.sinarefi.org.mx/redes/red_aguacate.html; http://www.medicinatradicionalmexicana.unam.mx/monografia.php?l=3&t=Aguacate&id=7088).
9. Reported use of wild relatives or local varieties for genetic	No specific information is available in this regard

improvement, or their potential use.	
10. Worldwide production	According to FAO, the worldwide production in 2014 was 5.14 million metric tons, of which 30 per cent was produced in Mexico, mainly the Hass variety. However, Mexico also has other Persea species that are used and the following species have been reported in the SINAREFI through the Avocado Network: *P. americana, P. shiedana, P. nubigena, P. steyermarkii, P. floccossa, P. cinerascens, P. meyeniana, P. lingue, P. parvifolia, P. gigantea,*: avocado consumption therefore ranges from fruit harvested in the forests to processed products. Mexico exports avocados to 34 countries, the United States being the main market (SE, 2017).
11. Production level in Mexico	In 2015 the Agri-food and Fishery Information Service (SIAP, 2016) recorded 187,327.08 seeded hectares and a production of 1,644,226 tons. The types of avocado handled are: Organic, Criollo, Fuerte, Hass, Tipo Agua and unclassified.
12. Existing cultivation in traditional agroecosystems	They are grown in traditional agroecosystem settings although there is an increasing tendency for the Hass commercial variety to be grown and fewer farmers also include Mexican varieties (Acosta Díaz *et al.*, 2012; Rubi Arriaga *et al.*, 2013).
13. Registration of commercial varieties/hybrids in Mexico	Seventeen varieties are registered in the National Catalogue of Plant Varieties (CNVV) (SNICS, 2016).
14. Description of landraces/varieties produced locally in Mexico	Native Mexican varieties are grown in orchards and backyard gardens, but there is still little information in this regard and more in-depth work is required on crop characterization.
15. Research efforts or groups working with the crop species in Mexico	SINAREFI set up a network of researchers involved in this topic; INIFAP (CEBAJ Celaya) and the Foundation Salvador Sánchez Colín-CICATAMEX, S.C., in conjunction with the Autonomous University of Chapingo (UACH) are working on programmes for germplasm conservation characterization and genetic improvement in Mexico; LANGEBIO is also working on avocado genome sequencing and functional characterization projects. See also the report by Jardon *et al*. 2009.
16. Potential contribution to climate change resilience	No studies were found in this regard, although efforts have been aimed at genetic improvement in order to obtain rootstocks tolerant to drought and salinity, for example.
17. Studies on genetic diversity in the genus in Mexico	Some studies have been conducted using molecular markers for phylogenetic studies in the Lauraceae family as well as for certain species of the genus *Persea* and *P.americana* varieties or accessions. (Jardon *et al*., 2009; Guzmán *et al*., 2017)
18. Studies required	Further studies on genetic diversity of crops and wild relatives, including population genetic studies and characterization of the phenotypic diversity of native or Mexican varieties and wild species. Genetic improvement.
19. Species or crop conservation problems or obstacles	The widespread adoption of the Hass variety, even in family gardens, tends to *reduce in situ* crop diversity sharply. We need to generate more information about wild relatives to understand their level of conservation.

Beans

Phaseolus vulgaris L., *P. acutifolius* A. Gray, *P. coccineus* L. , *P. lunatus* L.

1. General description of the species	Beans are creeping and climbing plants with leaflets of three leaves. The flowers come in pink, lilac and violet shades. The seeds, which are what we refer to as beans, are kidney shaped and grow in a pod that is edible as a vegetable when tender. Like other legumes, these plants have root nodules containing nitrogen-fixing bacteria. Four main species are cultivated in Mexico *Phaseolus vulgaris, P. acutifolius, P. coccineus* and *P. lunatus* (CONABIO)
2. Centre of origin / Centre of diversity	Beans are American in origin. Two primary centres of diversity are known for *Phaseolus vulgaris L*: Mesoamerica and the Andes. Mesoamerica is home to the greatest genetic variability of the genus *Phaseolus* and is also its centre of domestication (SINAREFI, undated).
3. Presence of wild relatives in Mexico	Seventy species of the genus *Phaseolus* have been reported in Mexico (Delgado Salinas, 2012). The primary gene pool for *P. vulgaris* are wild and cultivated variants (local and commercial varieties) of the same species (*P. vulgaris*). The secondary pool is made up of *P. albescens, P. coccineus* and *P. dumosus*. Lastly, the tertiary pool includes *P. acutifolius, P. carteri, P. filiformis, P. maculatus* and *P. parvifolius* (Vincent *et al*., 2013; CWR; Freytag and Debouck, 2002). For *P. acutifolius*, the primary gene pool is made up of wild and cultivated variants of the same species (*P. acutifolius* var. *acutifolius*, *P. acutifolius* var. *latifolius* and *P. acutifolius* var. *tenuifolius*). The secondary pool is made up of *P. parvifolius* and the tertiary pool includes *P. albescens, P. carteri, P. coccineus, P. dumosus, P. filiformis, P. vulgaris* (Vincent *et al.,* 2013; CWR; Freytag and Debouck, 2002). The primary gene pool for *P. coccineus* are wild and cultivated variants (local and commercial varieties) of the same species (*P. coccineus*). The secondary pool is made up of *P. albescens, P. dumosus* and *P, vulgaris*. Lastly, the tertiary pool includes *P. acutifolius* (Vincent *et al*., 2013; CWR; Freytag and Debouck, 2002). The primary gene pool for *P. lunatus* are wild and cultivated variants (local and commercial varieties) of the same species (*P. lunatus*). The secondary gene pool includes *P. longiplacentifer.*. Lastly, the tertiary pool includes *P. acinaciformis, P. albinervus, P. jaliscanus, P. juquilensis, P. maculatifolius, P. maculatus, P. marechalii, P. nodusus, P. novoleonensis, P. reticulatus, P. rotundatus, P. sonorensis, P. scrobiculatifolius, P. salicifolius, P. venosus* and *P. xolocotzii* (Vincent *et al.*, 2013; CWR; Freytag and Debouck, 2002).
4. Threatened wild relative (or species)	There are currently no species of this genus in the lists consulted, but this could change in the light of ongoing work as part of the Darwin initiative project**.**
5. Uses in Mexico	Their seeds are eaten as food and are essential for the diet due to their contribution of vegetable protein; the green pods are also edible. They are used to prepare food for offerings. They are also used to cure digestive, gynaecological, obstetric and dermatological disorders, among other things, and they are used for veterinary purposes (UNAM, 2009)
6. Historical and cultural importance	Beans have been a staple part of the diet since pre-Hispanic times. No medicinal uses are listed in the codices (Dergal, 2012; UNAM, 2009).

7. Uses and importance at world or regional level	Beans are among the legumes most consumed worldwide due to their protein content. (Dergal, 2012).
8. Importance in nutritional, medicinal, nutraceutical and other terms	They have a high protein content, ranging between 14 and 33 per cent, and also contain carbohydrates, vitamins and minerals (Acevedo-Ramos, 2016). The seeds have proven anti-parasitic activity (against *Schistosoma monsoni*) and have also been shown to contain anthocyanins. (Salinas-Moreno *et al*., 2005; Gálvez and Salinas, 2015)
9. Reported use of wild relatives or local varieties for genetic improvement, or their potential use.	The SINAREFI Bean Network reports improvement activities, but without any details. Wild forms of *P. vulgaris* have been found with high levels of resistance to weevils or bruchids (López-Soto,*et al*., 2005)
10. Worldwide production	In 2014, 26,529,580 tons of dried beans were produced. India was the leading producer and Mexico was in sixth place (FAOSTAT, 2017).
11. Production level in Mexico	According to SIAP, production figures in 2016 were: 1,088,766.73 tons of beans and 20,400.00 tons of green fodder beans.
12. Existing cultivation in traditional agroecosystems	These species are important within the milpa system, where the bean is able to fix nitrogen.
13. Registration of commercial varieties/hybrids in Mexico	There are 89 entries in the National Catalogue of Plant Varieties (SNICS 2016) for *Phaseolus vulgaris* L.
14. Description of landraces/varieties produced locally in Mexico	Mexico has a wide range of cultivated varieties or native strains that still need to be described in many cases.
15. Research efforts or groups working with the crop species in Mexico	SINAREFI has its own bean network and there are various working groups, such as those led by Dr Alfonso Delgado (UNAM), Dr Jorge Acosta (INIFAP), Dr Rogelio Lépiz (UDG CUCBA), Dr Daniel Piñero and Dr Alejandra Covarrubias (UNAM) and Dr Alfredo Herrera Estrella (LANGEBIO), among others.
16. Potential contribution to climate change resilience	Studies are currently being conducted on how climate change could affect the distribution of *Phaseolus* genus species in Mexico.
17. Studies on genetic diversity in the genus in Mexico	Phylogenetic studies are currently being conducted using cpDNA and other traditional markers; progress has been made in obtaining reference genomes and GBS *of P. coccineus* and *P. vulgaris* (Delgado-Salinas *et al*., 2006; Patel *et al*., 2014; Schmutz *et al*., 2014, Diaz and Blair, 2006).
18. Studies required	Further studies into genetic/gene diversity such as GWAS (Genome wide association studies) and phylogeography studies using new generation sequencing (NGS) markers throughout the distribution range of the five domesticated species. Continuing to characterize local diversity.
19. Species or crop conservation problems or obstacles	Bean cultivation in traditional agroecosystems is affected by the same factors that make these agricultural production systems vulnerable. Conservation of wild relatives also faces problems that are derived in many cases from loss of natural habitat.

Cactus pear or Prickly pear

Opuntia spp. and Nopalea spp.

1. General description of the species	Cactus pears are part of the Cactaceae family, subfamily Opuntioideae, genera *Opuntia* Mill. and *Nopalea* Salm-Dyck. Cactus pears are generally described as arborescent, shrub or creeping plants; they have different-shaped cladodes or pads with thorns and fruits in various shapes and sizes.
2. Centre of origin / Centre of diversity	Although no detailed information is available on the origin of both genera, we know that they originated in tropical and subtropical regions of America and Mexico can be said to be a major centre of diversification and domestication for certain species (Bravo, 1978). The two genera are found distributed throughout the country but their greatest concentration is in the centre, mainly in arid and semiarid areas (Scheinvar, *et al*., 2011b).
3. Presence of wild relatives in Mexico	Wild relatives are present in Mexico. For the 64 *Opuntia* species distributed in Mexico, between 126 and 243 cultivars have been reported for the southern uplands alone, which corresponds to 18 species (Bellón, 2009). The *Nopalea* genus includes 10 species.
4. Threatened wild relative (or species)	*Opuntia arenaria, Opuntia bravoana* and *Opuntia excelsa* are wild species listed in the special protection category of NOM-059-2010; the last two are endemic. The IUCN red list includes *O. chaffeyi* (microendemic), which is critically endangered and *O. megarhiza* (endemic), which is endangered.
5. Uses in Mexico	The plant's uses are mainly for food: the cladodes (nopalitos) are eaten as a vegetable along with the fresh or processed fruit (tuna). Wild cactus pears are used as a source of fodder for livestock. The plant is also used as a living enclosure in home gardens and livestock farms, for which thorny varieties are used. It is used in the pharmaceutical industry and cactus pear slime also has adherent properties which make it useful in construction and industrial applications.
6. Historical and cultural importance	The cactus pear is an important element of identity in Mexico. The plant is mentioned in the legend of the founding of Tenochtitlán, now Mexico City, and its role in this legend won it a place on the Mexican national emblem.
7. Uses and importance at world or regional level	Its international applications are reported to include uses as food, fodder and in the pharmaceutical, construction and textile industries, and so on (Sáenz *et al.,* 2013). In some countries, distilled beverages are made out of the fruit. In 2001, six countries were producing tuna and competing on international markets: Mexico, Italy, South Africa, Chile, Israel and the United States (SIAP, 2001), and cultivation for tuna production has been introduced in arid regions of various countries. In 2016, 5.6 per cent of the Mexican cactus pear harvest was exported, mainly to the United States, Belgium, South Korea and Japan (SIAP). The cactus pear is also used to obtain natural cochineal dyes, which are obtained by encouraging the pest insect producing the dye (*Dactylopius coccus*) to take up residence in the cactus pear cladodes. This product's heyday was during the colonial period in Mexico and Peru is currently the biggest exporter (Chávez-Moreno *et al*., 2009).
8. Importance in nutritional, medicinal, nutraceutical and other terms	The cactus pear has many nutritional properties, including dietary fibre and pectin content. Many medicinal properties have been described and exploited, and it is also used in the cosmetics industry (Kaur et al., 2012).

9. Reported use of wild relatives or local varieties for genetic improvement, or their potential use.	The SINAREFI cactus pear network reports improvement activities, but without describing the type of material used.
10. Worldwide production	Mexico is the leading country for vegetable prickly pear production because it has the largest area under cultivation (10,400 ha). Its only rival is the USA, with a much smaller area of 100 ha. Mexico exported 44,768 tons in 2016, making it the main exporter in the world (SIAP, 2016; SINAREFI Red Nopal)
11. Production level in Mexico	The national production level of cactus pear in 2016 was approximately 811,000 tons (SIAP, 2016; SINAREFI Cactus Pear Network).
12. Existing cultivation in traditional agroecosystems	The cactus pear is grown traditionally in home gardens to produce the vegetable and tunas for self-consumption. Sometimes they are marketed locally, as well as being used as fodder or to build enclosures, among other uses. Their production has also been extended through intensive monoculture.
13. Registration of commercial varieties/hybrids in Mexico	Fifty-five varieties of cactus pear are listed in the National Catalogue of Plants Varieties produced by the National Seed Inspection and Certification Service (SNICS, 2016).
14. Description of landraces/varieties produced locally in Mexico	Some cultivated and managed species worthy of consideration include: *O. albicarpa, O. cochinera, O. hyptiacantha, O. leucotricha, O. megacantha, O. robusta, O. streptacantha, O. durangensis, O. joconostle, O. matudae, O. ficus-indica, O. fuliginosa, O. robusta, O. azurea, O. neochrysacantha, O. cantabrigiensis, O. guilanchi, O. cochenillifera, O. macrocentra, O. macrorhiza, O. microdasys, O. rastrera* (Bellón, 2009)
15. Research efforts or groups working with the crop species in Mexico	The SINAREFI Cactus Pear Network has organized various projects and activities related to this crop. Other institutions involved in this area are the Autonomous University of Nuevo León, the Autonomous University of Chapingo (CRUCEN-UACH), various INIFAP research centres and the Autonomous University of San Luis Potosí, UNAM (see report by Dr Scheinvar), Aguascalientes Technology Institute, Mexican Council of Cactus Pear and Tuna, A.C. (CoMeNTuna, A.C),
16. Potential contribution to climate change resilience	Cactus pears could be used to recover depleted and eroded soils: they are significant soil builders because they mitigate erosion processes and have a great capacity to collect dew and store water.
17. Studies on genetic diversity in the genus in Mexico	Some morphological characterization studies have been conducted as well as other genetic studies on certain species using molecular markers such as RAPD, AFLPs and SSRs.
18. Studies required	Further genetic diversity studies on the various cultivated and wild cactus pear and tuna species and varieties. Further studies into characterizing the crop's phenotypic diversity and productive varieties of cultivated and wild cactus pear and tuna. Genetic improvement.
19. Species or crop conservation problems or obstacles	Land use changes and habitat destruction may endanger the survival of many species of these genera, some of which already face varying degrees of threat (see point 4).

Chayote

Sechium edule L.

1. General description of the species	Species belonging to the Cucurbitaceae family. Monoecious, herbaceous, creeping and climbing perennial plant with annual turnover of fleshy fruit. It can come in a great variety of shapes, sizes and colours, ranging from white to bright green (Lira *et al.*, 2009; Conabio: http://www.biodiversidad.gob.mx/usos/alimentacion/chayote.html).
2. Centre of origin / Centre of diversity	Evidence suggests that Mexico is the centre of origin of the *Sechium* genus because all the taxa in the genus are distributed throughout the country, including the wild ancestor *S. edule* ssp. *sylvestre* of the only domesticated species (*S. edule* ssp. *edule*) (Lira *et al.*, 2009).
3. Presence of wild relatives in Mexico	*Sechium edule* ssp. *sylvestre, S. chinantlense, S.compositum, S. hintonii* are distributed throughout Mexico (Lira *et al.*, 2009). Currently available information suggests that the primary gene pool is made up of wild and cultivated variants of the same species. The other wild species such as *S. chinantlense, S. compositum* and *S. hintonii* are also part of the chayote gene pool because they are closely related taxonomically; *S. chinantlense* is the closest taxa to the chayote (Lira, 1995; Cross *et al.*, 2006).
4. Threatened wild relative (or species)	Lira *et al*., (2009) identifies *S. hintonii*, an endemic species with limited distribution, as an endangered species.
5. Uses in Mexico	The fruit and, in certain regions, the tuberous roots, stems and tender leaves, are eaten as vegetables and also as fodder; stems have also been used to make baskets and hats (Lira *et al*., 2009).
6. Historical and cultural importance	Cultivated since pre-Colombian times in Mexico and northern Central America
7. Uses and importance at world or regional level	The chayote is cultivated and eaten in various parts of the world. Demand for it has increased in recent years. The main producing countries are Mexico, Costa Rica, Guatemala, Brazil, the United States, Algeria, India, New Zealand and Australia (SNITT, 2016).
8. Importance in nutritional, medicinal, nutraceutical and other terms	It has nutritional and medicinal properties. Recently, pharmacological studies have been carried out that indicate a potential use for some of its compounds in medical applications (Lira *et al*., 2009; Cadena-Iñiguez *et al.,* 2007)
9. Reported use of wild relatives or local varieties for genetic improvement, or their potential use.	Preliminary reports are available on crosses involving *S. compositum* and some variants of *S. edule* (Cadena Iñiguez *et al.,* 2013). However, the potential of wild relatives must be studied in order to improve the Chayote genetically.
10. Worldwide production	No specific information is available on the world production level of this crop, although Mexico is reported to be the world's leading producer and exporter of smooth green chayote with 53 per cent of the market (Avendaño Arrazate *et al*., 2010).
11. Production level in Mexico	Mexican production in 2016 was 178,746 tons (irrigation + rainfed), of which 133,781 were produced under rainfed conditions (SIAP, 2016).
12. Existing cultivation in traditional agroecosystems	Usually cultivated in orchards and backyards, (Lira *et al*, 2009)
13. Registration of commercial varieties/hybrids in Mexico	Fourteen varieties are currently listed in the CNVV, all registered by GISEM, A.C. (SNICS, 2016)
14. Description of landraces/varieties produced locally in Mexico	Lira *et al.* (2009) report that their observations identify local landraces in many regions, that are adapted to a wide variety of ecological conditions and soils ranging from sea level up to 2500m.
15. Research efforts or groups working with the crop species in Mexico	The SINAREFI has a chayote network and certain research groups are working to conserve and characterize the plant genetic resources of the chayote, including Grupo Interdisciplinario de Investigación en *Sechium edule* en México

	[Interdisciplinary Research Group into *Sechium edule* in Mexico] A. C. (GISeM), as well as Dr Rafael Lira's group in the UNAM.
16. Potential contribution to climate change resilience	Analyses based on different prediction models indicate that climate change would greatly decrease the distribution areas of many wild taxa; projections for 2060 also indicate that *S. chinantlense* will die out and *S. hitonii* will only retain 6.9 per cent of its potential range (Lira *et al*. 2009)
17. Studies on genetic diversity in the genus in Mexico	Characterization studies have been conducted on certain varietal groups of the chayote (Arévalo Galarza *et al*, 2011); also, see report at Lira *et al*. (2009) available on the CONABIO website.
18. Studies required	Further studies on genetic diversity at genus level, wild populations and traditional crop populations, using wider sampling and more up-to-date molecular markers, increase *in situ* and *ex situ* conservation efforts, amongst other things (Lira *et al*., 2009)
19. Species or crop conservation problems or obstacles	There are concerns over the genetic uniformity of material used in more commercial crops, where vegetatively propagated material is used. There has also been a similar trend in backyard orchards, which could have an impact in terms of loss of local varieties of the species (Cadena-Iñiguez *et al,* 2007; Cadena-Iñiguez and Arévalo Galarza, 2010; Lira *et al*., 2009).

Chili peppers

Capsicum annuum L.*, C. chinense* Jacq.*, C. frutescens* L. and *C. pubescens* Ruiz & Pav*.*

1. General description of the species	These are small herbaceous or shrub plants with a simple fruit (berry) and white or purple flowers (Montes *et al*., 2010). Five species are cultivated worldwide: *Capsicum annuum* L., *C. chinense* Jacq., *C. frutescens* L., *C. baccatum* L. and *C. pubescens* Ruiz & Pav.
2. Centre of origin / Centre of diversity	The origin of the genus Capiscum is America and it includes 31 species. Mesoamerica is the centre of diversification and domestication of the most popular and widely distributed species in the world (*C. annuum*). The greatest variability in cultivated forms is reported in Mexico, and they are widely distributed throughout the Mexican Republic.
3. Presence of wild relatives in Mexico	Wild relatives are present. Two wild ancestors(*Capsicum annuum* var. *glabriusculum* and *C. frutescens*) of *Capsicum annuum* var. *annuum* and *C. frutescens*, the other two wild taxa that grow in Mexico are *C. rhomboideum* and *Capsicum lanceolatum* (Montes *et al*., 2010). For *C. annuum* the primary gene pool includes wild variants (*C. annuum* var. *glabriusculum*) and cultivated variants (*C. annuum* var. *annuum*) of the same species and the species *C. frutescens* and *C. chinense*. The secondary gene pool includes *C. baccatum*. Lastly, the tertiary pool includes *C. pubescens* (Vincent *et al*., 2013; CWR).
4. Threatened wild relative (or species)	None officially listed.
5. Uses in Mexico	Used as a condiment; has anti-inflammatory and antidiarrhoeal properties. It also has veterinary and industrial uses, mainly as a dye and soil phytoremediation agent (UNAM, 2009).
6. Historical and cultural importance	Characterizes the taste of Mexican cuisine. Its use dates back to pre-Hispanic times, where its fundamental use was as a condiment as well as medicine, punishment, currency, tribute material, weaponry and so on, (UNAM, 2009; Montes *et al*., 2010).
7. Uses and importance at world or regional level	*Capsicum spp* is one of the main vegetables in the world. Its production has recently been increasing at a rate of 3.3 per cent per year and 4 per cent at national level (Montes, *et al*., 2010). Capsaicin has multiple medical and industrial uses.
8. Importance in nutritional, medicinal, nutraceutical and other terms	Source of vitamin C with proven analgesic, antiinflammatory and antibiotic activity against certain types of staphylococci and candida (Castellón-Martínez *et al.,* 2012; Flores-Rosas, 2011).
9. Reported use of wild relatives or local varieties for genetic improvement, or their potential use.	The SINAREFI chili pepper network reported activities to improve the chili pepper, but without specifying whether wild relatives or local varieties were used.
10. Worldwide production	In 2014, 32,324,345 tons of chili peppers, hot peppers and pimentos (green) were produced. China ranked first in production, followed by Mexico (FAOSTAT, 2017).
11. Production level in Mexico	SIAP reported that 3,279,909.67 tons of green chili peppers were produced in 2016 (SIAP, 2016)
12. Existing cultivation in traditional agroecosystems	These are usually cultivated in the milpa system and/or in family vegetable plots.

13. Registration of commercial varieties/hybrids in Mexico	The National Catalogue of Plant Varieties (SNICS, 2016) lists 21 entries for *C. annumm*, 12 for *C. chinense* and 5 for *C. pubescens*.
14. Description of landraces/varieties produced locally in Mexico	The country is home to more than 40 chili pepper varieties (SINAREFI)
15. Research efforts or groups working with the crop species in Mexico	Various research groups are working with chili peppers, such as the group led by Dr Latournerie (IT Conkal) and others involved in the SINAREFI chili pepper network, Dr Cibrián (LANGEBIO), Dr Jardón (UNAM) and Dr. Montes Hernández (INIFAP), Dr Araceli Vargas of Veracruz University, among others.
16. Potential contribution to climate change resilience	Wild chili pepper populations in north-west Mexico might be affected by the temperature rise and low humidity levels associated with climate change (Hernández-Verdugo *et al.*,2012).
17. Studies on genetic diversity in the genus in Mexico	Phylogeographic studies are being conducted using microsatellites to determine a gene panel suitable for domestication in wild and domesticated species. Work has also been carried out to obtain reference genomes (González Jara *et al.*, 2011; Kim *et al.*, 2014, Qin *et al.*, 2014; Rodelo-Urrego *et al.*, 2013).
18. Studies required	Further phylogeographical studies using NGS markers Continuing gene and phenotypic characterization studies on local materials.
19. Species or crop conservation problems or obstacles	Chili pepper cultivation in traditional agroecosystems is affected by the same factors that make these agricultural production systems vulnerable. Conservation of wild relatives also faces problems that are derived in many cases from loss of natural habitat.

Cocoa or cacao tree

Theobroma cacao L.

1. General description of the species	*Theobroma cacao* L. belongs to the Malvaceae family. Cocoa is a species that reaches 5 to 8 m in height but can grow up to 20 m. The inflorescences are found on the stem and main branches (cauliflory). The flower is hermaphrodite and 1 to 2 cm in diameter. Flowering usually begins when the plant is three years old and usually lasts for the whole year. The plant is cross-pollinated through the action of the diptera *Forcipomyia*.
2. Centre of origin / Centre of diversity	Some authors report that *Theobroma cacao* is native to South America and parts of Central America (Ogata, 2007), while others claim that the species probably originates from the upper Amazon region, including Peru, but was first domesticated in Mesoamerica.
3. Presence of wild relatives in Mexico	Approximately 22 species are known in the genus *Theobroma*. The only species distributed as far as south-eastern Mexico are *Theobroma cacao* and *Theobroma bicolor*. The latter is known as *pataxte*. The primary gene pool consists of wild and cultivated variants (local and commercial varieties) of the same species (*Theobroma cacao*). The tertiary pool is made up of the following species: *T. angustifolium, T. bernoullii, T. bicolor, T. grandiflorum, T. mammosum and T. simiarum* (Vincent *et al*., 2013; CWR).
4. Threatened wild relative (or species)	Avendaño-Arrazate *et al*.,(2011) reported *Theobroma bicolor* as an endangered species.
5. Uses in Mexico	The main part of cocoa used for human consumption are the seeds, which are processed at household or industrial level. The main product consumed is chocolate with the production of by-products such as liquor, cocoa butter, sugar and lecithin. Cocoa is made from the seed husks. Cocoa butter is also used in the cosmetic, drug and paint industries (CATIE, 1982). The seed is used as an energizer, tonic and appetite stimulant as well as to increase physical endurance and reduce fatigue.
6. Historical and cultural importance	Various authors mention Olmecs and Mayas as the first to cultivate and consume cocoa-based beverages, the use of which spread to other, later pre-Hispanic cultures. This drink was consumed by kings and nobles as well as during certain sacred rituals. It was also used as a currency.
7. Uses and importance at world or regional level	Nowadays, cocoa and chocolate are very important worldwide. The market recognizes three main varieties of cocoa: 1. Cacao Criollo or Nativo (high-grade) is the original cocoa, acknowledged to be of superior quality with low tannin content. It was originally cultivated in Venezuela, Central America and Mexico, but also in Ecuador, Colombia, Peru, Bolivia, Nicaragua, Honduras, Guatemala and Sri Lanka. It represents approximately 5 to 10 per cent of world production. 2. Cacao Forastero Amazónico (common grade): the form of cocoa with the highest tannin levels, originating in the upper Amazon. These cocoa varieties are predominantly grown in Africa and represent 80 per cent of world production. 3. Cacao Trinitario (high-grade): the result of a cross between cacao criollo and forastero. This originated in Trinidad and is currently cultivated in Central America, Africa, Asia and Oceania. Although its quality most closely resembles cacao forastero, it has the delicate flavour of cacao criollo. It represents approximately 10 to 15 per cent of world production.

8. Importance in nutritional, medicinal, nutraceutical and other terms	Several studies have been conducted on the type of compounds present in cocoa and chocolate and many of these have positive health properties. Cocoa's high flavonoid content confers antioxidant properties, which improve cardiovascular activity. Theobromine has tonic, diuretic and anti-neuralgic properties.
9. Reported use of wild relatives or local varieties for genetic improvement, or their potential use.	INIFAP's experimental fields in Rosario Izapa (Chiapas) and Huimanguillo (Tabasco) have the most comprehensive germbanks for cocoa and other species in the *Theobroma* genus. These cocoas include substances that are internationally reported to be tolerant to frosty pod rot disease (fungus *Moniliophthora roreri*), which has been described as the most severe disease in plantations and considered to be highly destructive and responsible for severe financial losses in cocoa production.
10. Worldwide production	Worldwide cocoa production exceeds 4,000,000 tons of pods; Africa accounts for 73 per cent, American countries 17 per cent and Asia and Oceania 10 per cent of world production (Arvelo *et al*., 2016).
11. Production level in Mexico	SIAP reported an output of a little over 28,000 t for 2015 (SIAP, 2016) and during the 2011-2012 cycle Mexico occupied 11th place in worldwide production, with under 2 per cent (Cacao México).
12. Existing cultivation in traditional agroecosystems	Cocoa can be grown as a monoculture and in forest plantations as well as interspersed with fruit trees. It is usually cultivated in shady forest glades or thinned forests, meaning that the forest structure is usually maintained (Rodríguez Litardo, 2016). Cocoa farms usually measure under 3 ha on average in Mexico.
13. Registration of commercial varieties/hybrids in Mexico	One registered cocoa variety was listed in the national catalogue of plant varieties in 2016 (SNICS, 2016).
14. Description of landraces/varieties produced locally in Mexico	Avendaño-Arrazate *et al*. (2010) provide descriptions of 20 varieties of Mexican cocoa. These are drawn up in accordance with varietal descriptors proposed by INIFAP to the International Union for the Protection of New Varieties of Plants (UPOV).
15. Research efforts or groups working with the crop species in Mexico	Efforts include a campaign promoted by the SINAREFI with the Cocoa Network, made up of the National Institute of Forestry, Agricultural and Livestock Research, the Rosario Izapa Experimental Field, the National Centre for Genetic Resources-INIFAP, the Autonomous University of Chapingo, Universidad Autónoma de Chiapas as well as work carried out by other researchers including those from the University of Veracruz.
16. Potential contribution to climate change resilience	Some studies suggest that climate change will have an impact in terms of reducing areas suitable for cocoa cultivation (Arvelo *et al*., 2016).
17. Studies on genetic diversity in the genus in Mexico	A portion of cocoa's worldwide genetic diversity has been studied using different types of marker such as isoenzymes, RAPD, RFLP, mitochondrial and chloroplast DNA as well as morphological characterization, e.g. (Vázquez-Ovando *et al*., 2014).
18. Studies required	Further studies on genetic and phenotypic diversity in order to characterize the Mexican germplasm (cacao criollo), species reintroduction programmes, bromatological descriptions, market recovery and genetic improvement.
19. Species or crop conservation problems or obstacles	Very few commercial plantations in Mexico maintain cacao criollo varieties; only 5 per cent of survey respondents grow only cacao criollo and 13 per cent cultivate it exclusively together with cacao forastero and trinitario. Pataste (*Theobroma bicolor*) is an endangered species (Avendaño-Arrazate *et al*., 2011).

Maize

Zea mays ssp. *mays* L.

1. General description of the species	Maize (*Zea mays* subsp. *mays*), teocintle and *Tripsacum* are grasses in the Poaceae or Gramineas family that are part of the Tripsacinae subtribe (Soreng *et al*., 2007). Maize and teocintle are monoecious grasses with a solid stem. They reproduce by cross-pollination, mainly under wind action (Kato *et al*., 2009). They include annual and perennial plants with life cycles of 4 to 6 months, although in the case of maize, some varieties are adapted to very short cycles (3 months) and long cycles (9 months). Maize produces seeds that grow on an ear.
2. Centre of origin / Centre of diversity	Mexico was the site where the process of differentiation between teocintle and cultivated maize took place and it was the site of distribution of the immediate ancestor of maize, teocintle *Z. mays* spp. *parviglumis* (Kato *et al*., 2009; CONABIO, 2011a; Sánchez- González, 2011; DOF, 2012). The country can therefore be considered the centre of origin. Maize and its immediate wild relatives display high levels of morphological and genetic diversity, which are reflected in the different varieties and strains present in Mexico (Sánchez-González, 2011; CONABIO, 2012).
3. Presence of wild relatives in Mexico	The primary gene pool of maize includes local and commercial strains and varieties of the same crop (Z. mays spp. mays), as well as annual teocintle grasses (*Z. mays* subsp. *mexicana* and *Z. mays* subsp. *parviglumis*). The secondary gene pool in Mexico includes the teocintle grasses *Z. diploperennis*, *Z. perennis* and *Z. luxurians*. Lastly, the tertiary pool includes all species in the genus *Tripsacum* (Vincent *et al*., 2013; CWR).
4. Threatened wild relative (or species)	According to the Mexican standard (NOM-059-SEMARNAT-2010), the teocintle grasses *Z. diploperennis* and *Z. perennis* are listed as threatened and in danger of extinction respectively, while the species *Tripsacum, T. maizar* and *T. zopilotense* are listed as threatened and subject to special protection respectively (DOF, 2010).
5. Uses in Mexico	Maize is the staple human food in Mexico. It is the most common crop in the country and is also an input for livestock and the production of many industrial products. This makes it the most important agricultural crop from a dietary, economic, political and social viewpoint.(CONABIO - maize webpage). In Mexico, the whole plant including grains, bracts, leaves, stems, ears of maize, corncobs, and even roots and stubble are used for purposes as varied as construction, handicrafts, medicine, fertilizer, fuel, beverages, food wrap, fodder and medicinal uses (Kato *et al.,* 2009); the grain is used to produce a great number of foodstuffs, including atoles, corn on the cob, tamales, tortillas, corn chips, toasted corn nuts, flours, pinoles, etc. (Kato *et al*., 2009; CONABIO, 2011b).
6. Historical and cultural importance	Due to its variety of different forms and uses, maize has always enjoyed such an important status in Mexico, particularly in rural areas, that Mexicans have been described as “people of corn” (Kato *et al.,* 2009). In high Mesoamerican cultures, the deities included corn gods. Examples in the Maya area include the maize god found in Copán, while Yum Kaax and others were part of the cosmology described in the Popol Vuh; for the Popolocas of Tehuacán and Mexicas the corn-coloured maize god Centeōtl enjoyed special status as a deity. This cult lives on in many indigenous and peasant communities, where special ceremonies are held for sowing and harvesting (Castillo-Tejero, 2009).
7. Uses and importance at world or regional level	According to FAO, worldwide maize production in 2014 was 1.2 billion metric tons. White maize, mainly intended for human consumption, accounts for only 4 per cent of internationally marketed maize. In contrast, 96 per cent is made up of yellow maize destined for the livestock, ethanol and edible oil industries (CONABIO, 2017). Although native maize is mainly produced for self-consumption, these varieties have recently gained currency in the gourmet market (CONABIO, 2017). One dietary and technological process that originated in pre-Hispanic cooking and persists to this day is nixtamalization. This alkaline process of cooking in water with lime or ash allows positive changes from a nutritional viewpoint and promotes the bioavailability of nutrients such as calcium and most essential amino acids. Tortilla nixtamalization and processing also increase soluble dietary fibre, promoting the formation of

	resistant starch and the breakdown of aflatoxins (Fernández *et al.*, 2013). This process is only carried out in America and has not been introduced in other regions of the world.
8. Importance in nutritional, medicinal, nutraceutical and other terms	Several studies discuss the nutritional properties of native maize and bioactive components in pigmented maize with regard to oil and sugar content, protein quality and so on (Fernández *et al.,* 2013). The nutritional advantages of nixtamilization have been widely explored (see also point 7).
9. Reported use of wild relatives or local varieties for genetic improvement, or their potential use.	Since the 1940s and 1950s, it has been acknowledged that Mexico has great potential for improving commercial maize from local varieties and their wild relatives. Many modern cultivars arose from the Tuxpeño variety, which originated in Mexico (Paliwal,2001). Mexican and Guatemalan species of tesosinte have been used to obtain maize lines with greater tolerance to abiotic factors, better yields and disease resistance as well as to improve the chemical composition of the grain and therefore achieve greater nutritional quality (Sánchez-González, 2011). For a recent review of the topic, see Sayadi *et al.* (2017).
10. Worldwide production	According to FAOSTAT food and agriculture statistics, a little over 1.2 billion tons were produced worldwide in 2014. The United States was the country with the highest production that year, with approximately 361 million tons (FAOSTAT, 2017).
11. Production level in Mexico	The Agrifood and Fisheries Information Service (SIAP) stated that approximately 28,251,000 tons were produced in 2016, counting both irrigated and rain fed crops (SIAP, 2017).
12. Existing cultivation in traditional agroecosystems	The traditional agroecosystem mainly used to produce maize is a system known as milpa farming, which arose in Mesoamerica and expanded to the rest of Mexico. Milpa is a polyculture-based agroecosystem where maize is the main crop and other crops are tolerated or planted in the same space. Examples include beans, pumpkins, chili peppers and tomatoes (Lozada-Aranda *et al*., 2017). Studies conducted to date have generally shown that diversity within a milpa farming system depends on climate and other physical factors in the region as well as on the human group involved (Lozada-Aranda *et al*., 2017).
13. Registration of commercial varieties/hybrids in Mexico	According to the National Catalogue of Plant Varieties, 1380 maize varieties have been recorded in Mexico. Most of these records were entered by private companies (SNICS, 2016). Native maize is also undergoing improvement, mainly by public higher education and research institutions.
14. Description of landraces/varieties produced locally in Mexico	Because Mexico is maize's centre of origin, it displays high levels of morphological and genetic diversity, which are reflected in the different varieties and strains present in Mexico (Sánchez- González, 2011; CONABIO, 2012). The latest study carried out at national level reported the presence of 59 varieties native to Mexico and five non-native varieties that are nevertheless present in Mexico (CONABIO, 2011b; CONABIO, 2012).
15. Research efforts or groups working with the crop species in Mexico	Several research centres and universities have maize working groups. SINAREFI had a network of researchers dedicated to this crop. The Global Native Maize Project, coordinated by CONABIO, INIFAP and INECC brought together more than 200 researchers from over 60 academic institutions in order to update information on maize and its wild relatives in Mexico. LANGEBIO is conducting a project to sequence and analyse the genes of the maize variety Palomero Toluqueño.
16. Potential contribution to climate change resilience	Maize varieties have been described in Mexico with different strategies for dealing with water stress, for example varieties such as Chalqueño, Bolita, Onaveño and Ratón have low moisture requirements and are able to withstand drought; varieties of Cónico Norteño, Cacahuacintle, Palomero Toluqueño, Tlabloncillo, Celaya, Conejo, Nal-tel and Ratón ripen early, which enables them to escape the drought. (http://www.biodiversidad.gob.mx/genes/pdf/proyecto/Anexo6_ReunionesTalleres/Tabla%20razas_marzo%202010.pdf) Other studies indicate the importance of maize diversity in the face of climate change and the possible effects of this phenomenon on maize distribution and that of its wild relatives (Bellon *et al*., 2011; Ureta *et al*., 2011)
17. Studies on genetic diversity in the genus in Mexico	Several published studies characterize the morphological and genetic diversity of native maizes and teocintle at various levels in Mexico. Some recent genetic studies used different types of molecular markers ranging from

	isoenzymes to microsatellites with different sets of varieties or accessions. Other recent approaches have been genome-related, generating markers such as single nucleotide polymorphisms (SNPs), which have allowed increasingly detailed levels of analysis (e.g. Caldu-Primo *et al*, 2017; Bedoya *et al*., 2017; Arteaga *et al*., 2015; González Castro *et al*., 2013 and so on). See also the Global Native Maize Project mentioned above.
18. Studies required	Although a relatively large amount of information has been generated on maize due to the crop's importance, certain aspects still remain to be explored with regard to the phenotypic and genetic characterization of cultivated and wild stock, *in situ* conservation and aspects of genetic improvement, among other things.
19. Species or crop conservation problems or obstacles	Many native maize varieties are produced by small farmers for self-consumption and for specific uses and they are produced on small areas. If these are no longer planted, the genetic diversity of these maize varieties will be reduced and their germplasm may be lost. Pressure associated with the drive toward intensive maize monoculture, changes in land use and lack of support for producers leading to rural depopulation affects native maize conservation. Conservation of wild relatives also faces problems that are derived in many cases from loss of natural habitat. Some wild relatives are already under threat (see also point 4) .

Pumpkins, squash and gourds

Cucurbita argyrosperma K. Koch*, C. pepo* L.*, C. moschata* Duchesne *and C. ficifolia* Bouché

1. General description of the species	Plants range from creeping to semi-bush varieties and may be annual, perennial or monoecious; flowers of both sexes are yellow and solitary. They are dependent on bees of the *Peponapis* and *Xenoglossa* genuses for pollination. Fruits come in a great variety of shapes, sizes and colours (Lira *et al*., 2009).
2. Centre of origin / Centre of diversity	The Cucurbita genus is considered an American genus. The area of domestication of many of these species seems to include Mexico (Lira *et al*., 2009).
3. Presence of wild relatives in Mexico	Wild relatives are present in Mexico, where 15 species of the genus are distributed. For *C. pepo*, the primary gene pool includes wild variants (*C. pepo* ssp. *fraterna*) and cultivated variants (*C. pepo* ssp. *pepo*) of the same species. The secondary pool is made up of *C. argyrosperma, C. moschata, C. okeechobeensis* and *C. lundelliana*. Lastly, the tertiary pool includes *C. cordata, C. digitata, C. foetidissima, C. palmata, C. pedatifolia* and *C. radicans* (Vincent *et al*., 2013; CWR; Lira, 1995). For *C. argyrosperma*, the primary gene pool comprises wild variants (*C. argyrosperma* subsp. *sororia*) and cultivated variants (*C. argyrosperma* ssp. *argyrosperma*) of the same species. The secondary gene pool is made up of *C. pepo* and C. moschata. Lastly, the tertiary pool includes *C. maxima, C. ficifolia, C. foetidissima, C. lundelliana, C. okeechobeensis* and *C. pedatifolia* (Vincent *et al*., 2013; CWR; Lira, 1995). For C. moschata, the primary gene pool includes cultivated variants of the same species (*C. moschata*). The secondary pool is made up of *C. argyrosperma, while the tertiary pool includes C. lundelliana, C. maxima* and *C. pepo* (Lira, 1995). For *C. ficilfolia*, the primary gene pool includes cultivated variants of the same species (*C. ficifolia*). The secondary pool is made up of *C. pedatifolia* and *C. foetidissima*, while the tertiary pool includes *C. lundelliana, C. maxima* and *C. pepo* (Lira, 1995).
4. Threatened wild relative (or species)	No species appears to be endangered, but some have restricted populations; this is the case with *C. pepo* ssp. *fraterna*, *C. okeechobeensis* ssp. *martinezii* and *C. cordata*, which are also endemic to Mexico (Lira 1995).
5. Uses in Mexico	The seeds, fruit, shoots, flowers and roots are eaten. The fruit is used in worship and is also important medicinally for treating diabetes and intestinal parasites. It is also used for fodder and in the treatment of some wastewater (UNAM, 2009; Lira-Saade, 1996).
6. Historical and cultural importance	Archaeobotanical records indicate that it was the first domesticated species on the American continent. It was an essential part of the diet in pre-Hispanic times.
7. Uses and importance at world or regional level	The fruits are eaten worldwide. China is the leading producer and Mexico is placed eighth. (FAOSTAT, 2017)
8. Importance in nutritional, medicinal, nutraceutical and other terms	Pharmacological studies confirm the effectiveness of the seeds as antiparasitic agents (UNAM, 2009). The main nutritional value also comes from the seeds, which provide proteins and oils. The fruits provide essential nutrients (calcium, phosphorus and amino acids) (Lira-Saade, 1996).
9. Reported use of wild relatives or local varieties for genetic	Because some wild relatives offer resistance to viruses, it would be interesting to include them in breeding programmes (Lira *et al*., 2009).

improvement, or their potential use.	
10. Worldwide production	In 2014, 25,196, 273 tons were produced at world level (FAOSTAT, 2017).
11. Production level in Mexico	According to SIAP, total production levels in 2016 were: Squash: 502,105.55 ton; Pumpkin: 174,942.51 ton; Chihua pumpkin: 39,013.31 ton; Gourds: 1,448.13 ton
12. Existing cultivation in traditional agroecosystems	These species are very important within the milpa system
13. Registration of commercial varieties/hybrids in Mexico	No varieties are listed in the National Catalogue of Plant Varieties (SNICS 2016).
14. Description of landraces/varieties produced locally in Mexico	There are numerous local varieties of the five cultivated species (Lira, 2009).
15. Research efforts or groups working with the crop species in Mexico	One group is coordinated by Rafael Lira, Luis Eguiarte (UNAM) and Salvador Montes (INIFAP), and another group is coordinated by Clemente Villanueva (UACh), among others. The SINAREFI also has a pumpkin network. See also the report Lira et al., 2009.
16. Potential contribution to climate change resilience	Climate change could have negative effects on wild taxa of *Cucurbita* (Lira *et al*., 2009)
17. Studies on genetic diversity in the genus in Mexico	Phylogenetic and phylogeographic studies are currently being carried out with cpDNA, mtDNA and microsatellites; genome analysis and reference genomes for some species are currently being mapped by projects supported by CONABIO.
18. Studies required	Further studies into genetic/gene diversity such as GWAS (Genome wide association studies) and phylogeography studies using new generation sequencing (NGS) markers. Genetic improvement.
19. Species or crop conservation problems or obstacles	Conservation *in situ* of native pumpkin varieties and strains as well as those of their relatives may be affected by factors that adversely impact the maintenance of traditional agroecosystems as well as the maintenance of natural habitats where wild taxa develop.

Quelites

Portulaca oleracea (purslane, verdolaga), *Amaranthus* spp.(quintonil), *Suaeda edulis* (seepweed, romerito), *Chenopodium berlandieri* ssp. *berlandieri* (lamb's-quarters, quelite cenizo), *Chenopodium berlandieri* ssp. *nuttaliiae* (goosefoot, huauzontle), *Anoda cristata* (anodas, alache), *Dysphania ambrosioides* (epazote), *Cnidoscolus aconitifolius* (chaya), *Piper auritum* (hoja santa), *Crotalaria* spp. (chipilin) *and Porophyllum* spp. (papalo, pipicha and chepiche), and so on.

1. General description of the species group	The word quelite comes from the nahuatl term *quilitl*, which means an edible tender vegetable or plant (herbaceous or woody). In general, the term quelite applies to all tender leaves, tender flowers and bulbs as well as tender tree shoots (Linares and Aguirre, 1992). Quelites are undervalued and underutilized traditional plants (Especies Tradicionales Subvaloradas y Subutilizadas - ETSS)
2. Centre of origin / Centre of diversity	Quelites are distributed practically everywhere in Mexico and are subject to different degrees of management by humans.
3. Presence of wild relatives in Mexico	The genera mentioned above are present in different regions of Mexico. Knowledge of primary gene pools is not yet available but the primary pool can at least be considered to be all variants within the same species.
4. Threatened wild relative (or species)	The risk of disappearance of quelites and their wild relatives is present, although not documented for each species.
5. Uses in Mexico	Between 240 (Mera *et al*., 2011) and more than 400 (Linares and Bye, 2015) species of quelites are eaten in Mexico. These are selected according to the local traditions of different peoples and regions. Their selection and consumption is based on the fact that they taste pleasant, are easy to digest and are free of toxic compounds (Linares and Bye, 2014). They are eaten in many forms and dishes. Some leaves and stems are eaten raw while others are lightly cooked or fried to provide dietary diversity. Others are used as medicinal plants (Mera *et al*., 2011). Their use has fallen off greatly over the last 500 years, but they are an interesting focus of current trends to revive culinary traditions.
6. Historical and cultural importance	In the pre-Hispanic period, the indigenous people greatly valued quelites and attached great importance to them as useful plants. They also had ritual importance; the huauquiltamalcuzliztli was a renewal ceremony celebrated in January by eating tamales made out of quelites (*quiltamalli*) (Bye and Linares, 2000).
7. Uses and importance at world or regional level	In many parts of the world, people eat products equivalent to quelites such as turnips, chard, spinach and so on. Mexican quelites could potentially improve diets and be used in worldwide cuisine.
8. Importance in nutritional, medicinal, nutraceutical and other terms	They have great nutritional importance due to their content of minerals, vitamins, antioxidants and fatty acids such as omega-3 and omega-6 (Mera *et al*., 2003; Morales et al., 2013). Some contain pharmacologically active compounds (Galvez and Peña 2015).
9. Reported use of wild relatives or local varieties for genetic	There have been few genetic improvement efforts in this group of plants.

improvement, or their potential use.	
10. Worldwide production	Because they are a heterogeneous group of species, there is no precise data on worldwide quelite production levels. Most quelites and traditional vegetables are produced in gardens or backyards and this makes their world production level difficult to assess (Rubaihayo, 2002).
11. Production level in Mexico	SIAP indicates that quelite production (without distinguishing between species) was 3127.5 tons in Mexico in 2016. Other reported species are purslane 4,975.80, epazote 1,925.01, chia 3,567.67, goosefoot 5,384, pipicha 204, papalo 4,843.99 and seepweed 6,500 (SIAP 2016; values in tons). However, most quelites are produced in milpa farming systems or backyards and the actual production level is unknown.
12. Existing cultivation in traditional agroecosystems	Quelites generally grow as tolerated, promoted and protected plants, either as weeds in various agroecosystems (e.g. milpa) or cultivated in association with other plants or in monocultures. They are also obtained by harvesting from natural vegetation.
13. Registration of commercial varieties/hybrids in Mexico	A few improved quelite varieties are registered: Goosefoot (*Chenopodium berlandieri* spp. *Nuttalliae)*, one variety; purslane (*Portulaca oleracea*) three varieties (SNICS, 2016).
14. Description of landraces/varieties produced locally in Mexico	Morphologically different cultivars have been reported in several species.
15. Research efforts or groups working with the crop species in Mexico	In Mexico there is a research group into quelites led by Dr Robert Bye (IB, UNAM), which has also participated in the SINAREFI quelites network, which involves other researchers. Dr Amanda Gálvez (FQ UNAM) coordinates an underutilized species project including chaya, anodas and chipilin, while Dr Heike Vibrans (COLPOS) has built up a collection of Mexican weeds, which includes many quelites.
16. Potential contribution to climate change resilience	No specific studies have been carried out on this subject, although the drought tolerance of some species has been studied, as is the case of *Portulaca oleracea* (Ren *et al*., 2011).
17. Studies on genetic diversity in the group of species in Mexico	Genetic diversity studies have been conducted at different levels on some genera, although progress in this field is limited.
18. Studies required	Further studies on genetic diversity and genotypic characterization of the various genera and species. To evaluate the level of risk that might be affecting some species or wild relatives. To encourage the production, marketing and consumption of quelites.
19. Species or crop conservation problems or obstacles	It is important to continue the work of recovering knowledge and consumption of these plants, given the trend toward underutilization.

Tomatillo

Physalis philadelphica LAM., *P. Ixocarpa* Brot. ex Hornem

1. General description of the species	Erect, branching herbaceous plant measuring up to 60 cm in height. The fruit is a berry measuring from 1.6 to 6 cm in diameter, belonging to the Solanaceae family (Espinosa and Sarukhán, 1997).
2. Centre of origin / Centre of diversity	Mexico is the centre of origin and diversity of the tomatillo family, although studies are required on population genetics, phylogenetics and other aspects in order to locate the region of the country that is its centre of taxonomic origin or domestication. Several studies indicate that Mexico was the centre of domestication.
3. Presence of wild relatives in Mexico	Approximately 71 species of the 100 species reported for the *Physalis* genus are to be found in Mexico. Of these, approximately 23 species are used in Mexico and only six are cultivated commercially: *P. phyladelphica* Lam., *P. ixocarpa* Brot. ex Hornem , *P. chenopodifolia* Lam., *P. acutifolia* (Miers) Sandwith, *P. pubescens* L., *P. pruinosa* L..
4. Threatened wild relative (or species)	No information is available in this regard.
5. Uses in Mexico	The tomatillo has been used in different ways since pre-Hispanic times. Its main use is as a foodstuff. It has medicinal, industrial and ornamental uses and some species have even been used as toys.
6. Historical and cultural importance	The plant is mentioned in the Florentine Codex. Depending on the region, different species are used for food, medicine and even ceremonial purposes.
7. Uses and importance at world or regional level	Different species are also exploited elsewhere in the world. Some of these are not native to Mexico, such as *Physalis peruviana*, which is utilized mainly in Brazil, Ecuador, Colombia, Peru and even India.
8. Importance in nutritional, medicinal, nutraceutical and other terms	In addition to providing nutrients such as vitamins, various medicinal properties are attributed to tomatillos (Montes Hernández and Aguirre Rivera, 1994) and various studies have been conducted into the properties of *Physalis peruviana*, particularly its medicinal and chemical properties.
9. Reported use of wild relatives or local varieties for genetic improvement, or their potential use.	The tomatillo network (SINAREFI) has worked on the genetic improvement of native varieties.
10. Worldwide production	It is very difficult to find accurate information on this topic, because the statistics are based on different species. In Mexico, for example, two species are considered: *P. ixocarpa* and *P. philadelphica* . However, *P. peruviana* production is considered for other parts of the world.
11. Production level in Mexico	In 2016, SIAP reported tomatillo production of 698,016.56 tons (SIAP 2016). The plant is produced nearly everywhere in Mexico and approximately 81 per cent is obtained under irrigated conditions while the rest is rainfed.
12. Existing cultivation in traditional agroecosystems	It is considered an important species within the milpa system, although no specific studies have been conducted on this topic.
13. Registration of commercial varieties/hybrids in Mexico	Twenty-three improved varieties are listed in the National Catalogue of Plant Varieties (*P. ixocarpa* 12, *P. philadelphica* 7, *P. pubescens* 1 and *P. angulata 3*) (SNICS, 2016).
14. Description of landraces/varieties produced locally in Mexico	Within the framework of the SINAREFI network, some efforts have been made to characterize varieties but the only information obtained was whether the varieties or landraces were specific to particular locations. Other researchers have described specific traditional management systems, as in the case of *P. angulata* in Jalisco (Vargas Ponce *et al.*, 2015)
15. Research efforts or groups working with the crop species in Mexico	Some research groups have worked with these species, such as the SINAREFI Tomatillo Network, the group led by Dr Ana Wegier IB UNAM (see Report Alavez-

	Gómez *et al*., 2009), Dr José Francisco Santiaguillo of the UACh, Dr Ofelia Vargas of the University of Guadalajara (UDG CUCBA), among others.
16. Potential contribution to climate change resilience	No specific information is available in this regard.
17. Studies on genetic diversity in the genus in Mexico	In general, few studies have been conducted. These include phylogenetic studies using molecular markers for some species in the genus, cytogenetic studies and population genetic studies (Alavez-Gómez *et al.,* 2009).
18. Studies required	Other studies are required on the genetic diversity of the genus and its reproductive biology and distribution, as well as studies on population genetics, ecology and phylogenetics (Alavez-Gómez *et al*., 2009); it is also necessary to characterize the phenotypic diversity of cultivated species and genetic improvement, among other aspects.
19. Species or crop conservation problems or obstacles	We need to find out the extent of the genetic diversity of this genus and also step up the above studies so that they can be taken into account in *in situ* conservation efforts (Alavez-Gómez *et al*.,2009) .

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Pumpkins, squash and gourds (*Cucurbita argyrosperma, C. pepo, C. moschata* and *C. ficifolia*)

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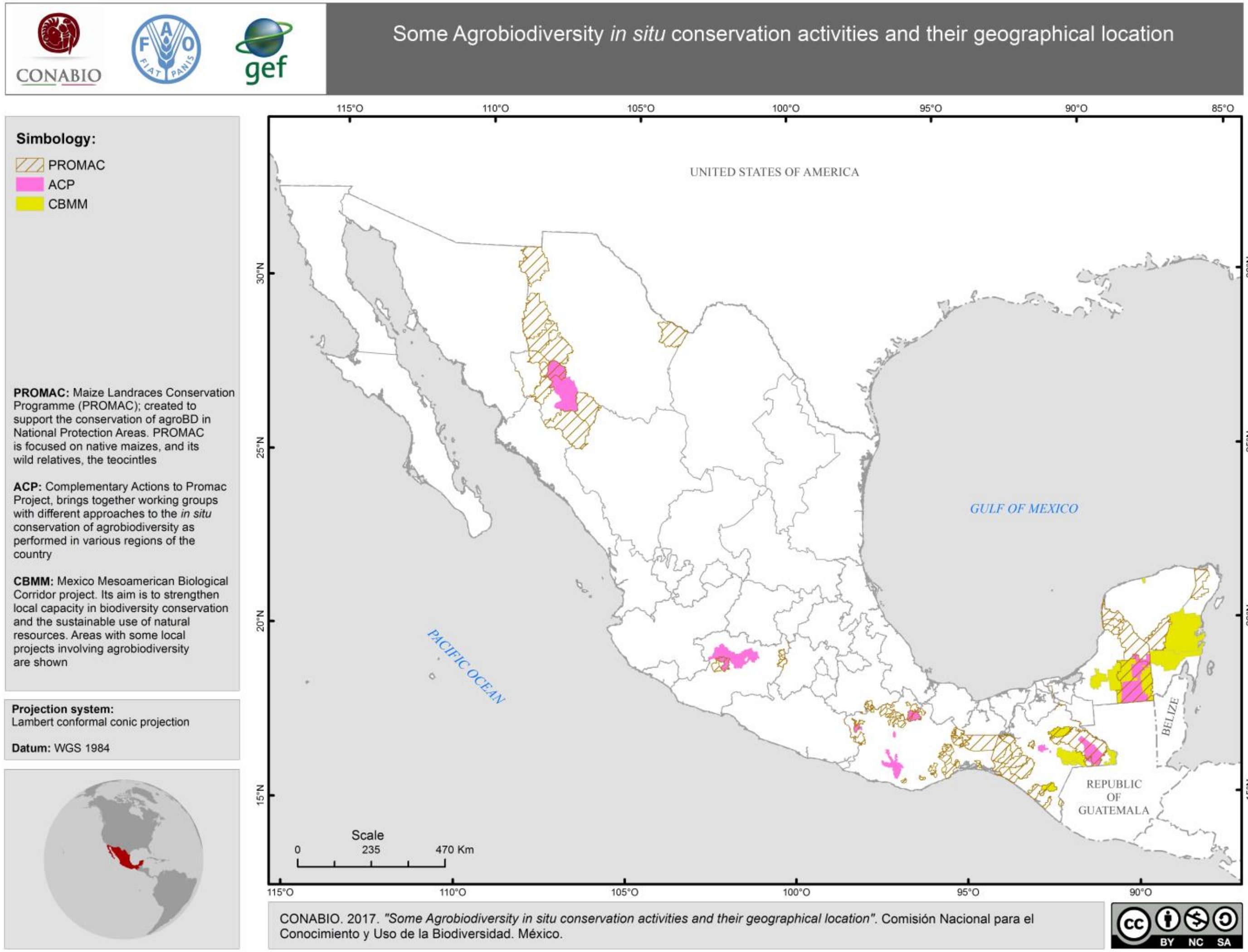
Appendix 10. Map of some in situ conservation activities and their geographical location.



Appendix 11. Descriptive factsheet of the twinned project located in Coahuila state

TWINNED PROJECT AREA

General data

Area name: Carboniferous region and north of Coahuila.
State: Coahuila
Municipalities included: Muzquiz, Sabinas, San Juan de Sabinas, Juárez, Zaragoza, Acuña.
Baseline locations*: 6 locations : Ciudad Muzquiz, Sabinas, San Juan de Sabinas, Juárez, Zaragoza, Acuña

** Locations where the project will be conducted

Statistical data on the working area

No of inhabitants per location (2010):

Municipality	Location	Inhabitants	aged >30	Women	Indigenous people
Muzquiz	Cuidad Muzqu	69102	14171	33369	
Muzquiz	Tribu Kikapu	423	222	221	423
Sabinas	Cuidad Sabinas	63522	6898	30600	
San Juan de Sabinas	Rosita	43232	8729	21147	
Juárez	Juárez	1574	354	772	
Zaragoza	Cuidad Zaragoza	13257	2606	6292	
Acuña	Cuidad Acuña	147809	33984	68405	
		338,919	66,964	160,806	423

Geographical data:

Altitude ranges from 300 to 2750 m asl; the orography of this region is rugged and gives rise to tributary streams. The topography of the lowland part features gentle hills ranging from 100 to 300 m asl.

Climate: average annual temperature is 30 °C maximum and minimum up to 3°; average annual precipitation ranges from 300 to 900 mm.

Economic data: The main productive activities of the municipalities in this region are farming, livestock and mining. However, the aspects of interest to the project are the natural areas of native flora with stands of wild walnuts, since the region is a major national walnut producer.

Sociodemographic data (no of farmers; no of people under 30; percentage of indigenous population)
Other information: The region where the twinned project will be conducted contains areas of wild walnut trees from which the seeds are harvested during the fruit production period. The crop is marketed in Mexico or exported. These areas also house and protect important areas of refuge for land birds and native fauna. They provide important environmental services such as moisture retention and protection against erosion of river banks, keeping waterways open and preventing flooding downstream.

Short description of project area

Coahuila contains a considerable spread of areas covered by riparian vegetation. These are home to great biodiversity, derived from intermittent rivers running through inland areas of the state, which provide ideal conditions for the establishment of stands (patches) of wild walnuts and associated species such as cypress, poplars, maples and legumes.

According to field reports, wild walnut trees play an important role in maintaining mammal and bird species from the viewpoint of shelter, food during critical seasons as well as soil stabilization due to the containing action of their roots. There is also strong pressure on fruits for marketing by the inhabitants of the various towns and villages near these tree-covered areas.

No information is available on the amount of fruit harvested in this area or on its destination. Similarly, no steps have been taken to identify the location of specimens with better characteristics that can be used as progenitors, once their genetic qualities have been established or to stress the importance of conserving them.

Species covered by the project

Species present in this working area:

Wild walnut (*Juglans spp*), Poplar (*P*opulus spp), Maple (*Arce rubrum*) and Cypress (*Taxodium micronatum*).

Agroecosystems covered

Potential areas for supporting wild fauna in the area as well as significant areas of woodland that provide various environmental services such as soil retention, food and refuge for associated biodiversity as well as providing food and financial income for not harvesting in villages and areas to be included in the project.

Background and existing initiatives in the project area

There is no history of similar initiatives.

Local and regional markets

Collection areas located in Muzquiz for the domestic market.

Information sources

No information is available on the distribution or location of wild walnut trees in the state of Coahuila.

Regional partners of the agroBD GEF project

State government Department of the Environment, State Department of Rural Development, Civil and non-governmental organizations (PROFAUNA).

Others

In proposed project areas, there are plantations of improved walnut trees for the production and sale of seeds abroad and on the domestic market.

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Map(s)