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IMPLEMENTATION COMPLETION AND RESULTS REPORT  
(TF-96681)

ON A

GLOBAL ENVIRONMENT FACILITY TRUST FUND GRANT FROM THE  
SPECIAL CLIMATE CHANGE FUND (SCCF)

IN THE AMOUNT OF US\$ 4.5 MILLION

TO THE

UNITED MEXICAN STATES

FOR THE

ADAPTATION TO CLIMATE CHANGE IMPACTS ON THE COASTAL  
WETLANDS IN THE GULF OF MEXICO PROJECT

April 28, 2017

Environment and Natural Resources Global Practice  
Mexico and Colombia Country Management Unit  
Latin America and the Caribbean Region

## CURRENCY EQUIVALENTS

(Exchange Rate Effective April 27, 2017)

Currency Unit = Mexican Pesos (MXN)

1.00 MXN = US\$ 0.05

US\$ 1.00 = 18.94 MXN

## FISCAL YEAR

January 1 – December 31

## ABBREVIATIONS AND ACRONYMS

ABE	Adaptation Based on Ecosystems
ALOS	Advance Landscape Observation Satellite
ANP	Natural Protected Area
CC	Climate Change
CCIG	Climate Change Implementation Grant
CONABIO	National Commission on Biodiversity ( <i>Comisión Nacional de Biodiversidad</i> )
CONAFOR	National Commission on Forests ( <i>Comisión Nacional Forestal</i> )
CONAGUA	National Water Commission ( <i>Comisión Nacional del Agua</i> )
CONANP	National Commission of Protected Areas ( <i>Comisión Nacional de Áreas Naturales Protegidas</i> )
CPS	Country Partnership Strategy
EA	Environmental Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Plan
FM	Financial Management
GEF	Global Environment Facility
GEO	Global Environmental Objective
GHG	Greenhouse Gas
GIS	Geographic Information System
GoM	Government of Mexico
GWL	General Wildlife Law
IFR	Interim Financial Report
IO	Intermediate Outcome
IMTA	Mexican Institute of Water Technology ( <i>Instituto Mexicano de Tecnología del Agua</i> )
INE	National Institute of Ecology ( <i>Instituto Nacional de Ecología</i> - later INECC)
INECC	National Institute of Ecology and Climate Change ( <i>Instituto Nacional de Ecología y Cambio Climático</i> )

INEGI	National Institute of Statistics and Geography, ( <i>Instituto Nacional de Estadística y Geografía</i> )
IPCC	Intergovernmental Panel on Climate Change
KPI	Key Performance Indicator
LUPP	Land Use Planning Process
MRI	Meteorological Research Institute (Japan)
MTR	Mid-term Review
NAFIN	National Development Banking Institution ( <i>Nacional Financiera</i> )
NDP	National Development Plan
NWP	National Water Program
OECD	Organization of Economic Cooperation and Development
OET	Land Zoning Plan
PAD	Project Appraisal Document
PAMP	Protected Area Management Plan
PDO	Project Development Objective
PECC	Special Program on Climate Change
PEMEX	Mexican Petroleum ( <i>Petróleos Mexicanos</i> )
PHRD	Policy and Human Resource Development Trust Fund (Japan)
PIT	Project Implementation Team
RBC	River Basin Council
SEMARNAT	Ministry of Environment and Natural Resources ( <i>Secretaría de Medio Ambiente y Recursos Naturales</i> )
SHCP	Ministry of Finance and Public Credit ( <i>Secretaría de Hacienda y Crédito Público</i> )
SPOT	Land Observation Satellite ( <i>Satellite Pour l'Observation de la Terre</i> )
TTL	Task Team Leader
UMA	Unit for Wildlife Conservation, Management and Sustainable Utilization
WMP	Wetland Management Plan
UNFCCC	United Nations Framework Convention on Climate Change

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ICR Team Leader: Renan A. Poveda

**MEXICO**  
**ADAPTATION TO CLIMATE CHANGE IMPACTS ON THE COASTAL**  
**WETLANDS IN THE GULF OF MEXICO PROJECT**

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<b>A. Basic Information</b>			
Country:	Mexico	Project Name:	Adaptation to Climate Change Impacts on the Coastal Wetlands in the Gulf of Mexico
Project ID:	P100438	L/C/TF Number(s):	TF-96681
ICR Date:	04/28/2017	ICR Type:	Core ICR
Lending Instrument:	SIL	Borrower:	UNITED MEXICAN STATES
Original Total Commitment:	USD 4.50M	Disbursed Amount:	USD 4.20M
Revised Amount:	USD 4.50M		
<b>Environmental Category: B</b>		<b>Global Focal Area: C</b>	
<b>Implementing Agencies:</b>			
National Institute of Ecology and Climate Change ( <i>Instituto Nacional de Ecología y Cambio Climático</i> - INECC)			
Mexican Institute of Water Technology ( <i>Instituto Mexicano de Tecnología del Agua</i> - IMTA)			
<b>Cofinanciers and Other External Partners:</b>			
(i) The Meteorological Research Institute of Japan (MRI) and the Japanese Aerospace Exploration Agency;			
(ii) The North American Wetlands Conservation Act (NAWCA);			
(iii) National Water Commission ( <i>Comisión Nacional del Agua</i> );			
(iv) Mexican Petroleum ( <i>Petróleos Mexicanos</i> );			
(v) National Institute of Ecology and Climate Change ( <i>Instituto Nacional de Ecología y Cambio Climático</i> );			
(vi) Mexican Institute of Water Technology ( <i>Instituto Mexicano de Tecnología del Agua</i> ); and			
(vii) The Japan PHRD Technical Assistance Program.			

<b>B. Key Dates</b>				
Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	03/14/2006	Effectiveness:	10/07/2011	10/07/2011
Appraisal:	02/11/2009	Restructuring(s):		10/14/2015
Approval:	11/23/2010	Mid-term Review:	07/10/2013	05/28/2013
		Closing:	10/31/2015	10/31/2016

## C. Ratings Summary

C.1 Performance Rating by ICR	
Outcomes:	Moderately Satisfactory
Risk to Global Environment Outcome	Moderate
Bank Performance:	Moderately Satisfactory
Borrower Performance:	Moderately Satisfactory

## C.2 Detailed Ratings of Bank and Borrower Performance

Bank	Ratings	Borrower	Ratings
Quality at Entry:	Moderately Unsatisfactory	Government:	Moderately Satisfactory
Quality of Supervision:	Moderately Satisfactory	Implementing Agency/Agencies:	Moderately Satisfactory
<b>Overall Bank Performance:</b>	Moderately Satisfactory	<b>Overall Borrower Performance:</b>	Moderately Satisfactory

## C.3 Quality at Entry and Implementation Performance Indicators

Implementation Performance	Indicators	QAG Assessments (if any)	Rating
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA):	None
Problem Project at any time (Yes/No):	Yes	Quality of Supervision (QSA):	None
GEO rating before Closing/Inactive status	Moderately Satisfactory		

## D. Sector and Theme Codes

	Original	Actual
<b>Sector Code (as % of total Bank financing):</b>		
General water, sanitation and flood protection	100%	100%
<b>Theme Code (as % of total Bank financing):</b>		
Climate Change	67%	67%
Biodiversity	33%	33%

## E. Bank Staff

Positions	At ICR	At Approval
Vice President:	Jorge Familiar	Pamela Cox

Country Director:	Gerardo M. Corrochano	Gloria Grandolini
Practice Manager/Manager:	Raul Ivan Alfaro Pelico	Karin Kemper
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ICR Team Leader:	Renan A. Poveda	
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**F. Results Framework Analysis**  
**Global Environment Objectives (GEO) and Key Indicators (as approved)**

The Global Environmental Objectives are:

- (a) *to promote adaptation to the consequences of climate impacts in the coastal wetlands of the Gulf of Mexico, through the implementation of pilot measures that will provide information about the costs and benefits of alternative approaches to reduce the vulnerability of said coasts to climate change; and*
- (b) *to assess the overall impacts of climate change on the Recipient's national water resource planning, including the identification of potential response options, with a focus on coastal wetlands and associated watersheds.*

(Source: Grant Agreement)

**Revised Global Environment Objectives (as approved by original approving authority) and Key Indicators and reasons/justifications**

The GEO was not revised at the time of project restructuring in October 2015. However, several of the GEO Indicators and Intermediate Outcome Indicators were revised. The revised indicators are provided below.

**(a) Revised GEO Indicator(s)<sup>1</sup>**

The *Formally Revised Target Values* reflect the modifications undertaken for indicators during project restructuring.

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
<b>GEO</b>	Design documents for pilot adaptation measures that facilitate prompt			

<sup>1</sup> The RF in the approved RP has an Adjustment to Project Indicators table (pg. 14 of RP) and an Updated Results framework table (pg. 19 of RP). The Adjustment to Project Indicators table (pg. 14 of RP) reflects the actual approved changes to the RF and this is what is used for the basis of the ICR.

<b>Indicator A</b>	implementation and include sustainability strategy as well as monitoring provisions developed.			
Value (quantitative or qualitative)	No adaptation measures in selected coastal wetlands.	Implemented measures provide results on adaptation approaches in wetlands; monitoring system fully operating and generating continuous data.	Three design documents completed.	Three design documents for pilot adaptation measures completed.
Date achieved	23-Nov-2010	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments including % achievement	100 % achieved. The revised target was achieved, as design documents for pilot adaptation measures (which include sustainability strategies and guidance for a prompt implementation and management provisions) were completed for all three pilot sites (Tabasco, Veracruz and in Quintana Roo). The original monitoring framework in the PAD refers to “measures” rather than “design documents” and expected that “at least 6” such measures would be under implementation in year 4. However, following the October 2015 restructuring, the target value was changed to “design documents under preparation” and the target reduced from 6 to 3. This indicator contributes to the achievement of GEO (a).			
<b>GEO Indicator B</b>	Two land use plans and a revised protected area management program, incorporating climate change adaptation activities, discussed with stakeholders, and at least one land use planning program submitted for approval to decision making authorities and supported by local and state institutions (depending on the aptitude of the territory in each pilot site, the land use planning will incorporate conservation elements).			
Value (quantitative or qualitative)	Limited availability of Wetland Management Plan (WMP) (exception Sian Ka’an); existing ones do not consider Climate Change (CC) information or expected impacts	At least one WMP updated based on relevant CC data; at least three WMP prepared, and a Protected Area Management Plan (PAMP) revised.	At least two land use planning process (LUPPs) submitted for approval by deciding authorities.	Two LUPPs completed and the one for Tabasco approved by local authorities; protected area management program (PAMP) for Sian Ka’an Reserve revised.
Date achieved	23-Nov-2010	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments	100% achieved. The LUPP for Alvarado Lagoon (Veracruz) incorporating			



including % achievement	climate change adaptation and conservation measures was completed and is under consultation with local and state authorities (expected to be approved in 2017), and the LUPP for Tabasco has been updated incorporating climate change adaptation and conservation measures and has been approved by local authorities. The PAMP in Sian Ka'an has been revised to include climate change considerations and has been discussed with key stakeholders. At the time of restructuring the original indicator which referred to WMPs, which are developed for official wetland Protected Areas was modified to the more appropriate land use plans, which are utilized for non-Protected Areas as the two wetlands involved do not have official Protected Area status. This indicator contributes to the achievement of GEO (a).			
<b>GEO Indicator C</b>	More than 50 ha of mangrove ecosystem and riparian zones reforested, more than 70 ha of water fluxes rehabilitated in Veracruz and Tabasco, and at least six areas in the Sian Ka'an Biosphere Reserve with repopulated temperature-resistant coral genotypes.			
Value (quantitative or qualitative)	No adaptation measures in pilot sites	Conservation plans presented for a target of 15,000 ha to Municipal Councils; a target of 5,000 ha reforested with native species; a target of 1,000 m of coastal stabilization works finished; a target of genetically diverse temperature-resistant coral patches established (3,750 m <sup>2</sup> ) achieved	Reforestation of an average of 25 ha of mangrove ecosystems and 5 ha of riparian zones in each of two pilot areas; rehabilitation of water fluxes in El Playón mangrove ecosystem in Sian Ka'an and in Papaloapan and repopulation of genetically diverse temperature-resistant coral genotypes in six areas in the Sian Ka'an Biosphere Reserve	50 ha of mangrove ecosystems and 10 ha of riparian zones reforested in Veracruz and Tabasco; rehabilitation of at least 70 ha of water fluxes in El Playón mangrove ecosystem in Sian Ka'an and at least 3 kms in Papaloapan. Repopulation of coral reefs in Sian Ka'an completed in six areas.
Date achieved	23-Nov-2010	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments including % achievement	100% achieved. The original targets for reforestation of mangrove ecosystems in Veracruz and Tabasco were 30 ha and 20 ha respectively, or an average of 25 ha, which was met. The other targets were met as planned. 100 ha of water fluxes rehabilitated in El Playón mangrove ecosystem in Sian Ka'an and in 3 kms of water fluxes in Papaloapan. Six areas in the Sian Ka'an Biosphere Reserve with repopulated temperature-resistant coral genotypes. These measures contribute to			

	adaptation of climate change by enabling mangrove development to mitigate the negative impacts of extreme weather episodes. Likewise, habilitating water fluxes, minimize the impacts of potential flooding. Repopulating coral reefs also contribute to mitigating negative potential impacts of extreme weather episodes. This indicator was substantially revised at the time of restructuring and the original overly ambitious targets were largely dropped except for the reforestation of a much smaller area of mangroves and the repopulation of corals with genetically diverse temperature-resistant genotypes in the Sian Ka'an Biosphere Reserve. This indicator contributes to the achievement of GEO (a).			
<b>GEO Indicator D</b>	Climate change impact scenarios developed for selected basins and for coastal wetlands supporting knowledge base required to mainstream CC into water resources and wetland management and planning.			
Value (quantitative or qualitative)	No response options defined yet on CC impacts in national water resource management	At least one national water resources management response options identified that considers CC impact scenarios	N/A	One national water response option that considers CC impact scenarios developed.
Date achieved	23-Nov-2010	31-Oct-2015	-	31-Oct-2016
Comments including % achievement	100% achieved. IMTA developed a national resources management response option that considered CC impact scenarios for the selected wetlands. This included an assessment under three different CC scenarios with respect to surface runoff nationwide, as well as a model that analyzed implementation of an adaptation measure related to water availability in the Alvarado Lagoon (Veracruz). It also involved development of a hydrological flow models for the three pilot projects in Quintana Roo, Tabasco, and Veracruz. This indicator was not changed at the time of restructuring. This indicator contributes to the achievement of GEO (b).			

**(b) Intermediate Outcome Indicator(s)**

The *Formally Revised Target Values* reflect the modifications undertaken for indicators during project restructuring.

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
<b>Indicator1 (component 1)</b>	At least 3 pilot adaptation measures count with sound technical design documents including analysis of financial, economic, social and environmental aspects and are ready for implementation.			
Value (quantitative or	Pilot sites do not consider adaptation	At least 6 designed	At least 3 pilot adaptation	3 pilot adaptation measures

qualitative)	yet	measures provide results on adaptation approaches in wetlands	measures implemented	implemented in Tabasco, Veracruz and Quintana-Roo.
Date achieved	23-Nov-2010	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments including % achievement	The revised target was 100% achieved. The design of adaptation measures implemented on three pilot sites were successfully completed. These included (a) the design of the repopulation of coral reefs in six areas in Sian Ka'an (Quintana Roo); (b) the design for the repopulation of temperature-resistant coral genotypes of 5 adaptation measure in Veracruz (which included reforestation of 30 ha mangrove ecosystems in Veracruz and 3 kms of water fluxes rehabilitated in Papaloapan); and (c) the design of 5 adaptation measures in Tabasco (which included the design for reforestation of 20 ha of mangrove ecosystems, 70 ha of water fluxes rehabilitated in El Playón mangrove ecosystem, the design for the rainwater caption system and potabilization plant constructed and operating in Las Coloradas, and the establishment of Palafites in el Mingo). These design measures had a sound technical design and included analysis of financial, economic, social and environmental aspects. This indicator contributes to the achievement of GEO (a).			
<b>Indicator2 (component 1)</b>	Modeling, generation of data, analysis, and access to information and long term remote sensing.			
Value (quantitative or qualitative)	Limited monitoring of pilot wetlands; limited monitoring of CC data in pilot site areas	Modeling, generation of data, analysis, and access to information and long-term remote sensing	N/A	Improved hydrological modeling and generation of data, analysis, and access to information and long-term remote sensing achieved.
Date achieved	23-Nov-2010	31-Oct-2015	-	31-Oct-2016
Comments including % achievement	100% achieved. IMTA has established a Land Observation Satellite (SPOT-SEMAR) agreement for obtaining satellite images and data. A GIS manual has been developed and the 5 CC scenarios have been updated. Three hydrological CC impact scenarios for national water resource management that include response options have been completed. Hydraulic models with climate variables and scenarios have been developed for each pilot watershed. Reports on lost temporal and spatial data in the pilot watersheds have been produced. Key data on climate change impacts on the hydrological cycles in each of the pilot sites have been updated. Analysis of potential options to minimize long-term CC impacts at the pilot sites has been undertaken as well as an assessment of surface runoff nationwide. The use of Advance Landscape Observation Satellite (ALOS) images was eliminated because these are no longer in operation, being instead substituted by SPOT images, which Mexico now uses. This indicator contributes to the achievement of GEO (b).			
<b>Indicator 3</b>	Pilot adaptation measures will include a sustainability strategy.			

<b>(component 1)</b>				
Value (quantitative or qualitative)	0	1	3	3
Date achieved	23-Nov-2010	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments including % achievement	100% achieved. Sustainability strategies for the 3 pilot sites have been completed. These include environmental action plans and strategies for the continuation of key activities including: (i) design and repopulation of coral reefs in Sian Ka'an (Quintana Roo); (ii) rehabilitation of hydraulic flow in El Platón (Quintana Roo); (iii) design of adaptation measures in Tabasco and Veracruz; (iv) reforestation and desilting in Tabasco and Veracruz; (v) design of <i>palafittes</i> in Veracruz; and (vi) design of rainwater capture system and water treatment plant. At the time of project restructuring this indicator was rephrased as "Pilot adaptation measures will include a sustainability strategy" and it was observed that the technical reports would be included as sustainability strategies for each of the adaptation measures. This indicator contributes to the achievement of GEO (a).			
<b>Indicator 4 (component 1)</b>	Two management plans for Wildlife Conservation, Management, and Sustainable Utilization Units (UMA) in mangrove ecosystems developed.			
Value (quantitative or qualitative)	There is no sustainable use of mangroves.	This is a new indicator	At least 2 UMAs established in mangrove ecosystems	3 UMAs were established in Veracruz and Tabasco.
Date achieved	23-Nov-2010	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments including % achievement	50% achieved. The Management Plans for wildlife conservation and sustainable utilization units (UMAs) in mangrove ecosystems in the Tarachi <i>ejido</i> in Veracruz, and in el Golpe primera sección in Tabasco were developed. Nonetheless, the registration of the UMA <sup>2</sup> in el Golpe was still pending due to the lack of a registration certificate for the <i>ejido</i> assembly. During project restructuring it was decided to develop actions that would contribute to the adaptation of local populations to floods, lack of clean water, food security, and mangrove conservation, as in the case of the Units for Wildlife Conservation (UMA) for the sustainable use of mangroves together with the provision of equipment and infrastructure, accompanied by local training, to reduce the population's vulnerability to climate change by strengthening its adaptive capacity. It is important to note that this indicator was erroneously included as part of <b>Component 1</b> during the project restructuring (as reflected by the Restructuring Paper). Nonetheless, the Management Plans for wildlife conservation and sustainable utilization units (UMAs) in mangrove ecosystems are activities developed under <b>Component 2</b> and thus are also reflected and			

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<sup>2</sup> The management plans for wildlife conservation and sustainable utilization units (UMAs) provide the necessary elements to ensure the sound and efficient management of the mangrove conservation and includes: (i) elements for reforestation with native species; (ii) a conservation protocol and standards to be followed by local communities; (iii) guidance on economic activities that could be developed without impacting the ecosystem among others.

	assessed in the intermediary indicators below. This indicator contributes to the achievement of GEO (a).			
<b>Indicator 5 (component 1)</b>	Infrastructure and equipment to reduce vulnerability to CC applied in pilot sites.			
Value (quantitative or qualitative)	No infrastructure and equipment in place to reduce vulnerability to CC in pilot sites.	N/A (new intermediary indicator)	Infrastructure and equipment to reduce vulnerability to CC in pilot sites installed and operating.	Infrastructure and equipment to reduce vulnerability to CC installed and operating in three pilot sites.
Date achieved	23-Nov-2010	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments including % achievement	100% achieved. Infrastructure and equipment to reduce vulnerability to CC including mareographs, rainwater caption systems, radio communication equipment, early warning systems, among others are installed and operating in the three pilot sites. This indicator contributes to the achievement of GEO (a).			
<b>Indicator 6 (component 1)</b>	Strengthening capacities for adaptation to CC at a local level.			
Value (quantitative or qualitative)	Limited information about CC.	N/A	Capacities for adaptation to CC strengthened in at least one location through follow-up workshops.	Capacities for adaptation strengthened in at least one location through awareness raising workshops.
Date achieved	14-Oct-2015	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments including % achievement	100% achieved. Field visits and a number of workshops undertaken at the three pilot sites including diagnosis of CC, on adaptation measures to be implemented, and workshops on results and vulnerability of social emergency plans were successfully undertaken. The workshops became a space for reflection, communication and joint problem solving to the challenges that communities are constantly facing. As a result from the workshops the level of conceptual understanding of climate change impacts and adaptation measures among local stakeholders related to the specific pilot areas was quite high. In addition, In some communities the local dynamic has positively changed as a result of the capacity building workshops (e.g., by organizing concrete adaptation measures and emergency response systems) and many have requested that these workshops continue beyond the life of the project. Working groups were established between the federal, state, and local levels and support from the local population was developed in order to strengthen the decision making process and carry out follow-up actions on adaptation measures. These working groups played a key role in contributing to the design of risks maps, formulation of the local land zoning plans (with a focus on CC). These groups today are of paramount importance in providing continuity to the activities initiated. This indicator contributes to the achievement of GEO (a).			
<b>Indicator 7 (component 2)</b>	Papaloapan (Veracruz) – Alvarado Municipality under land use planning incorporating CC impacts as well as adaptation and conservation measures.			

Value (quantitative or qualitative)	Conservation management plans do not take CC impacts into consideration and unsustainable land use practices in buffer zone prevail.	Conservation management plan considered for adoption by deciding authorities.	The land use planning of Alvarado Lagoon submitted for approval to deciding authorities	LUPP and a revised protected area mgt. program that addresses climate change adaptation measures for Alvarado has been completed, discussed with stakeholders, and submitted for approval.
Date achieved	23-Nov-2010	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments including % achievement	100% achieved. The adaptation measures included in the LUPP include construction protocols, evacuation routes in the case of floods, protocols for the continuing cleaning and desilting of key water flows. The LUPP includes also conservation measures such as reforestation schemes, proposal for protection to anthropogenic pressures, and sustainable approaches to mangrove management of the Alvarado lagoon. These have been presented to and discussed by key stakeholders, submitted for approval to authorities and supported by local and state institutions. It is expected that this LUPP will be approved by local authorities in 2017. This indicator contributes to the achievement of GEO (a).			
	Papaloapan (Veracruz). Reforestation of mangrove ecosystem and riparian zones for a target of at least 30 ha.			
Value (quantitative or qualitative)	A decline in the mangrove and riparian vegetation and no plans for reforestation	50% of the buffer zone under recommended practices; a target of 1,400 ha reforested with native species	A target of 30 ha of reforested mangrove and riparian forest	25 ha of mangrove reforestation concluded, and 5 ha of riparian zones restored in Papaloapan
Date achieved	23-Nov-2010	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments including % achievement	100% achieved. 25 ha of mangrove reforestation completed and 5 ha of riparian zones restored. These measures contribute to adaptation of climate change by enabling mangrove development to mitigate the negative impacts of extreme weather episodes. Likewise, rehabilitating water fluxes, minimize the impacts of potential flooding. This indicator was modified at the time of restructuring as the term “buffer zone” applies to creation of an ANP, which was not considered for the pilot sites in question. This indicator contributes to the achievement of GEO (a).			
<b>Indicator 9 (component 2)</b>	Papaloapan (Veracruz). Infrastructure and equipment (cleaning, desilting and rehabilitation of at least 3 km of water fluxes, and one tide gauge and meteorological instruments) to reduce vulnerability to CC.			

Value (quantitative or qualitative)	Limited infrastructure or equipment against CC vulnerability.	N/A	Infrastructure and equipment installed and operating, and at least 3 kms of water fluxes rehabilitated.	3 km of water fluxes competed and equipment installed and operating.
Date achieved	23-Nov-2010	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments including % achievement	100% achieved. 3 km of infrastructure for cleaning water fluxes completed which minimize the risk of flooding. One mareographic and one meteorological instruments installed and operating by National Autonomous University of Mexico (UNAM). The data helps to provide early warnings related to climatic events and thus reduce vulnerability to the local communities. The data also contributes to predict tide-coastal differences and thus strengthen the potential response options. This indicator contributes to the achievement of GEO (a).			
<b>Indicator 10 (component 2)</b>	Papaloapan (Veracruz). One management plan for Wildlife Conservation, Management, and Sustainable Utilization Units (UMA) in mangrove ecosystems.			
Value (quantitative or qualitative)	There are no management plans for wildlife conservation and sustainable utilization units in mangrove ecosystems in the pilot area.	This is a new indicator	At least one UMAs established in Papaolapan's mangrove ecosystems	2 UMAs were established in the Papaloapan mangrove ecosystem in the Tarachi Ejido.
Date achieved	23-Nov-2010	31-Oct- 2015	31-Oct-2016	31-Oct-2016
Comments including % achievement	200% achieved. The Management Plans for wildlife conservation and sustainable utilization units (UMAs) in mangrove ecosystems in the Tarachi <i>ejido</i> in Veracruz was developed, approved and UMAs established. During project restructuring it was decided to develop actions that would contribute to the adaptation of local populations to floods, lack of clean water, food security, and mangrove conservation, as in the case of the Units for Wildlife Conservation (UMA) for the sustainable use of mangroves together with the provision of equipment and infrastructure, accompanied by local training, to reduce the population's vulnerability to climate change by strengthening its adaptive capacity. This indicator contributes to the achievement of GEO (a).			
<b>Indicator 11 (component 2)</b>	Papaloapan (Veracruz). Strengthening capacities for adaptation to CC in at least one location.			
Value (quantitative or qualitative)	Limited information about CC.	N/A	Capacities for adaptation to CC strengthened in at least one location through follow-up	Capacities for adaptation strengthened in the Papaloapan, Veracruz through awareness raising workshops. Capacity

			workshops.	strengthened in organizing emergency groups, adoption of community emergency procedures, emergency plans between the federal, state, and local levels and support from the local population has been developed.
Date achieved	14-Oct-2015	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments including % achievement	100% achieved. Field visits and a number of workshops undertaken including one on diagnosis, a presentation on the adaptation measures to be implemented, and workshops on results and vulnerability of social emergency plans. Working groups have been established between the federal, state, and local levels and support from the local population has been developed in order to strengthen the decision making process and carry out follow-up actions on adaptation measures. These working groups played a key role in contributing to the design of risks maps, formulation of the local land zoning plans (with a focus on CC). These groups today are of paramount importance in providing continuity to the activities initiated. In addition, capacity has been strengthened through the organization of local emergency groups, adoption of community emergency procedures, and the development of emergency plans between the federal, state, and local levels where the support from the local population has been enhanced and developed. This indicator contributes to the achievement of GEO (a).			
<b>Indicator 12 (component 2)</b>	Tabasco. Land use planning updated incorporating CC impacts as well as adaptation and conservation measures.			
Value (quantitative or qualitative)	Deforestation and land conversion are frequent. Lack of CC or adaptation considerations in land use planning.	N/A	Land use planning updated with CC considerations and methodology for Carmen Pajonal Machona submitted for approval of deciding authorities	LUPP incorporating CC impacts as well as adaptation and conservation measures for Carmen Pajonal Machona has been completed, discussed with stakeholders, and submitted for approval.
Date achieved	23-Nov-2010	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments including % achievement	100% achieved. The local land use planning has been updated with CC and adaptation measures which include flooding risk areas, evacuation routes, and areas where specific adaptation measures (reforestation, rehabilitation of hydrological flows, etc.) should be implemented			



	in the Carmon Pajonal-Machona area. The LUPP includes also conservation measures such as reforestation schemes, proposal for protection to anthropogenic pressures, and sustainable approaches to mangrove management of the Carmen Pajonal-Machona area. The LUPP has been discussed with stakeholders and submitted for approval. It is expected that this LUPP will be approved by state authorities in the upcoming year. This indicator contributes to the achievement of GEO (a).			
<b>Indicator 13 (component 2)</b>	Tabasco. Reforestation of mangrove ecosystem and riparian zones for a target of at least 20 ha.			
Value (quantitative or qualitative)	A decline in the mangrove and riparian vegetation and no plans for reforestation	50% of the buffer zone under recommended practices; a target of 1,400 ha reforested with native species	A target of 20 ha of reforested mangrove and riparian forest	25 Ha of mangrove reforestation concluded, and 5 ha of riparian zones restored in the Carmen Pajonal-Machona ecosystem.
Date achieved	23-Nov-2010	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments including % achievement	100% achieved. 25 ha of mangrove reforestation completed and 5 ha of riparian zones restored. These measures contribute to adaptation of climate change by enabling mangrove development to mitigate the negative impacts of extreme weather episodes. Likewise, habilitating water fluxes, minimize the impacts of potential flooding. This indicator was modified at the time of restructuring as the term “buffer zone” applies to creation of an ANP, which was not considered for the pilot sites in question. This indicator contributes to the achievement of GEO (a).			
<b>Indicator 14 (component 2)</b>	Tabasco. Infrastructure and equipment (cleaning, desilting and rehabilitation of at least 3 km of water fluxes, and one tide gauge and meteorological instruments, and at least two stilt houses) to reduce vulnerability to CC.			
Value (quantitative or qualitative)	Limited infrastructure and equipment	N/A	At least 3 km of water fluxes rehabilitated through infrastructure and equipment installed and operational	3 km of water fluxes completed and all equipment installed and operational
Date achieved	23-Nov-2010	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments including %	100% achieved. Development of a rainwater capture system and a water treatment plant completed, cleaning, desilting, and rehabilitation of 3 km of			

achievement	water fluxes completed; mareographic and meteorological stations installed and operating. Radio and communications equipment and antennas for an early warning system installed and operating in three communities. Two stilt houses (palafittes) constructed. All of these measures contribute to contribute to adaptation of climate change by: (i) providing clean water to residents of communities periodically affected by climatic events through the rain capitation systems; (ii) habilitating water fluxes thereby minimizing the impacts of potential floods; (iii) providing crucial data on tides and climatic events for decision makers; (iv) giving early warnings to remote communities through communication networks; and (v) allowing communities to store their seeds and goods in stilt houses in case of extreme weather conditions. This indicator contributes to the achievement of GEO indicator (a).			
<b>Indicator 15 (component 2)</b>	Tabasco. One management plan for Wildlife Conservation, Management, and Sustainable Utilization Units (UMA) in mangrove ecosystems.			
Value (quantitative or qualitative)	There is no sustainable use of mangroves	At least one UMA established	NA	UMA management plan completed, but registry of UMA is pending
Date achieved	23-Nov-2010	31-Oct-2015	14-Oct-2015	31-Oct-2016
Comments including % achievement	50% achieved. The management plan for the Unit for Wildlife Conservation, Management and Sustainable Utilization (UMA) for the mangrove ecosystems in Tabasco is completed. However, registry of the UMA is pending due to lack of a registration certificate of the <i>ejido</i> assembly. The UMA would contribute to the adaptation of local populations to floods, lack of clean water, food security, and mangrove conservation, through the sustainable use of mangroves which, together with the provision of equipment and infrastructure, local training, would help reduce the population's vulnerability to climate change by strengthening its adaptive capacity. This indicator contributes to measure GEO (a).			
<b>Indicator 16 (component 2)</b>	Tabasco. Strengthening capacities for adaptation to CC in at least one location			
Value (quantitative or qualitative)	Limited information about CC	Capacities for adaptation strengthened in at least one location through follow-up workshops.	-	Capacities for adaptation strengthened in Carmen Pajonal-Machona
Date achieved	23-Nov-2010	31-Oct-2015	-	31-Oct-2016
Comments including % achievement	100% achieved. Field visits and at least 4 capacity building workshops took place in the communities of el Golpe Primera Sección, el Mingo and Las Coloradas in the Lagoon system of Carmen Pajonal Machona. These workshops focused on: (i) presenting a diagnostic of the CC conditions in the area, (ii) presenting the proposed design for the adaptation measures; (iii) strengthening the capacities for CC adaptation; and (iv) presenting the overall results, risk perceptions to vulnerability to CC, and social emergency plans. Surveys carried out during these workshops reflect the high level of participation and enhance capacity at the community level to adapt to CC, to organize and work around community emergency procedures in case of extreme weather (see Annex 5 and 6 of the ICR). Working groups have been established with specific adaptation measure and emergency plans between the federal, state, and local levels and			

	support from the local population has been developed. This indicator contributes to the achievement of GEO (a).			
<b>Indicator 17 (component 2)</b>	Sian Ka'an (Quintana Roo). Protected area monitoring system strengthened including climate change parameters			
Value (quantitative or qualitative)	Monitoring of wetland does not include CC data	CC data part of monitoring program of wetland	-	Monitoring system was strengthened to include CC parameters.
Date achieved	23-Nov-2010	31-Oct-2015	-	31-Oct-2016
Comments including % achievement	100% achieved. The monitoring protocol was developed and the mareographic and meteorological instruments are installed and operating. The oceanographic equipment was acquired, but official donation to CONANP was pending at the time of project closing due to administrative timelines that are expected to be met during 2017. This indicator contributes to measure GEO (a).			
<b>Indicator 18 (component 2)</b>	Sian Ka'an (Quintana Roo). Protected area management plan revised to include climate change considerations.			
Value (quantitative or qualitative)	Protected area management plan does not include CC data	Management plan revised to include CC considerations; first results of management plan collected and reported	Not revised	Protected Area Management plan was revised to include CC considerations and adaptation measures
Date achieved	23-Nov-2010	31-Oct-2015	14-Oct-2015	31-Oct-2016
Comments including % achievement	100% achieved. The Protected Area Management Program for the Sian Ka'an Natural Reserve was revised to include CC consideration and adaptation measures including identification of areas vulnerable to CC, strategies to minimize impacts on key ecosystems, economic activities that could be developed in area taking CC considerations into account, among others. The plan was presented to CONANP authorities which reviewed it and adopted it. This indicator contributes to the achievement of GEO indicators (a).			
<b>Indicator 19 (component 2)</b>	Sian Ka'an (Quintana Roo). A target of repopulating genetically diverse temperature-resistant coral genotypes in six areas.			
Value (quantitative or qualitative)	Repopulation not included in coral reef conservation programs.	At least six areas in the Sian Ka'an Biosphere Reserve with repopulated temperature resistant Coral genotypes.	-	At least 3,500m2 in 6 locations have been repopulated with temperature-resistant genotypes.
Date achieved	23-Nov-2010	31-Oct-2015	-	31-Oct-2016

Comments including % achievement	100% achieved. Six locations of the Reserve comprising at least 3,500 m2 have been repopulated with temperature-resistant coral genotypes. The grown temperature resistant coral reef contributes as a buffer and to mitigate the impacts of storms and hurricanes in coastal areas. This indicator contributes to measure GEO (a).			
<b>Indicator 20 (component 2)</b>	Sian Ka'an (Quintana Roo). Infrastructure and equipment (one tide gauge and meteorological and oceanographic instruments) to reduce vulnerability to CC.			
Value (quantitative or qualitative)	Limited infrastructure and equipment	Infrastructure and meteorological instruments to reduce vulnerability to climate change	N/A	Mareographic and meteorological equipment installed and operating; donation of an oceanographic equipment is pending
Date achieved	23-Nov-2010	31-Oct-2015	14-Oct-2015	31-Oct-2016
Comments including % achievement	100% achieved. The mareographic and meteorological equipment is installed and operating by UNAM. The donation of the oceanographic equipment (which has been acquired) from INECC to CONANP is pending internal administrative procedures. It is expected that the donation will become effective during 2017. The infrastructure and equipment will contribute to adaptation to CC by providing crucial data on tides and climatic events for decision makers and in giving early warnings to remote communities through communication networks. This indicator contributes to achievement of GEO (a).			
<b>Indicator 21 (component 2)</b>	Sian Ka'an (Quintana Roo). Rehabilitation of water fluxes of El Playón mangrove ecosystem for a target of at least 70 ha			
Value (quantitative or qualitative)	The mangrove ecosystem of El Playón is degraded and requires rehabilitation of water system	Rehabilitation of water fluxes and restoration of El Playón mangrove ecosystem in at least 70 ha.	N/A	100 ha of water fluxes rehabilitated and 6 sewers unclogged
Date achieved	23-Nov-2010	31-Oct-2015	14-Oct-2015	31-Oct-2016
Comments including % achievement	100% achieved and target exceeded as 100 ha of water fluxes have been rehabilitated and 6 sewers unclogged, which will permit restoration of hydrological flow in the mangrove area of El Playón. This indicator contributes to achievement of GEO (a).			
<b>Indicator 22 (component 3)</b>	Climate change impact scenarios developed for national water resources and for coastal wetlands including identification of response options.			
Value (quantitative or qualitative)	National policies do not yet incorporate CC impacts on water availability	At least one water resource management response option identified that considers CC impact scenarios	-	One national water response option that considers CC impact scenarios developed
Date achieved			-	

	23-Nov-2010	31-Oct-2015		31-Oct-2016
Comments including % achievement	100% achieved. Even though expressed somewhat differently, this is essentially the same as original GEO indicator D (see above) whose results were 100% achieved. It was not revised during restructuring.			
<b>Indicator 23 (component 4)</b>	Established processes for articulation and coordination among the agencies involved. Time reduction of drafting contracts and administrative processes.			
Value (quantitative or qualitative)	Lack of articulation among agencies involved leading to administrative bottlenecks	-	Project management has improved during the last review period as reflected by the level of disbursements, committed resources and progress in implementation of key activities	Stakeholders involved in processing contracts significantly increase their management and action capacity, which is reflected in the number of implemented activities and by the level of disbursements.
Date achieved	23-Nov-2010	31-Oct-2015	31-Oct-2016	31-Oct-2016
Comments including % achievement	Achieved 100%. This indicator was replaced at the time of restructuring. Project management improved substantially from 2014 onwards reflected by a reduced time in contracting (from 9 to 6 months or less), high level of disbursements, and committed resources which allowed for a satisfactory level of implementation of project activities. Articulation and coordination among key agencies was developed through systematic meetings and establishment of a common roadmap where all agencies had to comply. Communications greatly improved between IMTA and INECC that also contributed to identify bottleneck and means to address them. This indicator contributes to achievement of GEOs (a) and (b).			

## G. Ratings of Project Performance in ISRs

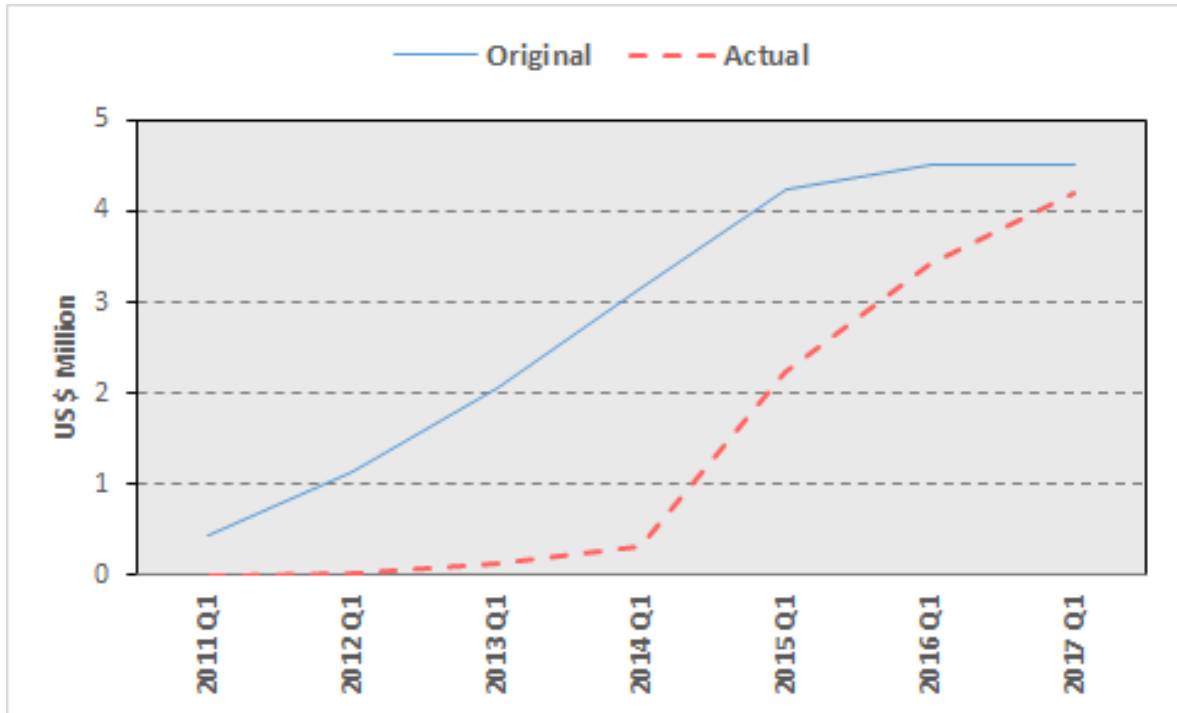
No.	Date ISR Archived	GEO	IP	Actual Disbursements (USD millions)
1	02/23/2011	Satisfactory	Satisfactory	0.00
2	12/03/2011	Satisfactory	Satisfactory	0.00
3	06/22/2012	Satisfactory	Moderately Satisfactory	0.03
4	12/25/2012	Moderately Unsatisfactory	Moderately Unsatisfactory	0.10
5	07/09/2013	Moderately Unsatisfactory	Moderately Unsatisfactory	0.13

6	02/24/2014	Moderately Unsatisfactory	Moderately Unsatisfactory	0.20
7	12/07/2014	Moderately Unsatisfactory	Moderately Unsatisfactory	0.69
8	06/30/2015	Moderately Satisfactory	Moderately Satisfactory	2.23
9	01/05/2016	Moderately Satisfactory	Moderately Satisfactory	3.28
10	11/15/2016	Moderately Satisfactory	Moderately Satisfactory	3.94

#### H. Restructuring (if any)

Restructuring Date(s)	Board Approved GEO Change	ISR Ratings at Restructuring		Amount Disbursed at Restructuring in USD millions	Reason for Restructuring & Key Changes Made
		GEO	IP		
10/14/2015	No	MS	MS	2.40	Elimination of one pilot site and reallocation of associated resources at GoM's request; revision of GEO and Intermediate Indicators; one year extension of closing date

## I. Disbursement Profile



# 1. Project Context, Global Environment Objectives and Design

## 1.1 Context at Appraisal

1. Mexico has been and continues to be particularly vulnerable to the impacts of global climate change. These impacts include an increase in sea surface temperature in the Gulf of Mexico, continuous sea level rise affecting coastal areas and inland basins, intensification of hurricanes, changes in the hydrological cycle with an increase in heavy rains and storms, longer and more frequent drought episodes, and net decreases in water run-off, among others. Given the long-term irreversible character of many of these changes and the nature of their impacts, it was critical for Mexico to begin a process of adaptation. Mexico's National Communications to the United Nations Framework Convention on Climate Change (UNFCCC) have assessed the country's vulnerabilities to climate change focusing on areas and sectors seen as particularly fragile in terms of its impacts. These include water resources, drought and desertification, and coastal zones, in particular the wetlands of the Gulf of Mexico.

2. According to the PAD (para. 4, pp. 1-2), at the time the project was appraised, water resources planning and management in Mexico, while still in need of further regulatory reform to address sustainability concerns, already had most of the necessary building blocks in place. Over the preceding years, the National Water Commission (CONAGUA) had reportedly focused its efforts on: (i) legally registering and regularizing all water users; (ii) developing mechanisms for approving new water rights and water right transfers; (iii) establishing River Basin Organizations and River Basin Councils (RBCs) with representatives from federal and regional governments and other stakeholders, and Aquifer Committees with representatives from the various water users; (iv) preparing national and regional water plans; (v) improving groundwater and surface water monitoring, modeling, and assessment; (vi) enhancing meteorological services;<sup>3</sup> and (vii) improving the operation of hydraulic infrastructure. Legislation had established water concessions, permits for effluent discharges, and the Public Register of Water Rights. The National Water Commission (CONAGUA) had also developed the 2007-2012 National Water Program (NWP), which was divided by region and described the respective objectives, strategies, and targets in line with a 2030 vision of sustainable human development. In the specific case of the Gulf of Mexico, for instance, CONAGUA had developed and funded an action plan having the objectives of rationalizing water use, improving its quality, and strengthening flood control infrastructure.

3. In 2005, the National Committee on High-Priority Wetlands was created in the National Commission of Protected Areas (CONANP), to produce guidelines and recommendations for wetland management. In addition, the National Forest Commission (CONAFOR), together with CONAGUA, the National Institute of Statistics, Geography,

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<sup>3</sup> However, a Bank-supported project to help strengthen Mexico's meteorological services was cancelled.



and Informatics (INEGI), the Ministry of Environment and Natural Resources (SEMARNAT), the then National Institute of Ecology (INE), and the National Commission on Biodiversity (CONABIO) were promoting a National Wetlands Inventory to help locate, quantify, and ascertain the state of wetlands in order to assist in decision making for their protection. Given their location, the coastal wetlands in the Gulf of Mexico are generally recognized as the ecosystems that are expected to most likely be adversely affected by climate change in the region. It is also well known that coastal wetlands (i.e., mangroves) are habitats that support multiple uses that provide local populations with ecological services of economic importance as well as primary direct uses (e.g., fuelwood, fishing, hunting, etc.), and the incomes of a significant number of families depend directly or indirectly on these areas in Mexico's coastal region.

4. Despite the progress achieved to date, water sector planning and investments did not yet explicitly include consideration of climate impacts. At a regional scale, the ecosystems expected to be most adversely affected by climate change impacts were the coastal wetlands in the Gulf of Mexico. These wetlands provide many environmental services including regulation of the hydrological regime, human settlement protection through flood control and buffering of storm impacts, erosion control, conservation and replenishment of coastal groundwater, reduction of pollution, regulation and protection of water quality, and habitats for fish, crustaceans, waterfowl, migratory birds, and other wildlife. Among likely climate change impacts, salinization caused by sea level rise, reduced surface water, increasing droughts, and high exposure to extreme weather events (i.e., hurricanes, sea surges, intense precipitation), affecting both ecosystems and human population were deemed to be the most significant.

5. Mexico possessed several regulatory tools to protect wetlands, particularly mangroves. These included the General Wildlife Law (GWL), which was amended in 2007 and which prohibited any activity that affected the natural productivity of mangroves or their interaction with rivers, dunes, the neighboring maritime zone and corals, or any other actions that provoked changes in their characteristics and ecological services. However, the country faced challenges in effectively implementing these conservation tools, and the gains in regulating coastal wetland protection were compromised by weak enforcement, poor coordination between national, state, and local authorities, the lack of supporting regulations and land use planning at some locations, as well as increasing climate change impacts. Poorly regulated tourism and agricultural activities in coastal areas and buffer zones were largely responsible for the loss of wetland areas.

6. Rational for Bank Assistance. The project, which was the Bank's and GEF's first attempt to support climate change adaptation measures in Mexico, had its origins in the country's strategy to cope with the consequences of climate change and constituted an important element in the Government's adaptation strategy, as outlined in its Special Program on Climate Change (PECC). It was specifically referred to in the country's Third National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) as a measure to address a region very vulnerable to the impacts of global climate change. The Bank's support for its preparation, which was financed in part

by a PHRD grant from the Government of Japan, was also acknowledged in this document. Project preparation included a cooperation agreement between the World Bank and Japan's Meteorological Research Institute (MRI) on the application of the Earth Simulator in Mexico. This provided a high resolution tool to assess climate change scenarios. Project preparation, which took place over a three year period, was viewed in the PAD as helping to promote more sustainable natural resource management practices in the Gulf coastal region and to boost its capacity to respond to anticipated climate impacts. The pilot areas were part of a broader strategy to conserve and recuperate marine, coastal, and water-dependent ecosystems.

7. Various institutions were involved in project preparation and implementation with complex financing arrangements. According to the PAD (para. 29, pg.9), the project would be financed by a GEF-SCCF (Special Climate Change Fund) grant of US\$ 4.5 million with co-financing and counterpart funds from: (i) MRI of Japan; (ii) the Japanese Aerospace Exploration Agency (JAXA); (iii) the North American Wetlands Conservation Act (NAWCA);<sup>4</sup> (iv) the National Water Commission (CONAGUA); (v) Mexican Petroleum (PEMEX); (vi) the National Ecology Institute (INE), which later became the National Ecology and Climate Change Institute (INECC); (vii) the Mexico Water Technology Institute (IMTA); and (viii) a previously agreed Climate Change Implementation Grant (CCIG) with the Japan PHRD Technical Assistance Program. In addition, the local executing agencies were expected to provide counterpart funds in the amount of US\$ 1.8 million -- mostly as in-kind contributions over the project's expected five year implementation period -- although this apparently did not occur in practice. The CONAGUA (US\$ 15.0 million) and PEMEX (US\$ 0.35 million) contributions, however, were described as "baseline investments,"<sup>5</sup> and, in practice do not seem to have contributed to (or been part of) the project *per se* even though they were included as such in the project cost and financing table (Annex 5, pg. 65) in the PAD.

8. The PAD (para. 46, pg. 14) clarified that the project's "baseline" consisted of "interventions already planned" by CONAGUA and PEMEX in the Gulf region. CONAGUA's program sought to: (i) support local municipalities in the project area to develop mechanisms to improve water quality and the level of treatment of effluents; (ii) monitor water quality in selected wetlands; (iii) rationalize water use practices for economic activities; and (iv) flood control. PEMEX, in turn, provided resources for

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<sup>4</sup> In practice, however, these funds (a grant of US\$ 0.769 million to Ducks Unlimited of Mexico, A.C.), which were originally intended to support restoration of critical habitats for migratory birds through adaptation measures to climatic variability in the Gulf of Mexico, did not materialize during project implementation.

<sup>5</sup> The PAD also states that "the level of counterpart funding meets the guidelines of the GEF's Special Climate Change Fund (SCCF) securing a better than 4:1 ratio of total to SCFF funding. The funding structure complies with the SCCF guidelines in that counterpart funding (from CONAGUA and PEMEX) provides the basis for future investments in the area, to which the SCCF and NAWCA funding add a climate overlay and influence the type of interventions made with counterpart funding." It adds that "the modeling and monitoring efforts will be supported through the instruments already signed with the MRI and the Japanese Aerospace Exploration Agency."

conservation activities including development of an inventory of ground vegetation, conservation of riparian belts, biodiversity conservation, reforestation activities, technology deployment, and community training for the conservation of natural resources in the areas of influence of the initially planned four pilot sites. The programmed investments by CONAGUA in the Gulf area had an estimated total value of US\$ 90.8 million (PAD, para. 48, pg. 14) and included “an estimated US\$ 7.7 million that will be directly invested in under the four programs in the area of the Panuco-Altamira wetlands; US\$ 5.0 million will be invested in the Papaloapan rivershed that includes the lagoon of Veracruz, and US\$ 2.3 million in the area of influence of the Punta Allen wetland, for a total of US\$ 15.0 million.” According to INECC, however, the activities financed by these resources were concluded in 2008 (PEMEX) and 2009 (CONAGUA), respectively, thus well before approval of the present GEF project, which did not occur until November 2010.<sup>6</sup>

9. Project implementation arrangements were similarly complex. INE, later INECC, was responsible for the coordination and technical implementation of Components 1 and 2 (see below for a brief description of each one) as well as for the technical monitoring of the entire project through a shared INECC-IMTA project implementation team (PIT). IMTA was responsible for implementation of Component 3 in collaboration with CONAGUA, as well as for Component 4 (Project Management) which includes all fiduciary activities, procurement and financial management. INECC and IMTA were both responsible for the application of environmental and social safeguards and for meeting the provisions of the Anti-Corruption guidelines, for which NAFIN was also responsible. NAFIN was the National Financing Agent for the project appointed by the Ministry of Finance and Public Credit (SHCP). Implementation of the pilot activities under Component 2 would also involve the participation of the municipalities in each site. Project oversight was the responsibility of a Steering Committee consisting of SEMARNAT, through INECC and CONAGUA, and IMTA, as permanent members, together with representatives from each of the participating states (i.e., Quintana Roo, Tabasco, Tamaulipas, and Veracruz), and of CONANP.

## **1.2 Original Global Environment Objectives (GEO) and Key Indicators** (*as approved*)

10. The project’s original GEOs, as stated in both the Project Appraisal Document (PAD) and the GEF Grant Agreement, were: (i) to promote adaptation to the consequences of climate impact in the coastal wetlands of the Gulf of Mexico, through the implementation of pilot measures that will provide information about the costs and benefits of alternative approaches to reduce the vulnerability of said coasts to climate change; and (ii) to assess the overall impacts of climate change on the Recipient’s national water resources planning, including the identification of potential response options, with a focus on coastal wetlands and associated watersheds.

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<sup>6</sup> INECC also confirmed that, other than the PHRD grant, the Bank did not have any direct oversight over implementation of the activities financed by the complementary co-financing resources.

11. The original key performance indicators (KPIs), the initial four of which referred to the first GEO, thus signaling its greater importance to the Bank preparation/appraisal team relative to the second, to which only the last KPI referred, were:

- Design documents for pilot adaptation measures that facilitate prompt implementation and include a sustainability strategy as well as monitoring provisions.
- Three wetland management plans, a revised protected area management plan, and land zoning regulations, incorporating climate change adaptation activities, discussed with stakeholders, and at least one plan submitted for approval to decision-making authorities and supported by local and state institutions.
- A target of 15,000 hectares presented to Municipal Councils for consideration to be entered into conservation status in local land use plans; a target of 5,000 ha reforested with native species that would add to climate-resilience of coastal wetlands; a target of 3,000 meters of coastal bars stabilized addressing threat of sea level rise; and increased thermal resilience of coral populations in the Biosphere Reserve Sian Ka'an through repopulating genetically diverse temperature-resistant coral genotypes in six areas of 25 m x 25 m (3,750 square meters) in selected locations.
- Production and dissemination of practical guidance document on cost and benefits of adaptation measures in coastal wetlands as a basis for replication efforts.
- Climate change impact scenarios developed for selected basins and for coastal wetlands supporting knowledge base required to mainstream climate change (CC) into water resources and wetland management and planning.

### **1.3 Revised GEO (*as approved by original approving authority*) and Key Indicators, and reasons/justification**

12. The original GEO remained unchanged but some of the KPIs<sup>7</sup> were altered and other modifications in project design were formally introduced at the time a Level 2 restructuring was approved on October 14, 2015. The unchanged indicators remained relevant for assessing project achievements in relation to the GEOs, but, in addition to converting the fourth of the original KPIs to an Intermediate Outcome (IO) indicator, three key indicators were modified as follows:

- The word “developed” was added at the end of the first indicator after “monitoring provisions.”
- The second indicator was reworded to state: “Two land use plans and a revised protected area management program, incorporating climate change adaptation

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<sup>7</sup> The RF in the approved RP has an Adjustment to Project Indicators table (pg. 14 of RP) and an Updated Results framework table (pg. 19 of RP). The Adjustment to Project Indicators table (pg. 14 of RP) reflects the actual approved changes to the RF and this is what is used for the basis of the ICR.

activities, discussed with stakeholders, and at least one land use planning program submitted for approval to decision making authorities and supported by local and state institutions (depending on the aptitude of the territory in each pilot site, the land use planning will incorporate conservation elements).”

- The third indicator was reworded to state: “More than 50 ha of mangrove ecosystem and riparian zones reforested, more than 70 ha of water fluxes rehabilitated in Veracruz and Tabasco, and at least six areas in the Sian Ka’an Biosphere Reserve with repopulated temperature-resistant coral genotypes.”

13. The justification for the change to the second indicator, according to the project restructuring paper, was that the three wetland management plans had been substituted by two land use plans considering that there were no Natural Protected Areas (ANPs) in the wetlands of Veracruz or Tabasco where promotion of a conservation and management plan for wetlands could be undertaken. The justifications for the modification of the third indicator were: (i) the amount of 15,000 ha to be considered for conservation status was eliminated because the Government of Mexico (GoM), through CONANP, had not planned to establish ANPs in Veracruz or Tabasco, and, as a result, conservation areas would be defined by land use plans that would include adaptation to climate change considerations rather than subject to the preparation of wetland management plans;<sup>8</sup> (ii) the target of 5,000 ha to be reforested was reduced because the surface had been overestimated in the initial pilot projects, and it was later determined that in some pilot sites it was not feasible to reforest this large area due to their soil characteristics and other environmental conditions; and (iii) the construction of 3,000 meters of coastal barriers was eliminated because project management, based on lessons and new information, had reconsidered the objective of focusing on “adaptation based on ecosystems,” which promotes the conservation of biodiversity and ecosystem services as a strategy of adaptation to climate change for human communities, and because international experience had demonstrated that construction of coastal barriers often led to limited results and could alter erosion patterns in the coastlines.

14. Instead it was decided to develop actions that would contribute to the adaptation of local populations to floods, lack of clean water, food security, and mangrove conservation, as in the case of the Units for Wildlife Conservation (UMA) for the sustainable use of mangroves together with the provision of equipment and infrastructure, accompanied by local training, to reduce the population’s vulnerability to climate change by strengthening its adaptive capacity. In addition, with regard to the pilot in Sian Ka’an, CONANP concluded that the reserve did not have the stated surface of 3,750 m<sup>2</sup> of coral reefs. Thus, the amount of coral reef to be replanted was to be determined by a proposal

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<sup>8</sup> It should nevertheless be pointed out that land use plans are quite different from wetland management plans. A wetland is a productive system where the mangrove trees are the key building block. Preservation/conservation without exploitation can be an option but not necessarily the most efficient one in economic terms. A mangrove can be economically exploited under different use alternatives taking into account linkages between economic primary uses and ecological functions (i.e., protection against storms, nursing grounds for fisheries, biodiversity, etc.).

under development by Oceanus, A.C. at the time of the project's restructuring by Oceanus, A.C, which later provided the basis for this intervention.

15. Three new GEO indicators were added at the restructuring, as were a number of new IO indicators. The new GEOs were:

- Two management plans for Wildlife Conservation, Management and Sustainable Utilization Units (UMAs) in mangrove ecosystems developed;
- Infrastructure and equipment to reduce vulnerability to climate change (CC) applied in pilot sites; and,
- Strengthening capacities for adaption to CC in at least three municipalities.

#### **1.4 Main Beneficiaries**

16. The main project beneficiaries<sup>9</sup> were the local communities in the coastal areas of the Gulf region where project pilot activities were undertaken (i.e., in and around the Sian Ka'an Punta Allen Biosphere Reserve in Quintano Roo, the Carmen-Pajonal-Machona wetlands in Tabasco, the Papaloapan rivershed wetlands in Veracruz, and the Panuco-Altamira wetlands in Tamaulipas (which were later dropped). The livelihoods of such communities frequently depend on benefits (i.e., both subsistence and commercial ones) provided by these coastal wetlands. As a result, these beneficiaries were expected to -- and, in fact, did -- participate actively in the selection of the adaptation measures to be implemented at each site. They were also expected to benefit from enhanced knowledge about climate change and adaptation measures as well as from added protection against the increasing negative impacts of climate change-related extreme weather events (i.e., hurricanes and associated flooding and storm surges, as well as gradual sea level rise) in the coastal areas where these actions would be implemented. Other coastal areas and communities were likewise expected to benefit from the experience and lessons learned in carrying out project activities to the extent that these interventions were subsequently replicated elsewhere in the Gulf region. Institutionally, the main project beneficiaries were INECC and IMTA, its two main implementing agencies together with CONANP and the municipalities where the pilot sites were located.

#### **1.5 Original Components (*as approved*)**

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<sup>9</sup> Community beneficiaries include artisanal fishermen, farmers and fishermen cooperatives, foresters, cattle raising associations, environmental State agencies, private environmental companies, local universities, beneficiaries from recreational activities and tourism, govt. agencies and institutions, municipal and state environmental authorities, as well as local communities and grass-roots organizations including fishermen and farmers' cooperatives, local and regional NGOs. Pertinent federal government institutions (i.e., SEMARNAT, INECC, IMTA CONANP, CONAFOR, CONAGUA) also benefited from the project.

17. The project had four components, the second of which originally had four subcomponents. Each one (and the respective anticipated total costs and GEF contributions as indicated in the PAD) is briefly described in the following paragraphs.

***Component One – Design of Selected Adaptation Measures and Technical Coordination of the Project (US\$ 3.0 million, of which the GEF contribution would be US\$ 0.74 million)***

18. This component entailed detailed design of the adaptation measures to be implemented under the project, taking into account the Recipient’s pertinent federal programs to deal with wetland management in the project’s pilot areas. It included the provision of technical assistance (TA) to facilitate modeling, generation of data, analysis, and access to information and long-term remote sensing of these areas as well as TA to facilitate technical coordination of the project.

***Component Two – Implementation of Pilot Adaptation Measures in Highly Vulnerable Wetlands (US\$ 18.5 million,<sup>10</sup> of which the GEF contribution would be US\$ 2.96 million)***

19. This component would develop and implement, *inter alia*, comprehensive wetland management plans and land zoning for the pilot areas, including specific measures and procedures to prevent and otherwise address deforestation and illegal construction, and, in connection therewith, implementation of a technical monitoring system and the carrying out of adaptation measures. The experience from these pilot projects was intended to inform the GoM’s future adaptation strategy and efforts in the Gulf Coast region. The component consisted of the following original subcomponents:

20. ***Subcomponent 2.1: Wetlands Panuco-Altamira (Tamaulipas).*** Under the Tampico Agreement for the Tamaulipas Pilot Area, taking all appropriate action needed for: (i) preparation of a climate-resilient zoning plan and associated regulations and submission of this plan and regulations to the Tamaulipas Municipal Council; (ii) preparation and implementation of specific adaptation measures, including strengthening of land barriers and carrying out other conservation measures around the Lagoon La Escondida.

21. ***Subcomponent 2.2: Wetlands of the Papaloapan Rivershed, Alvarado Lagoon (Veracruz).*** Under the Alvarado Agreement for the Veracruz Pilot Area, taking all appropriate action needed for: (i) the integration of climate concerns in the conservation and management strategy of the Alvarado Lagoon, including adoption of a plan for

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<sup>10</sup> This figure includes the US\$ 15.0 million contribution of CONAGUA and US\$ 0.35 million contribution of PEMEX that refers to the “baseline” investments that were actually carried out prior to project implementation, and, thus overstate its real dimensions (i.e., US\$ 5.15 million, of which the GEF contribution would be US\$ 2.96 million).

enforcement of a buffer zone around the Lagoon; and (ii) construction of a pilot stabilization barrier to buffer against extreme weather events and future sea level rise.

22. ***Subcomponent 2.3: Wetlands of Carmen-Pajonal-Machona (Tabasco).*** Under the Cardenas Agreement for the Tabasco Pilot Area, taking all appropriate action needed for: (i) development of a wetland conservation and management strategy, including the updating of land zoning regulations; (ii) carrying out pilot restoration and reforestation with native species along biological corridors; and (iii) carrying out pilot strengthening of the sandbars that separate lagoons from the sea.

23. ***Subcomponent 2.4: Biosphere Reserve Sian Ka'an Punta Allen (Quintana Roo).*** Under the agreement between the National Institute of Ecology (INE), the Mexican Institute of Water Technology (IMTA), and CONANP for the Sian Ka'an Pilot Area, taking all appropriate action needed for: (i) strengthening of the Sian Ka'an Pilot Area's monitoring system and the revision of the protected area management plan to include climate change impacts; and (ii) carrying out pilot repopulation of coral reefs to maintain their buffering capability and protection of the coastal wetlands.

***Component Three – Assessment of the Impacts of Climate Change on Water Resources Planning at a National Level and in Coastal Wetlands including identification of Potential Optimal Response Options (US\$ 1.0 million, of which the GEF contribution would be US\$ 0.5 million)***

24. This component would develop climate change impact scenarios on the Recipient's national water resources, hydrological characterization of pilot emblematic basins with a focus on coastal wetlands and associated watersheds, and identification of response options and measures that could be adopted at a national level to incorporate the anticipated impacts of climate change on water resource planning.

***Component Four – Project Management (US\$ 1.0 million, of which the GEF contribution would be US\$ 0.3 million)***

25. This component would entail coordination of the administrative, financial management, procurement, and safeguard aspects of the project. Specific institutional responsibilities for project management and implementation were briefly described in para, 9 above.

## **1.6 Revised Components**

26. At the time the project was restructured, all proposed activities in relation to the pilot site in Tamaulipas (Subcomponent 2.1) were withdrawn at the request of the state government due to continuing insecurity in the state, although IMTA continued its hydrological analysis in the Tamaulipas wetland, and the associated grant funds were reallocated. The pilot activities originally planned for Tamaulipas were removed at the



request of the state government due to continuing insecurity in the area, although IMTA continued its hydrological analysis in the Tamaulipas wetland. In addition, the proposed activities for the pilot sites in Veracruz (Laguna de Alvarado) and Tabasco (Sistema Lagunar-Carmen-Pajonal-Machona) were modified, thereby altering the original design of Subcomponents 2.2 and 2.3. The changes introduced by the restructuring were appropriate, as was the decision to retain the original GEOs, and significantly helped to improve both the project's implementation capacity at the three viable pilot sites and its ability to achieve its development objectives.

## **1.7 Other significant changes**

27. At the time of the restructuring in October 2015, the closing date was extended for one year until October 31, 2016 in order to undertake pending activities and improve the possibility that the project would achieve its GEOs. INE's name was also corrected to INECC (National Institute of Ecology and Climate Change) to reflect this official change by the GoM.<sup>11</sup> Training and workshops were added as eligible expenditures under the project, and, as indicated above, some of the KPIs and intermediate outcome (IO) indicators were modified to better reflect and measure project achievements. These changes, which reflect proactivity on the Bank's part, sought to make the project objectives achievable in view of the limited actual resources available and better knowledge of the reality on the ground in the pilot areas. At the time of the restructuring, just under US\$ 2.4 million, or 53.3 percent, of the GEF grant had been disbursed.

## **2. Key Factors Affecting Implementation and Outcomes**

### **2.1 Project Preparation, Design and Quality at Entry**

28. Project design, while innovative, in retrospect was overly ambitious, which led to a number of complications during implementation.

**Soundness of the background analysis.** Despite the three year preparation period, insufficient background analysis was conducted (with respect to the security situation in one of the proposed pilot areas and the Government's intentions to establish new protected areas along the Gulf coast, for example). The project incorporated lessons

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<sup>11</sup> Founded in 1992 as a division of the Ministry of Social Development with technical and regulatory powers and attached in 2001 as a research institute within the Ministry of Environment and Natural Resources (SEMARNAT), INE was converted into the National Institute of Ecology and Climate Change and its acronym changed to INECC in 2012 in accordance with the recently approved National Law on Climate Change. At this time its mission was redefined to become "to contribute to the development, conduct and evaluation of national policy on climate change, green growth, and sustainability through the development, coordination, and dissemination of studies and scientific or technological research".

learned from other adaptation operations. Analytical work was done and assessed as part of project preparation and design.

**Assessment of the project design.** The project's proposed sequencing, for instance, required that key studies be undertaken for the design of the pilot activities (e.g., in relation to deforestation, infrastructure works, land management plans, etc.) before specific interventions could be implemented. As indicated, complex financing and institutional arrangements were agreed during negotiations that involved a number of agencies (INECC, IMTA, CONANP, CONAGUA, NAFIN – the National Development Banking Institution – and the SHCP) with multiple responsibilities in the project's technical and administrative decision making process. INE/INECC and IMTA were properly selected as the key implementing agencies given their respective national responsibilities for wetland and water resource management and NAFIN's intermediation was required because INE did not possess the necessary legal status to be able to sign the Grant Agreement itself (in addition, IMTA (with the assistance from NAFIN) was chosen given that at the time INE lacked the legal administrative capacity to issue/process contracts and lead FM activities).

**Adequacy of government's commitment.** Government agencies were committed to the overall concept of addressing adaptation to climate change and collaborated with key data and analysis during preparation phase.

**Assessment of risks.** The up-front risk assessment in the PAD was also insufficient, which overlooks potential security and other risks, including those associated with inadequate Government and implementing agency commitment.

These factors, together with weak initial Government and implementing agency ownership of project objectives and design, however, contributed directly to the project's slow initial implementation progress.

## 2.2 Implementation

29. In addition to the design-related shortcomings cited above, there was nearly a one-year delay between project approval and grant effectiveness, which was largely due to the delay in the execution of the required agreement between SEMARNAT, through INE and IMTA, with regard to the division of responsibilities between the two agencies for project implementation. This was an early signal of the initial relative lack of commitment on the part of both these agencies. Implementation was also affected by changes in INECC's leadership and team composition in 2012, which led to new institutional priorities and a revision of the activities carried out previously. These changes were important because there had been insufficient commitment to the project on the part of INE, IMTA, or NAFIN prior to this time. The revision also included a differing focus in terms of project-related studies and investments, as the studies were no longer considered to be a necessary precondition before taking concrete adaptation interventions on the ground in the pilot sites. Implementation progress had also been hindered by cumbersome and time-consuming procurement processes and weak technical and administrative teams in both INECC and IMTA. Atypical weather events were likewise experienced in the pilot sites, further contributing to the delays. As a result, project implementation progress was rated Moderately Unsatisfactory between December

2012 and December 2014. In addition, on the Bank's side there were three changes in team management until a fourth task team leader (TTL) was appointed in the field in 2013, thereby allowing for more continuous and proactive project supervision. The previous TTLs had all been located at Bank headquarters, making direct communication with the client more difficult.

30. Most of these issues were successfully addressed during the period following the Mid-term Review (MTR), which took place in May 2013, by establishing a more agile and better functioning implementation system between INECC, IMTA, and NAFIN. This led to agreements on how to reduce the process for issuing contracts from 9 to 6 months, which was a particularly significant accomplishment, and by realizing periodic meetings among key agencies and the Bank to better monitor progress, identify bottlenecks, and define mitigation measures. In addition, instead of waiting for lengthy prior studies, adaptation measures were implemented with information already available at INECC, SEMARNAT and local communities. The capacity of project teams within both INECC and IMTA was strengthened in part through additional support provided by the Bank in the areas of procurement and financial management. As a result, implementation progress was upgraded by the Bank to Moderately Satisfactory in June 2015 and remained so for the rest of the project implementation period.

31. At the pilot site level, a consultation process was undertaken involving numerous meetings and fora with municipal and state environmental authorities, as well as with local communities and grass-roots organizations including fishermen and farmers' cooperatives, local and regional NGOs, and universities, together with representatives of the pertinent federal government agencies (i.e., SEMARNAT, CONANP, CONAFOR, and CONABIO). There was ample stakeholder participation during this process, which focused on how the pilot areas could be strengthened in terms of wetland protection and sustainable natural resource use more generally. Once selected, implementation of the adaptation measures proceeded smoothly, and they were largely completed by the time the project closed.

32. The progress achieved during the latter part of the implementation period was boosted by increased involvement and commitment on the part of other government agencies, particularly the SHCP and NAFIN, together with the higher priority assigned to the project by INECC, whose top management had changed. Co-financing for technical assistance from the Government of Japan was delivered as expected although that by NAWCA was not.

33. This progress notwithstanding, a Level 2 restructuring was approved by the Bank on October 14, 2015 and the restructuring led to the adoption of more realistic results indicators in relation to two of the three remaining pilot areas (i.e., those in Tabasco and Veracruz) that were expected to be achieved within the extended implementation period. The GEF grant was not fully disbursed by the time of project closing. This was the result of a substantial depreciation of the Mexican peso against the US dollar during the last two years of project implementation, meaning that the grant resources went farther than initially anticipated at the time of appraisal.

### **2.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization**

34. **Design.** The project implementation team (PIT) was responsible for M&E. The M&E methods included data collection, field visits and interviews with beneficiaries, photographic records, satellite images, GIS among others. Technical Coordinators in INECC being specifically responsible for Components 1 and 2 and in IMTA for Components 3 (in collaboration with CONAGUA) and 4. A detailed M&E system and guidelines were contained in the project's Operational Manual. However, some of the original indicators and targets were not measurable and/or had multiple results. A number of the project indicators were subsequently changed, as the initial ones and their associated targets were subsequently proven to be too ambitious. These modifications were appropriate and were intended to make project interventions more realistically achievable without the need to alter its overall objectives.

35. **Implementation.** During implementation data collection and the monitoring methods and instruments worked well. The team at INECC and IMTA were adequately staffed and had the elements to carry out a sound M&E. In addition to revising the Results Framework and some of the monitoring indicators and targets at the time of restructuring, from 2013 onwards, the PIT held periodic meetings among key stakeholders to monitor implementation progress, identify bottlenecks, and define mitigation measures. During these meetings the PIT systematically reviewed progress toward fulfillment of the IOs and KPIs. The PIT also carried out a cost-benefit analysis of the project's reforestation activities in two of the three pilot sites (see the section on Efficiency below) and submitted biannual integrated progress reports to the Steering Committee and the Bank in relation to the project financial and physical performance indicators.

36. **Utilization.** Through periodic meetings, audio-conferences and exchanges with local stakeholders, the PIT systematically monitored the project in a way that served to verify progress toward fulfillment of the KPIs. Data was reviewed and evaluated which helped the decision making process. Furthermore, the PIT visited the pilot sites in order to get first-hand knowledge on the status of activity development, bottlenecks and other issues that could affect project implementation. For example, it helped to identify the need to reduce the targets of some indicators that had been overestimated, and need to clarify some indicators, which led to the level 2 restructuring in October 2015. The information obtained by these means was reportedly used to help guide management of project implementation and for preparation of the Recipient's Implementation Completion Report, which findings and conclusions are summarized in Annex 7 below.

### **2.4 Safeguard and Fiduciary Compliance**

37. **Safeguards.** The project was classified as Category B for safeguards purposes. It triggered OP 4.01 (Environmental Assessment), OP 4.04 (Natural Habitats), and OP 4.36 (Forests). INECC and IMTA were jointly responsible for the application of Bank

environmental safeguards during project implementation. Expected direct positive environmental impacts of the project included: (i) reduced vulnerability of coastal ecosystems in the pilot sites; (ii) reduced uncertainty regarding likely impacts of global climate change and improved water resource planning and ecosystem conservation; (iii) mitigation of impacts of unsustainable land uses; (iv) reduced vulnerability of and improved planning and management of water supply in selected urban areas; (v) increased public awareness of adaptation needs and increased social and institutional capacity to manage local ecosystems; and (vi) strengthened resilience of environmental services in the face of climate change.

38. Considering the project's strong environmental focus, no significant adverse impacts were anticipated, although some minor ones could have resulted from proposed project investments on the ground. An Environmental Management Framework (EMF) was thus prepared and publicly disclosed in-country and at the Bank's Infoshop in February 2008. Specific environmental assessments (EAs) were performed at each of the pilot sites as part of the design of the project's specific adaptation measures. This process included a specific vulnerability analysis with respect to anticipated climate change impacts and development of site-specific environmental management plans (EMPs). The list of proposed adaptation measures was subject to public consultations prior to being selected for each site. The preparation of land zoning regulations and management plans incorporated social analysis to assess the potential direct and indirect effects of these instruments on local populations living in the affected areas. All environmental safeguard policies were complied with during implementation.

39. The project did not trigger any Bank social safeguard policies. No involuntary taking of land was required for the project, and, with one partial exception, no indigenous peoples were found in the project areas. The project did use land for the building of three community stilt, or palafitte, houses in El Mingo in Tabasco, but this land was provided voluntarily. Elsewhere the land used for mangrove restoration was in private hands and was voluntarily provided by the owners in the form of local private reserves. Some people of indigenous origins were living in the Sian Ka'an pilot area, but they were mixed with non-indigenous peoples and thus did not fall under the criteria of OP 4.10 (Indigenous Peoples).

40. **Procurement.** Due mainly to the complexity of the implementation arrangements, and lack of prior experience from INECC and IMTA with Bank procedures and requirements, the project's procurement risk was considered "Substantial". For the same reason, the procurement performance rating was Moderately Satisfactory during much of the project's implementation. The complex institutional arrangements particularly affected preparation of procurement plans during the initial years of the project. While this situation was largely overcome during the latter years, a one-year extension of the closing date was needed in order to complete project activities. During the project's final years, the affected institutions worked together more effectively to revise procurement procedures so as to ensure more streamlined and faster execution of the funds in order to

deliver actions on a yearly basis and under the constraints of the annual budget allocations.

41. Capacity building for procurement was provided to INECC and IMTA by both NAFIN and the Bank. Most of the activities were not themselves complex and entailed fairly small amounts, so they would not normally have been subject to prior review. However, because of the specialized nature of the goods or services involved, some of the procurement needed to be cleared up front by the Bank. In addition, there were disagreements regarding procurement of some activities, which were considered to be operating costs by the implementing agencies, but goods or consultant services by the Bank. These differences likewise required discussions and clearance of contracts involving very small amounts that otherwise would not have needed Bank prior review.

42. **Financial Management.** The project's financial management (FM) arrangements during implementation were adequate and provided assurance that grant proceeds were utilized for the intended purposes. All FM provisions and requirements were complied with by the implementing entities. The project's unaudited Interim Financial Reports (IFRs) were generally submitted on time to the Bank with only minor delays, especially for the first two reporting periods. Audit reports for the most part were also submitted in a timely fashion and unmodified (i.e., clean) opinions were issued. No relevant findings or internal control weaknesses were found by the auditor.

43. The FM rating at the time the project closed was Satisfactory, even though during the early stages of project implementation intensive supervision and support was needed because the unit within IMTA responsible for both FM and procurement required considerable strengthening. Its initial capacity weaknesses were reflected in the rating of project financial management as Moderately Satisfactory from June 2013 through May 2015. This was primarily due to delays in the submission of disbursement applications for incurred expenses and inadequate coordination between IMTA, as the unit responsible for FM, and INECC as that responsible for technical aspects of the project, which slowed budget execution and procurement processes. For other—non-FM-related—reasons (see paras. 30-31 above), the disbursement rate was low during the first stages of project implementation, but, from 2015 on, both project execution and disbursements accelerated in response to the action plan that was adopted at the time of restructuring and extension of the closing date.

## **2.5 Post-completion Operation/Next Phase**

44. No concrete follow-on activities had been defined at the time of project closing. However, there are ongoing discussions between the Bank and SHCP, INECC, IMTA, and NAFIN about a possible new national ecosystem-based adaptation operation with Green Climate Fund (GCF) support that would seek to provide continuity to the pilots already developed and to apply and scale up the lessons from this project. SHCP has already signaled its interest in this potential project, and its scope and the viability of proceeding with this new proposal are expected to be defined during 2017.

### 3. Assessment of Outcomes

#### 3.1 Relevance of Objectives, Design and Implementation

##### Rating: Modest

45. **Relevance of Objectives.** Project objectives were highly **relevant** at the time of appraisal given the increasing threat to coastal areas along the Gulf of Mexico by the adverse effects associated with global climate change, and this continues to be the case. This is clearly manifested in Mexico's National Communications to the UNFCCC. The third such report, submitted in October 2007, for example, contained a specific section on adaptation to climate change in the Gulf of Mexico wetlands that, inter alia, makes specific reference (pg. 109) to the anticipated GEF support through the World Bank to help implement this priority. Environmental sustainability was one of the main pillars of GoM's National Development Plan (NDP) for 2007-2012, which referred specifically to the recently issued National Strategy on Climate Change that included adaptation measures as well as to actions to mitigate Mexico's Greenhouse gas (GHG) emissions and was supported by the Bank's Country Partnership Strategy (CPS) for FY2008-2013.

46. Mexico's Fifth National Communication to the UNFCCC, issued in 2012, includes a chapter that describes its adaptation programs. This chapter (pg. 126) likewise specifically refers to the present project and identifies the pilot sites where adaptation actions were being implemented by INECC and IMTA with GEF support. Mexico's adaptation challenges and accomplishments were also discussed in a chapter in OECD's (third and) most recent Environmental Performance Review for Mexico, published in 2013. This report (pp. 126-125) recognized that Mexico, and particularly its coastal areas, was highly vulnerable to the adverse effects of climate change and observed that the country had "played a leading role in identifying approaches to water-related adaptation on the international agenda," to which the present project has directly contributed.

47. The project's objectives continue to be relevant in relation to Mexico's National Development Plan for 2013-2018, more specifically to its strategies for disaster prevention, generating community development schemes through social participation, integrated development policy that links environmental sustainability with social costs and benefits, sustainable water resource management, conservation of natural patrimony, and strengthening national climate change and environmental protection policy in order to transition to a competitive, sustainable, resilient, and low carbon economy. They are likewise relevant in terms of Mexico's National Climate Change Strategy's Vision 10-20-40, whose adaptation pillar emphasizes conservation and sustainable use of ecosystems and maintenance of the services that they provide. And it is relevant to the country's Special Climate Change Program (PECC) for 2014-2018, whose second objective is to "conserve, restore, and sustainably manage ecosystems guaranteeing their environmental services for the mitigation and adaptation to climate change" and one of whose associated strategies is to "promote protection, conservation, and restoration schemes and actions for terrestrial, coastal and marine ecosystems and their biodiversity."

48. The Bank Group's CPS for Mexico for the period FY 2014-2019, (latest update Report: 104752), in turn, identifies "promoting green and inclusive growth" as one of its

four themes, which, among other concerns, entails supporting the use of natural resources “in an optimal way.” More specifically, it affirms (para. 83, pg. 36) that “Mexico’s significant natural resource capital, the high cost of environmental degradation, and the increasing risks posed by climate change highlight the importance of a green-growth agenda addressing critical policy concerns: the footprint of growth (externalities), including urban planning, solid waste management, energy efficiency; and managing natural assets under pressure—focusing on forest, biodiversity and water management, and renewable energy.”

49. **Relevance of Design.** Considering that national approaches to climate change adaptation in Mexico were still at a very early stage when the project was prepared and appraised, its design, which concentrated on developing a set of pilot activities in different areas along the vulnerable Gulf Coast, was excessively ambitious. In the Results Framework, moreover, the relation between some of the key outcome indicators and the second objective—to assess the overall impact of climate change on the Recipient’s national water resources planning, including the identification of potential response options, with a focus on coastal wetlands and associated watersheds—is not entirely clear. For example, it is unclear how the KPI, which referred to “production and dissemination of practical guidance document on costs and benefits of adaptation measures in coastal wetlands as a basis for replication efforts,” while valid as an objective, but later “downgraded” (perhaps for this reason) to intermediate outcome (IO) indicator status, specifically relates to this objective. In addition, neither this, nor the fifth indicator – climate change impact scenarios developed for selected basins and for coastal wetlands supporting knowledge base required to mainstream climate change into water resources and wetland management and planning – reflects the objective, particularly in relation to “the Recipient’s national water resource planning, including the identification of potential response options,” which would appear to be an overly ambitious objective considering the scope of project’s pertinent activities and the resources available to implement them.

50. There were a number of other significant design shortcomings as well. The investments covered by the CONAGUA and PEMEX contributions were included in the PAD as part of the project costs and financing, but in practice were totally independent of the project. The specific nature of these interventions, especially in the case of the US\$ 15 million investments undertaken by CONAGUA, are not described in the PAD nor reflected in the project’s Results Framework and key or intermediate outcome indicators. Thus, to claim that the associated costs and financing were part of the project was a stretch at best. As also observed above, the planned sequencing or project activities (i.e., conclusion of detailed technical studies and design measures prior to taking action in the pilot areas), together with the complexity of project institutional and implementation arrangements, featured strongly in its subsequent institutional delays as did the weak commitment to the project on the part of the various government agencies involved. Due to these various issues, the overall relevance of project design is, therefore, rated **Modest**.

51. **Relevance of Implementation.** The relevance of project implementation is likewise rated **Modest** up to the time of the mid-term review and the subsequent associated restructuring and Substantial during the latter years of implementation when



INECC's performance and overall project coordination both dramatically improved. Even though nearly all revised project activities were completed as expected by the time of project closing in October 2016, a one-year extension was required as well as a Level 2 restructuring that reduced the scope of the second component (Implementation of Pilot Adaptation Measures in Highly Vulnerable Wetlands) in relation to the original project design. This reinforces above assessment that the initial design of this component in particular, which absorbed the largest share of project, was overly ambitious in view of the reality on the ground (e.g., the absence of Protected Areas in Tabasco and Veracruz and lack of firm Government commitment or plans to establish them) at the time of project preparation and the planned sequencing of Components 1 and 2 (i.e., the development of key studies on adaptation measures) prior to the development of the pilots was inefficient.

### **3.2 Achievement of Global Environmental Objectives**

#### **Rating: Substantial**

52. The project had two GEOs, the degree of achievement of which is reviewed in the paragraphs below. In doing so, accomplishments in relation to the project performance indicators that were in place both prior to and following the October 2015 restructuring is considered. It can be concluded, however, that the project largely achieved its objectives, particularly as measured by the revised indicators, which were adopted following the MTR and at the subsequent formal restructuring. Proposed studies and modeling activities were carried out, and three pilot adaptation projects were successfully implemented. This involved considerable community participation, including distilling water fluxes, reforestation of degraded mangroves in the pilot sites in both Tabasco and Veracruz, which were also the subject of cost-benefit analyses (see the section on Efficiency below). Other successful measures included community palafittes to secure cops and seeds in the eventuality of adverse climatic episodes, and a system for capturing rainwater and a water treatment plant that are properly operating in Tabasco. Mareographs and other equipment have been installed and are operating, and a deteriorated coral reef area in the Sian Ka'an Biosphere Reserve has been restored. The following paragraphs briefly summarize these outcomes in relation to each objective and Annex 2 provides a more detailed account of project outputs by component.

*Promoting adaptation to the consequences of climate impact in the coastal wetlands of the Gulf of Mexico through the implementation of pilot measures that will provide information about the costs and benefits of alternative approaches to reduce the vulnerability of said coasts to climate change.*

53. Progress toward achievement of this objective was to be measured by several key performance indicators<sup>12</sup> originally including the production and dissemination of a

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<sup>12</sup> The revised GEO indicators that helped measure the achievement of this objective include: a) Design documents for pilot adaptation measures that facilitate prompt implementation and include sustainability strategy as well as monitoring provisions developed; b) Two land use plans and a revised protected area management program, incorporating climate change adaptation activities, discussed with stakeholders, and

practical guidance document on the costs and benefits of adaptation measures in coastal wetlands as a basis for replication efforts, which was reclassified as an IO indicator at the time of the restructuring. The language of two other KPIs was also substantially modified and some of the end-of-project (EoP) targets were altered as indicated in para. 12 above.

54. This objective in practice referred essentially to the pilot measures that were to be implemented in the coastal wetlands of the Gulf of Mexico. The project originally called for the implementation of four such pilots, but the initially proposed activities in Tamaulipas had to be withdrawn due to insecurity in the state and the affected site could not be replaced because project implementation was too far advanced to allow for addition of another site without requiring a further extension of the closing date. It was also decided that, by reallocating the resources to the other pilots, the project could have a greater impact in those sites. The three pilot sites benefited under the project were nevertheless located in different states, thus characterized by different ecological conditions, along the Gulf coast. Most of the planned project activities in these three areas, starting with the design documents for the pilot adaptation measures in the three pilot areas that were referred to in the first PDO indicator, were fully completed before project closing, as is described in detail in Annex 2.

55. With respect to the revised PDO outcome indicators that specifically refer to actions in the pilot areas, both land use plans which incorporated specific climate change adaptation measures, were produced, and the protected area management plan was revised. More specifically, the Alvarado (Veracruz) Lagoon Land Use Planning Program (LUPP) contained adaptation and conservation measures including identification of areas at risk for and/or vulnerable to flooding, definition of emergency evacuation procedures and routes, and appropriate construction protocols. This Program was under consultation with state and municipal authorities at the time of project closing. The Tabasco LUPP, in turn, was revamped to include conservation and adaptation measures similar to those introduced in the one for Alvarado. It has already been approved by the municipal government and state government approval was pending at the time the project closed. Finally, the Protected Area Management Program for the Sian Ka'an Reserve was also revised to include climate change considerations affecting zoning, conservation, and economic activities, among others.

The target of more than 50 ha of mangrove ecosystem and riparian zones reforested, more than 70 ha of water fluxes rehabilitated in Veracruz and Tabasco, and at least six areas in the Sian Ka'an Biosphere Reserve with repopulated temperature-resistant coral genotypes was also achieved. The repopulating of temperature-resistant coral genotypes in six areas (3,500 m<sup>2</sup> of coral with an approximate 1 m<sup>2</sup> per colony) in the Sian Ka'an

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at least one land use planning program submitted for approval to decision making authorities and supported by local and state institutions (depending on the aptitude of the territory in each pilot site, the land use planning will incorporate conservation elements); and c) More than 50 ha of mangrove ecosystem and riparian zones reforested, more than 70 ha of water fluxes rehabilitated in Veracruz and Tabasco, and at least six areas in the Sian Ka'an Biosphere Reserve with repopulated temperature-resistant coral genotypes.

Reserve was likewise accomplished. Similarly, rehabilitation of 100 ha (the initial target having been 70 ha) of water fluxes and desilting of 6 drainage systems in the El Playón mangrove ecosystem in this Reserve was completed. Thus achievements for this objective are rated High.

56. However, the situation is somewhat different with respect to the original KPIs for this objective that were modified at the time of restructuring. The indicator with respect to land use management plans was not substantively very different from the original one that referred specifically to “wetland management plans” considering that the latter referred to Natural Protected Areas (ANPs) that do not exist in Veracruz and Tabasco and thus was inappropriately used in the PAD. The other revised indicator, which refers to reforestation of mangrove ecosystems and riparian zones, however, is quite distinct from the original one which called for: (i) the presentation of 15,000 ha to Municipal Councils for consideration for placement in conservation status in new land use plans; (ii) 5,000 ha to be reforested with native species to add to the climate-resilience of coastal wetlands; (iii) 3,000 meters of coastal bars to be stabilized to address the threat of sea level rise; as well as (iv) increased thermal resilience in the Sian Ka’an Biosphere Reserve by repopulating genetically diverse temperature-resistant coral genotypes in six areas in this Reserve. Of these four initial targets, only the last one with respect to coral repopulation in the Sian Ka’an Reserve was actually achieved. The reasons for the changes in this indicator were indicated in para. 13 above. These justifications notwithstanding, actual project performance in relation to this initial KPI and achievement of objective is considered Modest.

57. If project performance ratings in relation to this objective are considered both with respect to the three original performance indicators and their associated targets (Modest) and with regard to the revised ones (i.e., two of the three) (High), and considering that little more than half (53.3 percent) of the GEF grant had been disbursed at the time of the restructuring in October 2015, the composite rating is **Substantial**.

*Assessing the overall impact of climate change on the Recipient’s national water resources planning, including the identification of potential response options, with a focus on coastal wetlands and associated watersheds.*

58. The remaining KPI<sup>13</sup> following the restructuring was intended to measure project performance in relation to its second objective. It was also substantially met. IMTA developed a response to the Intergovernmental Panel on Climate Change’s (IPCC’s) fifth assessment report and produced at least one national water resource management response option that considers climate change impact scenarios for the selected wetlands. These impact scenarios included: (i) an assessment under three different climate change scenarios with respect to surface runoff nationwide; and (ii) improved hydrological

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<sup>13</sup> The KPIs that measure achievement of this objective include: (a) Climate change impact scenarios developed for selected basins and for coastal wetlands supporting knowledge base required to mainstream CC into water resources and wetland management and planning; and (b) Modeling, generation of data, analysis, and access to information and long term remote sensing.

modeling, including models of the hydrological flows for the project pilot areas in Quintana Roo, Tamaulipas, Tabasco, and Veracruz. In addition, IMTA analyzed implementation of an adaptation measure related to water availability in the Alvarado Lagoon area and has made technical presentations on this experience in national and international fora.<sup>14</sup> IMTA is also finishing editing a book on the impact of surface runoff in watersheds in the Laguna de Alvarado, Carmen Pajonal Machona, and Punta Allen wetlands that is expected to be published with its own resources later in 2017.

59. A cost-benefit analysis of the project's mangrove reforestation activities in the pilot sites in Tabasco and Veracruz was undertaken by INECC to determine the potential benefits and costs of this particular climate change adaptation measure. The results of this analysis were positive, were disseminated at the time of project closing, and are expected to serve as the basis for replication of similar interventions elsewhere (see the next section on project Efficiency for more details concerning this analysis and its results). Overall, project outcomes in relation to this objective are, therefore, rated **Substantial**.

### **3.3 Efficiency**

#### **Rating: Substantial**

60. According to the PAD, due to the long-term nature of the project with its focus on integrating climate change considerations into the management of vulnerable coastal ecosystems, it was difficult to identify one quantitative indicator that would best reflect project outcomes. Project preparation reportedly followed procedures recommended by the GEF for biodiversity operations (i.e. cost-effectiveness analysis) under such circumstances by assessing various alternatives "best suited to achieve the project's development objectives." In addition, it was affirmed that the project's focus on conservation and strengthening the resilience of the endangered ecosystems involved would also benefit "the sectors that depend upon functioning ecosystems such as tourism, fisheries, biodiversity, and coastal protection" and that its coordination with CONAGUA in the pilot areas would help "to address the overarching issues that affect these ecosystems." However, there was no attempt in the PAD to quantify these benefits, which makes ex-post comparisons difficult.

61. In significant contrast to the lack of economic analysis in the PAD, during project implementation, as mentioned in para. 62 above, a cost-benefit assessment was carried out on mangrove reforestation investments in two of the pilot demonstration areas (Tabasco and Veracruz). The results of this analysis, which was undertaken by INECC's

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<sup>14</sup> (a) XXVII International Symposium on Remote Sensing and Geographic Information Systems (Argentina Nov. 2016); (b) X International Congress on Meteorology (Puerto Vallarta, Nov. 2016); (c) XXI National Meeting on the Remote Sensing Chapter (Oct. 2016); (d) XVI Bolivarian Congress (Santa Cruz, Bolivia Oct. 2015); (e) IX International Congress on Meteorology (Mazatlán Oct. 2015); (f) International Congress of Forest Resources (Ixtapan de la Sal, Nov. 2015); and (g) National Hydrological Congress (Mexico City, March 2017).

Direction of Natural Resource Economics in November 2015, were presented to the Bank, NAFIN, IMTA, and SEMARNAT in June 2016. For this analysis, direct and indirect project benefits included estimates of the value of the environmental services provided by mangrove reforestation in terms of: (i) improved quantity and quality, including purification, of water supply; (ii) improved habitat for fish species; and, (iii) increased forest products. Other benefits provided by intact or restored mature mangroves that could not be quantified in monetary terms included their value in terms of coastal protection against floods and erosion, carbon capture, and use as species habitat, as well as possible aesthetic and recreational values. Thus actual subproject benefits are likely to have been – perhaps significantly -- underestimated.

62. The direct and indirect costs of these adaptation measures were for: (i) diagnostic studies of the zone for the Rio Papaloapan-Laguna de Alvarado site in Veracruz and equipment rental for the Sistema Lagunar Carmen-Pajonal-Machona site in Tabasco; (ii) land preparation; (iii) production materials; (iv) planting; (v) technical assistance; (vi) monitoring; and (vii) the opportunity cost of land use, which in both cases was for use as pasture for cattle. The time horizon considered for the flow of costs and benefits was 35 years and the time required for the restored mangroves to mature was 8.5 years, at which point the benefits were expected to start flowing. The total area involved was 25 hectares in each case, and the assumed survival rates of the reforested mangroves were 90% for Rio Papaloapan-Laguna de Alvarado pilot site and 75% for the Sistema Lagunar Carmen-Pajonal-Machona site based on observed performance. Two discount rates were used, 4% and 10%, with the latter representing the rate normally used by SHCP to assess investments and the former that is frequently applied in the specific case of climate change adaptation investments.

63. The results of this analysis in terms of net present value (NPV), as well as for an average of the two discount rates mentioned above, for both pilot sites are presented in Table 1 below. Additional information regarding the specific costs and benefit estimates used in the analysis is provided in Annex 3.<sup>15</sup> As the table shows, the investments at both sites had positive NPVs at all three discount rates considered. The somewhat higher NPV for the Rio Papaloapan-Laguna Alvarado site is primarily due to its higher estimated mangrove survival rate even though the initial investment costs in Veracruz were higher than those in Tabasco due to higher land preparation and monitoring costs.

Table 1. Net Present Value Estimates for Mangrove Reforestation Projects (millions of Mexican pesos)

<b>Project/NPV</b>	<b>4% Discount Rate</b>	<b>10% Discount Rate</b>	<b>7% Discount Rate</b>
Rio Papaloapan	\$20.9	\$5.6	\$13.2
Sistema Lagunar Carmen Pajonal Machona	\$18.3	\$5.6	\$11.9

Source: INECC, June 2016

<sup>15</sup> See also INECC, *Nota Técnica sobre el Análisis Costo Beneficio de las Medidas del Proyecto de Adaptación de Humedales Costeros del Golfo de Mexico – Reforestación de Manglar*, Mexico City, November 2015 and the associated Power Point presentation, also by INECC's Natural Resource Direction, June 2016.

64. As the reforestation interventions in the demonstration areas under Component 2 accounted for 33 percent (US\$ 117,344) of the project’s adaptation costs at the pilot site in Tabasco and 63 percent (US\$ 330,880) of those for the one in Veracruz,<sup>16</sup> the results of this cost-benefit analysis suggest that project resources were used efficiently. The results are also likely to be similar when extrapolating the analysis applied to the Sian Ka’an pilot, where mangrove reforestation efforts and repopulation of coral reefs were also successfully undertaken. Other project activities, including its management, which cannot be assessed using a cost-benefit approach (e.g., development of land use plans, repopulation of coral reefs, revision of climate change scenarios, improved hydrological modeling), were implemented efficiently in terms of financial resource use and no cost overruns were recorded. As a result of these considerations, project efficiency is rated **Substantial**.

### **3.4 Justification of Overall Outcome Rating**

#### **Rating: Moderately Satisfactory**

65. The overall rating for relevance is considered **Modest**, while both efficacy and efficiency are rated **Substantial**. The project largely achieved its GEOs, even though some of its initial performance indicators were overly ambitious and needed to be revised. This was formalized following the mid-term review through a Level 2 restructuring, at a time when slightly more than half (53.3 percent) of the GEF grant had been disbursed. The revised outcome indicators have been generally achieved in full and, as a result, the project has recorded significant climate change adaptation-related outputs and accomplishments in all three of its pilot coastal wetland areas, including a high degree of local community participation. However, the project design was overly ambitious and its institutional arrangements were cumbersome. These factors, together with other design shortcomings, led to substantial implementation delays and required a one year extension of the initial closing date. Thus, the project’s overall outcome is rated **Moderately Satisfactory**.

### **3.5 Overarching Themes, Other Outcomes and Impacts**

#### **(a) Poverty Impacts, Gender Aspects, and Social Development**

66. Project implementation was strongly based on the active participation of local stakeholders. Project objectives at the pilot site level would likely not have been

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<sup>16</sup> Other project-supported adaptation interventions in Tabasco included implementation of a rainwater capture system and water potabilization plant in Las Coloradas, which cost US\$ 91,387, and establishment of palafittes in El Mingo, Cárdenas municipality that cost US\$ 148,516. Other such measures in Veracruz were management of the Conservation and Sustainable Utilization Unit (UMA) for the mangrove in the *ejido* el Tarachi in Acula Municipality, which cost US\$ 25,376, and development of a local land use zoning plan that included climate change adaptation measures for Alvarado municipality that cost US\$ 168,683.

achieved if it had not successfully empowered local organizations. From the beginning INECC devoted significant time and efforts to envisage and implement a highly participatory strategy that also aimed at empowering local women (an unforeseen aspect at project design). This strategy included social, economic, and cultural assessments of each selected site, as well as realization of several workshops prior to, during, and after implementation of investments on the ground in each of the pilot areas.

67. Project social impacts were varied and ranged from raising awareness about the local implications of climate change to providing local people with the means to better adapt to climate change, such as potable water for a primary school and the community stilt houses to safeguard community belongings at times of flooding, as well as to improve the capacity of mangroves to reduce the erosive impact of future hurricanes. During project implementation, local communities also benefited from educational impacts of workshops for the planning, organization, execution, and evaluation of project interventions.

#### **(b) Institutional Change/Strengthening**

68. Considering that this was the first consolidated and integrated effort to address climate change adaptation issues and measures in Mexico, the key institutions involved with its implementation (namely INECC, IMTA, CONANP, CONAGUA and NAFIN), learned and evolved in its overall approach to address these key challenges. In particular, INECC has now mainstreamed these concerns and created a Directorate for Vulnerability and Ecological Adaptation in charge of leading these efforts. Likewise, all key agencies are now in discussions with the Bank for a follow-on operation that reflects institutional maturity/strengthening and commitment to adaptation to climate change.

#### **(c) Other Unintended Outcomes and Impacts (*positive or negative, if any*)**

69. Overall there were mostly positive unintended impacts which included:

- broad community participation and commitment for adaptation measures;
- a strong gender focus in project implementation, having local women actively contributing to project activities and reflecting that men and women are equal participants, leading to changes in the social fabric; and,
- strengthening and recognizing local community leaders for their efforts has led them to become champions on adaptation measures.

### **3.6 Summary of Findings of Beneficiary Survey and/or Stakeholder Workshops**

70. The Bank team participated in several stakeholder workshops including the International Summit on Adaptation Based on Ecosystems (ABE) that took place in September 2016, where the outcomes and conclusions of the project were highlighted among international experts. The Bank's Country Director also participated in a stakeholder workshop in the Sian Ka'an Reserve where the team was able to note the following:

- There was a highly active level of women participating and engaging in the workshop's discussions;
- The high level of interest, participation and engagement by local stakeholders in all workshops was notable;
- The level of conceptual understanding of climate change impacts and adaptation measures among local stakeholders related to the specific pilot areas was quite high;
- Small rewards and recognition (i.e., diplomas) given by INECC to participants helped to maintain their motivation and commitment to implementing project activities;
- In some communities the local dynamic has positively changed as a result of the capacity building workshops (e.g., by organizing concrete adaptation measures and emergency response systems) and many have requested that these workshops continue beyond the life of the project;
- Many participants felt great satisfaction by applying the knowledge from the workshops through the implementation of key adaptation measures.

#### **4. Assessment of Risk to Development Outcome**

##### **Rating: Moderate**

71. The risk to development outcome is considered Moderate. The mareographic and meteorological instruments installed under the project at the pilot sites are fully operational and will continue to be monitored by UNAM. The technical activities developed under Component 3 are likely to either continue or be expanded by both IMTA and CONAGUA. While INECC and IMTA will continue to advocate for the adaptation agenda associated with project outcomes, it is possible, however, that, in the absence of the continued presence and involvement of the project coordination team, some of the activities in the pilot sites may weaken.

72. Subprojects and complementary activities at all three pilot sites were selected with the inputs and active decision making of local stakeholders. The project had a common denominator in all of these sites, which was the strong community participation in the design and implementation, as well as the choice, of the climate adaptation measures it financed. This is expected to contribute to the sustainability of the investments made. Operation and maintenance of the infrastructure developed in the pilot sites, moreover, are almost exclusively under the responsibility of the grassroots organizations that participated throughout the project cycle, and they are expected to continue to be actively involved in its upkeep, maintenance, and preservation.



## **5. Assessment of Bank and Borrower Performance**

### **5.1 Bank**

#### **(a) Bank Performance in Ensuring Quality at Entry**

##### **Rating: Moderately Unsatisfactory**

73. While project design involved three years of preparation and the Bank deserves credit for its pioneering and innovative nature, some aspects of project design were overly ambitious and later needed to be significantly modified at the time of restructuring. The Bank should be commended for helping to design and supporting the first climate change adaptation project in Mexico and for focusing on the country's coastal wetlands, which are a particularly vulnerable ecosystem. On the other hand, project design seems to have optimistically assumed that the proposed pilot coastal wetlands in Tabasco, Tamaulipas, and Veracruz would be converted into formal protected areas (ANPs), hence the GEO indicators for the development of wetland management plans, which later needed to be redefined as land use plans for these areas. However, this does not appear to have been in the Government's plans at the time and the Bank should have been aware of this. For the same reason, the initial proposal to establish buffer zones around these areas had to be dropped. Also, some of the proposed activities (establishing sand barriers as coastal buffers) have since been technically rejected for their collateral negative impacts. In addition, the poor security situation in Tamaulipas, which resulted in its being eliminated from the project at restructuring at the Government's request, was not identified during appraisal as a project risk, nor was insufficient Government and implementing agency commitment and those associated with the project's complex institutional arrangements despite the comparatively small amount of resources involved. As a result, Bank performance in ensuring quality at entry is rated Moderately Unsatisfactory.

#### **(b) Quality of Supervision**

##### **Rating: Moderately Satisfactory**

74. The Bank supervision team deserves credit for the restructuring, which simplified project design and made it more realistic and also led to stronger implementing agency commitment and coordination and essentially turned project performance around. However, there were three changes in Bank Task Team Leaders (TTLs) over the life of the project, the first of which occurred before the initial supervision mission. This led to lack of continuity and some confusion for the client. During the initial years of project implementation, when the TTLs were based in headquarters, supervision missions were infrequent. Since 2013, however, the TTL has been based in the field office, which has greatly facilitated contacts and interactions, and improved the effectiveness of overall Bank supervision efforts, which also included stepped-up assistance to the Recipient with regard to procurement (in the process helping to reduce the time required to process contracts), financial management, and social development and community participation

aspects. The skill mix of the supervision team, however, was appropriate throughout. All missions included environmental and social safeguards, procurement, and financial managements specialists, and the Country Director participated in one of the field missions. The budget provided was likewise considered adequate by the Bank project team. ISRs were comprehensive and submitted in a timely manner, and the Bank played an important and appreciated role in assisting the client.

### **(c) Justification of Rating for Overall Bank Performance**

#### **Rating: Moderately Satisfactory**

75. Despite the Bank's improving supervision performance over time, primarily because of the various quality at entry shortcomings summarized above, overall Bank performance is rated Moderately Satisfactory.

## **5.2 Borrower**

### **(a) Government Performance**

#### **Rating: Moderately Satisfactory**

76. While during the latter years of project implementation, the Government of Mexico demonstrated stronger support, in its initial phase there was a weak level of commitment on the part of virtually all the agencies involved and by the Government more generally. Furthermore, the complex institutional arrangements for project implementation contributed to the substantial delays experienced, and it took time for the key agencies to reach agreement on a shared methodology for ensuring efficiencies in issuing contracts, thereby reducing overall time required to carry out these processes. A change in the approach to the project and greater institutional commitment following the mid-term review, however, resulted in more satisfactory implementation and higher levels of disbursements.

### **(b) Implementing Agency or Agencies Performance**

#### **Rating: Moderately Satisfactory**

77. INECC, IMTA, and NAFIN performed moderately satisfactorily. Procurement and other problems were experienced during the early years of implementation, leading to delays and slow disbursements. There were also coordination difficulties between IMTA, which was responsible for Component 3 and project administration in general, and INECC, which was responsible for technical coordination of Components 1 and 2. This was exacerbated by the fact that these two agencies are located in different cities (IMTA in Cuernavaca and INECC in Mexico City). However, their performance improved significantly following the change of leadership in INECC in 2013, which resulted in greater institutional commitment to the project and considerable strengthening of the project team, as well as improved coordination with IMTA.

### **(c) Justification of Rating for Overall Borrower Performance**

#### **Rating: Moderately Satisfactory**

78. Government and implementing agency commitment and performance both improved during the latter years of the project, although there were substantial initial implementation difficulties and delays, particularly on the part of INECC. Thus, overall Recipient performance is rated Moderately Satisfactory.

## **6. Lessons Learned**

79. A number of important lessons have been learned from this project including the following.

- Even with a small grant, significant accomplishments can be made with respect to the implementation of climate change adaptation measures. However, as the present project also clearly illustrates community participation (as demonstrated in the three pilot sites) is essential for the successful implementation of local adaptation measures because these communities' livelihoods in many cases rely on benefits (commercial and subsistence ones) provided by coastal wetlands, and it is important to empower and recognize community leaders and strengthen local organizations in this process.
- Complex institutional arrangements involving multiple agencies should be avoided, especially when the amount of resources is small and, thus, the activities involved may not receive high priority within one or more of these agencies. Similarly, delaying project investments, implementation, and disbursements by requiring complex prior technical studies should also be avoided in situations, as was the case with the present operation, when appropriate, if simpler, technical solutions may already be available and well known.
- The design and implementation of adaptation measures in coastal wetlands require multidisciplinary teams, including experts in social participation with a focus on gender, climate change, ecosystem conservation, and administration, as well as others who are familiar with the specific geographic areas involved. Project implementation, however, should be sufficiently flexible as to allow incorporation of measures not initially contemplated in its design (such as the palafittes and the rainwater capture system) but that would enhance its effectiveness. Likewise the incorporation of a gender focus during implementation (as it was not initially considered in project design) as cross-cutting issue in the present operation brought about great benefits. A share of project resources should be held in reserve as a contingency to finance unexpected field expenses in a timely way.
- Proposed interventions in geographic areas characterized by or subject to civil conflicts or other security risks, such as in Tamaulipas in the present case, should be carefully assessed before deciding to include them in project design. In short, given the deteriorating conditions in the country, due consideration needs to be given to security issues in project areas during preparation.
- Implementation of adaptation measures should be accompanied from the start by capacity building, both at the community level and within the various levels of public

administration involved. However, it should be recognized that both capacity building and building local ownership of adaptation measures require time and resources that may not be adequately anticipated in the initial design of the interventions in question. Community strengthening and maintenance of infrastructure investments nevertheless should continue after the initial investment project ends.

- Monitoring and evaluation of climate change adaptation measures should be viewed as longer-term activities and should likewise continue after the initial project concludes. Undertaking a cost-benefit analysis of project investments to strengthen local adaptation to climate change as part of project evaluation activities represents a good practice that should be replicated elsewhere.

## **7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners**

### **(a) Borrower/implementing agencies**

### **(b) Cofinanciers**

### **(c) Other partners and stakeholders**

## Annex 1. Project Costs and Financing

### (a) Project Cost by Component (in USD Million equivalent)

Components	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
Design of Selected Adaptation Measures and Technical Coordination of the Project	(3.0) 2.8	1.6	56.3%
Implementation of Pilot Adaptation Measures in Highly Vulnerable Wetlands	(18.5) 3.9	3.3	84.6%
Assessment of the Impacts of Climate Change on Water Resources Planning at the National Level and in Coastal Wetlands	1.0	1.0	100%
Project Management	1.0	1.2	120%
<b>Total Baseline Cost</b>	<b>(23.5) 8.7</b>	<b>7.1</b>	<b>81.6%</b>
Physical Contingencies	0.00		
Price Contingencies	0.00		
<b>Total Project Costs</b>	<b>(23.5) 8.7</b>	<b>7.1</b>	<b>81.6%</b>
Project Preparation Facility (PPF)	0.00		
Front-end fee IBRD	0.00		
<b>Total Financing Required</b>	<b>8.7</b>	<b>7.1</b>	<b>81.6%</b>

\* Actual disbursement and percentage estimates after internal reallocation of grant proceeds. These amounts exclude CONAGUA and PEMEX contributions included as project costs and financing in the PAD since in practice these expenses were totally independent of the project and were executed before project effectiveness. For reference, the PAD's initial project costs (including the PEMEX and CONAGUA) are reflected in parenthesis ( ) in the table above.

### (b) Financing

Source of Funds	Type of Cofinancing	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
CONAGUA/PEMEX (baseline activities)	Investments	15.35 (0)	15.35 (0)	100 (MA)
Global Environment Facility (GEF)	Grant	4.50	4.20	93.4
NAWCA (US)	Grant	0.769	0.00	0.00
JAPAN: Ministry of Finance – PHRD	Grant	0.545	0.51	95.4

Source of Funds	Type of Cofinancing	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
JAPAN -- Other financing	Grant	0.54	0.54	100.0
Borrower (INECC & IMTA)	In kind	1.79	1.79	100.0
<b>Total Financing</b>		23.5 (8.15)	22.4 (7.05)	95.3 (*6.5)

In terms of co-financing, the Government of Japan, through its Policy and Human Resources Development (PHRD) Trust Fund, provided US\$ 0.51 million in 2007 to support project preparation (Grant TF090326). The PHRD Grant helped the Recipient to assess in general terms the key threats and vulnerabilities to climate change in four coastal wetlands identified as potential pilot sites for the project. This grant also served to inform GoM about the possible development of adaptation strategies that could be developed in the Gulf of Mexico.

In addition, there was financial assistance from the Japanese Government through the Meteorological Research Institute (MRI) on the order of US\$ 0.35 million and from the Japan Aerospace Exploration Agency (JAXA) on the order of US\$ 0.19 million to undertake hydrological monitoring, which concluded in 2012.

The proposed collaboration with the North American Wetlands Conservation Act (NAWCA) to Ducks Unlimited of México, A.C. did not materialize. This grant for US\$ 0.77 million was intended to support the restoration of critical habitats for aquatic migratory birds through adaptation measures to climatic variability in the Gulf of Mexico.

In terms of borrower contribution resources were channeled through PEMEX's Environmental Protection Strategy for 2008-2009 for US\$ 0.35 million which served to develop the baseline for the wetlands in Alvarado, and US\$ 15 million from CONAGUA for improvements in water quality in the pilot sites. Both activities concluded in 2008 and 2009 respectively (before project effectiveness). Lastly, the in kind contributions (infrastructure and human resources) from INE (now INECC) for US\$ 1.25 million, and from IMTA for US\$ 0.54 million were reportedly fully met.

Other than for the PHRD and GEF Grants, the Bank did not have direct oversight of the implementation of the complementary co-financing resources.

## **Annex 2. Outputs by Component**

The project had four components, including Project Management. The outputs of the other three components are summarized below.

### ***Component 1. Design of Selected Adaptation Measures and Technical Coordination of the Project***

Sustainability strategies for the three (reduced from four) pilot adaptation sites were fully completed. Each one contains an environmental action plan and strategies for the continuation of key activities.

Additional actions completed include: (i) the design and repopulation of coral reefs in the Sian Ka'an Biosphere Reserve (Quintana Roo); (ii) design of adaptation measures in Tabasco in El Golpe primera sección, El Golpe segunda sección, las Coloradas and el Mingo; (iii) design of adaptation measures in Veracruz in the private conservation area of el Pájaro and in the Tarachi communal farm (*Ejido*); (iv) rehabilitation of hydraulic flow in El Playón (Quintana Roo); (v) reforestation and desilting in Tabasco in el Mingo and el Golpe segunda sección and Veracruz in the private conservation area of el Pájaro; (vi) design of palafittes in Tabasco in el Mingo; and (vii) design of rainwater capture system and water treatment plant in Las Coloradas in Tabasco.

Management Plans for wildlife conservation and sustainable utilization units (UMAs) in mangrove ecosystems in the Tarachi *ejido* in Veracruz, and in el Golpe primera sección in Tabasco were likewise developed, although the registration of the UMA was still pending due to the lack of a registration certificate for the *ejido* assembly.

### ***Component 2. Implementation of Pilot Adaptation Measures in Highly Vulnerable Wetlands***

This component included actions in pilot areas in three different Gulf Coast States. Project outputs in each one are briefly described below.

For the Wetlands of the Papaloapan Rivershed, Alvarado Lagoon (Veracruz), two land use plans and a revised Protected Area management program that includes climate change adaptation measures have been completed. The adaptation measures include construction protocols, evacuation routes in the case of flooding, protocols for the continual cleaning and desilting of key water courses. These plans have been presented to and discussed with key stakeholders and at least one land use plan has been submitted to the pertinent authorities for approval and is supported by both local and state authorities.

For the same area, reforestation of 25 hectares of mangroves has been completed and 5 ha of riparian zones have been restored. Three kilometers of infrastructure for cleaning waterflux have also been installed as have mareographic and meteorological stations,

which are in full operation. In addition, in order to further strengthen capacities for adaptation to climate change in at least one location, field visits and nineteen workshops have been undertaken, including two on diagnostics, two presentations on adaptation measures.

A working group was also established between the federal, state, and local level with support from the local population as well as involvement of the private sector to approve a proposal of local land zoning plan (OET) for the municipality of Alvarado. The consultants played a key role in this activity, as they were seeking the compliance with the Mexican regulations on this regard, in which the participation of the abovementioned stakeholders is a requirement.

The OET has been updated with the inclusion of climate change adaptation measures such as the identification of areas of risk for flooding, evacuation routes, and areas where specific adaptation measures (e.g., reforestation, rehabilitation of water flows, etc.) should be implemented. However, state government approval of this plan was still pending at the time the project closed.

In addition, 25 ha of mangroves were reforested and 5 ha of riparian zones were restored at this location, a system for capturing rainwater and a water treatment plant, including a fence for protection of the equipment, were completed, while cleaning, desilting, and rehabilitation of 3 km of water fluxes has likewise been finished. The mareographic and meteorological stations have also been installed and are fully operational, two stilt (or palafitte) houses have been constructed, and the radio and communications equipment and antennas for an early warning system have been installed and are operating in three local communities.

Also in Tabasco in el Golpe Segunda sección finally, the management plan for Wildlife Conservation, Management, and Sustainable Utilization Unit (UMA) for the mangrove ecosystems has been completed. However, at the time of project closing, registry of the UMA was still pending due to the lack of a registration certificate for the *ejido* assembly. Local capacities have also been strengthened for climate change adaptation through field visits conducted by consultants, representatives of INECC as well as other governmental institutions and 57 workshops similar to those carried out in Veracruz were conducted. As also occurred there, an inter-governmental working group has likewise been established and support from the local population obtained through its involvement and inclusion along the whole process by the consultants that were working in the community.

For the Sian Ka'an Biosphere Reserve (Quintana Roo), the monitoring protocol has been developed, mareographic and meteorological instruments have been installed and are operating, and oceanographic equipment has been acquired, but its donation to CONANP was pending at the time of project closing. The Protected Area Management Plan for the Reserve was revised to include climate change adaptation measures, including identification of areas vulnerable to climate change, strategies to minimize its impacts on key ecosystems, identification of economic activities that could be developed in the area taking climate change considerations into account, among other actions.



Other project outputs in this Reserve include the repopulation of six locations, comprising some 3,500 square meters, with temperature-resistant coral genotypes, rehabilitation of 100 ha of water fluxes and the unclogging of 6 sewers that will permit improved hydrological flow in the El Playón mangrove area. Local capacity for adaptation to climate change has also been strengthened through the same types of activities (i.e., field trips, workshops, establishment of working groups) implemented in the other two pilot areas.

According to the PAD (para. 36, pg. 12), four other areas would serve as potential substitutes, if needed, for the pilot areas identified above: (i) Rio San Fernando-Laguna La Nacha in Tamaulipas; (ii) Rio Coatzacoalcos (Uxpanapan-Laguna El Colorado) in Veracruz; (iii) Cancún (Laguna Nichupte-Nizuc) in Quintana Roo; and (iv) Sistema los Petenes in Campeche. If necessary, selection of a substitute area was to be done in prior agreement with the Bank after carrying out the relevant assessments required by Bank policy and based on a detailed implementation plan satisfactory to the Bank.

### ***Component 3. Assessment of the Impacts of Climate Change on Water Resources Planning at the National Level and in Coastal Wetlands***

To implement this component, IMTA has generated the following outputs:

- An agreement through the Secretary of the Navy (SEMAR) in order to obtain SPOT satellite images and data to monitor changes in the natural resources (deforestation) and hydrological variations;
- Development of a GIS manual;
- Updated the five Climate Change scenarios;
- Three hydrological impact scenarios for national water resource management that include adaptation and emergency response measures to these scenarios; Hydraulic models of data with climate variables and scenarios for each of the pilot watershed were developed;
- Reports on lost temporal and spatial data in the pilot watersheds;
- Updated key data on climate change impacts on the hydrological cycle of the three pilot sites;
- Geo-referenced database containing climate change scenarios for the initial four pilot sites of the project, with the intent that specific adaptation measures be developed and that the methodology be eventually applied to other areas in the country; Analysis of potential options to minimize long-term impacts of climate change in key pilot sites (Carmen Pajonal Machona, Laguna de Alvarado and Natural Reserve of Sian Ka'an and Nationwide assessment of the effects of climate change on surface runoff.

### Annex 3. Economic and Financial Analysis (including assumptions in the analysis)

According to the PAD (para. 63, pg. 21), due to the long-term nature of the project with its focus on integrating climate change considerations into the management of vulnerable coastal ecosystems, it was difficult to identify one quantitative indicator that would best reflect project outcomes. However, project preparation reportedly followed procedures recommended by the GEF for biodiversity operations (i.e. cost-effectiveness analysis) under such circumstances by assessing various alternatives “best suited to achieve the project’s development objectives.” In addition, it was affirmed that the project’s focus on conservation and strengthening the resilience of the endangered ecosystems involved would also benefit “the sectors that depend upon functioning ecosystems such as tourism, fisheries, biodiversity, and coastal protection” and that its coordination with CONAGUA in the pilot areas would help “to address the overarching issues that affect these ecosystems.” However, these benefits were not quantified.

During project implementation, a cost-benefit analysis was carried out on mangrove reforestation with native species in two of the pilot demonstration areas (Tabasco and Veracruz). The results of this analysis, which was undertaken by INECC’s Direction of Natural Resources Economics in November 2015 indicated that the benefits were higher than the associated costs for these measures. This analysis was presented to the Bank, NAFIN, IMTA, INECC, and SEMARNAT in June 2016. At the time of project closing the associated report was being disseminated and is expected to serve as the basis for replication efforts.

The costs involved in the reforestation activities in Tabasco and Veracruz that were the subject of this cost-benefit analysis represent significant shares of the total adaptation costs under the project in these two pilot areas, particularly in the case of Veracruz. The main adaptation interventions and their respective costs in each site are indicated in the table below. In addition, the adaptation activities in Quintana Roo and their respective costs were: (i) repopulation of coral reefs with temperature-resistant coral genotypes in the Sian Ka’an Biosphere Reserve – US\$ 100,596; and (ii) rehabilitation of the hydraulic flow to enhance the natural rehabilitation of the mangrove ecosystem of El Playón – US\$ 163,888.

Pilot Site	Adaptation Measure	Cost (US\$)	Percentage of Total
Tabasco	Rainwater capture system and water potabilization plant in Las Coloradas	91,387	25.6
	Establishment of palafittes in El Mingo, Cárdenas Municipality	148,515	41.6
	Reforestation of mangroves and restoration of riparian zones and distilling water fluxes in el Mingo and Golpe, Cárdenas Municipality	117,344	<b>32.8</b>
Veracruz	Management of the Conservation and Sustainable Utilization Unit (UMA) for the mangrove in the		

Pilot Site	Adaptation Measure	Cost (US\$)	Percentage of Total
	<i>ejido</i> El Tarachi, Acula Municipality	25,376	4.8
	Local land zoning plan including climate change adaptation measures for Alvarado Municipality	168,683	32.1
	Reforestation of 25 ha of mangroves and restoration of 5 ha of riparian zones in the private conservation area “El Pajaro,” Tlacotalpan Municipality	330,880	<b>63.0</b>

For this analysis, direct and indirect project benefits included estimates of the value of the environmental services provided by mangrove reforestation in terms of: (i) improved quantity and quality, including purification, of water; (ii) improved habitat for fish species; and (iii) increased forest products. Other benefits provided by intact and/or fully restored mangroves that could not be quantified in monetary terms include coastal protection against floods and erosion, carbon capture, use as species habitat, and possible aesthetic and recreation value.

The direct and indirect costs involved in the two pilot subprojects, in turn, included: (i) diagnostic studies of the zone (Rio Papaloapan- Laguna de Alvarado) or equipment rental (Sistema Lagunar Carmen-Pajonal-Machona); (ii) land preparation; (iii) production material; (iv) planting; (v) technical assistance; (vi) monitoring; and (vii) opportunity cost of the land use, in this case as pasture land for cattle. The time horizon considered for the flow of costs and benefits was 35 years<sup>17</sup> and the time for maturation of the mangrove was 8.5 years,<sup>18</sup> at which point the benefits were expected to start flowing. The area involved in both subprojects was 25 hectares, and the survival rate of the mangrove was 90% (Rio Papaloapan-Laguna de Alvarado) or 75% (Sistema Lagunar Carmen-Pajonal-Machona).<sup>19</sup> Two basic discount rates were used, 4% and 10%.<sup>20</sup>

The values of the estimated benefits and investment costs for the two systems assessed are listed in Table 3.1 below expressed in Mexican pesos of 2014. Clearly, the main benefits that can be quantitatively estimated are derived from the subprojects’ impacts with respect to water quantity and quality and secondarily from their effects in terms of fish habitats.

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<sup>17</sup> This is the period for the natural life of mangroves as observed in an earlier study for mangroves in Tabasco. See Dominguez-Dominguez M., J. Zavala-Cruz, P. Martínez-Zurimendi, *Menejo Forestal Sustentable de los Manglares de Tabasco*, Secretaria de Recursos Naturales y Protección Ambiental, Colegio de Postgraduados. Villahermosa, Tabasco, Mexico, 2011.

<sup>18</sup> This figure is an average of the period of time when mangroves in the regions were observed to reach full maturity – i.e., 7 to 10 years.

<sup>19</sup> This rate refers to the expected rate of survival of the reforested mangrove area, and, thus, the actual area that is expected to provide the estimated benefits. The survival rates applied for each of the two mangrove areas reforested by the project reflect the observed experience elsewhere in the respective coastal regions.

<sup>20</sup> The 10% discount rate is that used by SHCP for the analysis of investment projects generally. The lower 4% rate is that being applied to other climate change adaptation measures that are intended to benefit future generations as well as the present one.

Table 3.1 Estimated Benefits and Costs of Mangrove Reforestation in Project Pilot Areas

Variable	Rio Papaloapan-Laguna de Alvarado	Sistema Lagunar Carmen-Pajonal-Machona
<b>Benefits – Environmental Services<sup>21</sup></b>		
Water Quantity and Quality	\$50,866 pesos/ha/year	\$50,866 pesos/ha/year
Improved Fisheries Habitat	\$20,031 pesos/ha/year	\$20,031 pesos/ha/year
Forest Products	\$98 pesos/ha/year	\$98 pesos/ha/year
<b>Costs</b>		
Diagnostic Studies	\$260,000 pesos	NA
Equipment Rental	NA	\$71,000 pesos
Land Preparation	\$900,000 pesos	\$ 360,000 pesos
Production Material	\$7,350 pesos	\$ 7,350 pesos
Planting	\$527,500 pesos	\$ 406,000 pesos
Technical Assistance	\$40,000 pesos	\$ 370,000 pesos
Monitoring	\$1,130,000 pesos	\$ 100,000 pesos
Opportunity Cost – use as pasture	\$1,791 pesos/ha/year	\$ 1,791 pesos/ha/year

The results of the analysis in terms of net present value (NPV) using discount rates of 4% and 10%, as well as an average of the two (i.e.,7%), are presented in Table 3.2 below, keeping in mind that most of the costs, except the opportunity cost of the alternate use of the area reforested as pasture land, which applies throughout the 35 year anticipated life of the investment, occur during the first two years of the project life and that the benefits that can be estimated exclude those which cannot be readily quantified and, thus, likely underestimate actual total project benefits.

Table 3.2 Net Present Value Estimates for Mangrove Reforestation Projects (millions of pesos)

Project/NPV	4% Discount Rate	10% Discount Rate	7% Discount Rate
Rio Papaloapan	\$20.9	\$5.6	\$13.2
Sistema Lagunar	\$18.3	\$5.6	\$11.9

In summary, the figures generated by this analysis were positive for all three discount rates, including the higher 10% rate used by the SHCP to assess regular investments. The higher NPV for the Rio Papaloapan site at the lower discount rate is attributed to the greater expected survival rate of the reforested mangrove at that site (90% versus 75% at the Sistema Lagunar site), even though its initial investment costs were higher.

<sup>21</sup> These figures are based on a 2011 study for Mexico with the values updated to 2014.

## Annex 4. Bank Lending and Implementation Support/Supervision Processes

### (a) Task Team members

Names	Title	Unit	Responsibility/ Specialty
<b>Lending</b>			
Walter Vergara	Lead Environmental Specialist		TTL
Alejandro M. Deeb	Consultant	GEN04	
Alfred H Grunwaldt	E T Consultant	LCSSEN - HIS	
Seraphine Marie Haeussling	E T Consultant	LCSSEN - HIS	
Alonso Zarzar Casis	Sr. Social Specialist	GSU04	Safeguards Specialist
Efraim Jimenez	Consultant	OFSPF	Procurement
Daniel J. Boyce	Practice Manager	GGO22	Financial Management
Jorge Luis Alva-Lup	Senior Counsel	LEGES	
Ricardo Hernandez	Sr. Environmental Specialist	LCSSEN	
Keiko Ashida Tao	Environmental Specialist	GEN04	
Victor Manuel Ordonez	Sr. Finance Officer		
<b>Supervision/ICR</b>			
Beatriz Eugenia Gonzalez	Team Assistant	LCC1C	
Daniel Mira-Salama	Sr. Environmental Specialist	GEN01	TTL
Javier Zuleta	Sr. Water Resources Mgmt. Specialist	GWA03	TTL
Renan Alberto Poveda	Sr. Environmental Specialist	GEN04	TTL
Hector Alexander S.	Water Resources Mgmt. Specialist	GWA03	
Keiko Ashida Tao	Environment Specialist	GEN04	
Gabriel Penalzoa	Sr. Procurement Specialist	GGO04	Procurement
Dimitri Gourfinkel	Sr. Financial Management Specialist	GGO22	Financial Management
Luz A. Zeron	Sr. Financial Management Specialist	GGO22	Financial Management
Luis Barajas Gonzalez	Financial Management Specialist	GGO22	Financial Management
Alonso Zarzar Casis	Sr. Social Scientist	GSU04	Safeguards
Adrian Pedrozo Acuna	Consultant	GENDR	
Dora Patricia Andrade	Consultant	GEN04	Safeguards
Katharina Siegmann	Environmental Specialist	GEN04	
Nadya Selene Alencastro Larios	Consultant	GSU10	
Diana Gabriela Jimenez	Program Assistant	LCC1C	
Nancy Montes de Oca	Program Assistant	LCC1C	
John Redwood III	Consultant – ICR	GEN04	Principal Author

**(b) Staff Time and Cost**

Stage of Project Cycle	Staff Time and Cost (Bank Budget and GEF Fees)	
	No. of staff weeks	USD Thousands (including travel and consultant costs)
<b>Lending</b>		
<b>FY06</b>	0.45	1.57
<b>FY07</b>	10.93	82.10
<b>FY08</b>	23.24	100.17
<b>FY09</b>	8.31	94.59
<b>FY10</b>	5.30	45.29
<b>FY11</b>	6.37	27.91
<b>Total:</b>	<b>54.60</b>	<b>351.63</b>
<b>Supervision/ICR</b>		
<b>FY12</b>	10.50	33.55
<b>FY13</b>	15.46	54.22
<b>FY14</b>	24.22	76.63
<b>FY15</b>	7.69	43.44
<b>FY16</b>	9.01	54.01
<b>FY17</b>	13.26	59.89
<b>Total:</b>	<b>80.14</b>	<b>321.737</b>
<b>Total:</b>	<b>134.74</b>	<b>673.36</b>

## Annex 5. Beneficiary Survey Results

(if any)

The results of the surveys carried out in multiple workshops reflect that the project was perceived differently in each of the intervened communities as well as their impacts. Taking into account that this study was undertaken through representative samples to the entire adult population of each community (i.e. not only was focusing on project beneficiaries), it provided information on the transcendence the project had for the whole community.

Below are some of the conclusions:

- *Punta Allen, Quintana Roo*: This site is where the project and the adaptation measures to climate change were less known among the inhabitants of the community. Those who had knowledge about it, had this knowledge due to its technical benefits instead of the organizational ones.
- *Veracruz*: Taking into account that the communities in this site are relatively small there was a greater involvement of the community in the project, but more focused on technical issues than in participatory process.
- *Tabasco*: In the communities of this site (namely in el Golpe Primera Sección, el Mingo and Las Coloradas), a participatory process was observed with the highest level of involvement among inhabitants (out of the three intervened sites), with strong social awareness and knowledge about climate change and the importance of the adaptive measures.

It is important to highlight that taking this survey as a starting point to assess the participation of the different stakeholders helped to identify the different project leaders; coordinators, local leaders and consultants among others, and in turn recognize the aptitudes and opportunities of improvement as well as for knowledge sharing, experiences and the lessons learned of each activity.

Contrasting the last survey with earlier ones allowed to identify a higher knowledge and understanding on climate change issues in all the communities intervened (although Veracruz was the site with lesser increase in knowledge). It is important to note that TV was selected as the key media through which the communities learned the most. Thus it may be necessary to conduct further studies to clarify whether the increased knowledge was a result of the project or external media.

When assessing the responses of the surveys, the following aspects were noticed: (i) organization was a key element in order to succeed in project activities (this point was highlighted in Tabasco); (ii) the project is seen as a source of technical knowledge; (iii) Project activities have been key in order to keep the rivers and channels in wetlands clean, the mangroves healthy, rain water collection systems operating, among others. All the above mentioned activities are perceived with a high potential to be replicated.

## **Annex 6. Stakeholder Workshop Report and Results**

(if any)

Through this project, the inhabitants of the communities (where the activities were undertaken) developed and enhanced their overall knowledge on climate change (CC), including not only those related to actions to be developed under different CC scenarios but also their overall capacity to implement adaptation measures.

The workshops facilitated the appropriation and understanding of CC and adaptation measures by the society including public and private sector, academia and inhabitants not associated directly to the project. It was clear that CC is a natural phenomenon that is being accelerated by humans, and there are specific geographical zones which are more vulnerable to climate impacts. Thus, specific measures are needed to be put in place in order to face potential challenges, and where stakeholder or society as a whole plays a key role through the implementation of integrative measures.

The workshop reports highlight how communities experienced an ongoing capacity building process associated to different aspects of CC, in which they participated for the constant awareness they were continuously acquiring, which generated a deep engagement in the community. At the time of writing this report communities are still requesting the continuation of the trainings/capacity building workshops.

Furthermore, the workshops allowed the incorporation and appropriation of the necessary tools needed to ensure the correct operation and maintenance of the adaptation measures including the stilts; the communal enterprises such as “*Gotita de Amor*”; reforestation activities; and disilting of channels in the wetlands. Moreover, the new capacities and organizational abilities developed through the workshops allowed the creation of working groups (integrated by representatives of the 3 levels of government and communities and private sector) which played a key role in contributing to the design of risks maps, formulation of the local land zoning plans (with a focus on CC). These groups today are of paramount importance in providing continuity to the activities initiated.

The workshops also allowed for the reconstruction of social trust in governmental institutions while promoting unity among the inhabitants. In addition, they strengthened the link between consultants and communities, enabling the transformation of the pilot sites into new spaces for knowledge sharing and exchange. In fact, the workshops became a space for reflection, communication and joint problem solving to the challenges that communities are constantly facing.



## Annex 7. Summary of Borrower's ICR and/or Comments on Draft ICR



# Proyecto de Adaptación de Humedales Costeros del Golfo de México ante los Impactos del Cambio Climático (TF-096681)

## Resumen Ejecutivo del Implementation Completion and Results Report (ICR)

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**Instituto Nacional de Ecología y Cambio Climático**

Abril de 2017, Ciudad de México

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Jefe de Departamento de Gestión Institucional en Adaptación

## **Consultores INECC – Banco Mundial**

### **Mtra. María Patricia Arendar Lerner**

Consultora de Apoyo a la Coordinación General del Proyecto

### **Mtra. Alejandra Tenorio Peña**

Consultora de Gestión Administrativa del Proyecto

#### **1. Principales resultados del proyecto**

- Aumentó la capacidad y el conocimiento del Gobierno de México para implementar medidas de adaptación que disminuyan la vulnerabilidad de comunidades costeras al cambio climático.
- El INECC adquirió aprendizajes, capacidades y habilidades en diseño, desarrollo e implementación de medidas de adaptación, lo cual refuerza su liderazgo y capacidad de gestión en el tema. Desarrolló innovadoras metodologías, estrategias y elaboró documentos fundamentales para replicar medidas de adaptación en comunidades vulnerables al cambio climático.
- Se consolidaron vínculos con actores clave -dependencias gubernamentales, instituciones académicas, centros de investigación, organizaciones de la sociedad civil, sector privado- y se fomentó la confluencia de instituciones federales, estatales y municipales en los tres sitios piloto.
- Se logró credibilidad y reconocimiento del impacto del proyecto, tanto a nivel nacional como internacional, mediante la vinculación interinstitucional y la difusión.
- Se cuenta con una sólida base científica, producto de estudios y propuestas de medidas de adaptación, para la toma de decisiones.
- Se constató la importancia y pertinencia de adoptar estrategias de adaptación basadas en ecosistemas para reducir la vulnerabilidad al cambio climático mediante la conservación y restauración de humedales.
- Se comprobaron en campo las técnicas más exitosas para reforestación de manglar e incrementó el conocimiento técnico y científico para repoblamiento de coral con ejemplares resistente a altas temperaturas.
- Se fortaleció la operación de la Red Mareográfica Nacional y el conocimiento que el país requiere en torno al comportamiento del mar y del clima en los tres sitios piloto.
- Se promovieron acciones de cooperación y colaboración internacionales –participación de consultores de otros países; Encuentro Internacional sobre Adaptación basada en Ecosistemas.
- Se promovió la sinergia de las medidas de adaptación con otros temas de capacitación – desazolve de canales con manejo de residuos, salud y seguridad alimentaria.
- Con el trabajo constante con las comunidades se logró su participación en todas las fases del proyecto, así como la apropiación y mantenimiento de las medidas de adaptación y la incorporación del lenguaje de cambio climático en sus vidas cotidianas.
- Se restableció la confianza social en procesos de cambio, surgieron nuevos liderazgos y las comunidades incrementaron su capacidad adaptativa.
- Se constató la importancia de utilizar el enfoque de género para desarrollar un proyecto incluyente, generar nuevos liderazgos y promover cambios en la distribución de poderes y el empoderamiento de mujeres y hombres; así como para conocer cómo se da el acceso y control de los

- recursos, los tipos de vulnerabilidades y necesidades e intereses diferenciados presentes en las comunidades.
- Se avanzó en el cumplimiento de metas internacionales y nacionales.

#### **i) Internacionales**

- Contribución Determinada a Nivel Nacional de México (NDC por sus siglas en inglés), con la aplicación del enfoque de Adaptación basada en Ecosistemas.
- Metas de Aichi del Convenio de Diversidad Biológica (CDB): 1, 5, 10, 14 y 15.
- Objetivos de Desarrollo Sostenible (ODS): 6, 7, 8, 13 y 15.
- Convención Ramsar: Laguna de Alvarado y Reserva de la Biosfera de Sian Ka'an.

#### **ii) Nacionales**

##### **Plan Nacional de Desarrollo 2013-2018**

*México Próspero:* salvaguardar los bienes de la población frente a desastres (palafitos, Planes de Emergencia); impulsar el desarrollo de emprendedores (Gotita de Amor); impulsar el aprovechamiento sustentable de los recursos del país (UMA).

*México incluyente:* alimentación y nutrición adecuada para mexicanos en situación de pobreza (huerto escolar, bebederos); generar esquemas de desarrollo comunitario con participación social; invertir en proyectos de infraestructura básica y realizar acciones de protección y mejora en la salud de la población (Gotita de Amor).

Se promovió como línea transversal la igualdad de género.

##### **Programa Especial de Cambio Climático (PECC) 2014-2018**

**Objetivos:** reducir la vulnerabilidad de la población ante el cambio climático; conservar y proteger los ecosistemas y los servicios ambientales; modernizar las estaciones mareográficas y meteorológicas; proveer sistemas de captación de agua de lluvia, promover el establecimiento de comités de protección civil; promover la conservación, protección y restauración de ecosistemas terrestres, costeros y marinos.

## **2. Desempeño de diferentes agencias y del Banco Mundial**

### **I. Banco Mundial**

- a) Fase de diseño del proyecto: 2011-mediados de 2013. Evaluación: Poco satisfactorio (6). El diseño original del proyecto incluía áreas demasiado grandes para reforestar, metas imposibles de alcanzar, la construcción de infraestructura dura, sin un análisis de los posibles efectos sobre el ambiente.
- b) Supervisión del proyecto: mediados de 2013-cierre del proyecto. Evaluación: Altamente satisfactorio (9). Durante dicho periodo, la supervisión y gestión del proyecto fue muy buena, expedita y con un alto nivel de compromiso.
- c) Desempeño general. Evaluación: Moderado a altamente satisfactorio (8). A pesar de que en un inicio el diseño del proyecto no fue el óptimo, después del nombramiento de Renán Poveda como gerente, se constata que la supervisión, gestión y apoyo en la solución de imprevistos fue muy buena.

### **II. Socios del proyecto**

- a) Comportamiento gubernamental. Evaluación: Moderado a altamente satisfactorio (8)
  - Comisión Nacional de Áreas Naturales Protegidas (CONANP): Evaluación: Moderadamente satisfactorio (7). La coordinación con la CONANP presentó los siguientes problemas: i) dificultades para concretar visitas de supervisión a la Reserva de la Biosfera Sian Ka'an; ii) para trabajar con las

comunidades se requería la presencia y acompañamiento del personal del ANP; y, iii) la revisión de informes fue lenta.

- Comisión Nacional del Agua (CONAGUA): Evaluación: Moderadamente satisfactorio (7). La CONAGUA no se involucró de lleno en el proyecto y no gestionó el trabajo con las agencias locales ni con los Comités de Cuenca.
- Nacional Financiera (NAFIN): Evaluación: Altamente satisfactorio (10). La gestión de los proyectos fue siempre muy eficiente y las propuestas de solución ante eventualidades administrativas, financieras y de gestión siempre fueron propositivas y lograron desatorar procesos.
- Secretaría de Hacienda y Crédito Público (SHCP). Evaluación: Altamente satisfactorio (10). Las gestiones de la SHCP fueron muy buenas para la obtención del recurso de la donación.

### **III. Comportamiento de las agencias implementadoras**

a) Instituto Mexicano de Tecnología del Agua (IMTA) ® Evaluación Global: 8.

- Evaluación de mediados de 2013 a finales de 2014: Moderadamente satisfactorio (7). Durante ese periodo, la colaboración y coordinación con el IMTA fue muy deficiente.
- Evaluación del 2014 al cierre del proyecto: De moderado a altamente satisfactorio (8). La colaboración y coordinación mejoró notablemente.

En general el proceso de contratación fue muy lento. La revisión de TDR era un proceso demasiado largo. No obstante, una vez contratadas las consultorías y servicios de no consultoría, la administración de los mismos se realizó de manera eficiente.

### **IV. Justificación General del comportamiento de los socios del proyecto**

Evaluación General: entre moderado y altamente satisfactorio (8). A lo largo del desarrollo del proyecto y en sus distintas etapas de administración y gestión se observaron cambios en la eficiencia y coordinación con las distintas dependencias, mismos que fueron resultado de un esfuerzo conjunto por reducir los tiempos administrativos. La participación e intervención de la Directora General del INECC quien dio seguimiento cercano al desarrollo del proyecto fue clave para destrabar obstáculos y realizar gestiones al más alto nivel. El desempeño del equipo de implementación en el INECC y de los consultores externos fue creativo, comprometido y muy satisfactorio.

### **3. Principales lecciones aprendidas**

- Es necesario trabajar con las comunidades en opciones económicas que respondan a la vocación ambiental del lugar; al grado de organización adquirida y fortalecida con el proyecto; y capacitarlas para que puedan acceder, tramitar, conseguir subsidios o financiamiento que les permita asegurar el mantenimiento de las medidas de adaptación implementadas.
- La implementación de medidas de adaptación requiere de equipos multidisciplinarios -con especialistas en participación social, derechos humanos y género, biólogos, ingenieros y especialistas dependiendo de la medida de adaptación de que se trate-, que trabajen constantemente en gabinete y campo más allá de la duración del proyecto.
- La participación social y el enfoque de género no deben ser anexos a cumplir en los proyectos, deben incorporarse desde el inicio del desarrollo de las medidas de adaptación.
- Es necesario que algunas medidas den beneficios -ambientales, económicos, sociales, en salud-tangibles a las comunidades en el corto plazo, pues aquellas cuyos beneficios son de más largo plazo son difíciles de asimilar por las comunidades que ven el futuro como incierto y lejano.



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- Las medidas de adaptación deben ser sustentables en el tiempo, de baja inversión, con tecnologías fáciles de operar, aceptadas culturalmente por los usuarios, replicables en otras comunidades, que promuevan un sólido aprendizaje social, así como nuevas habilidades y capacidades adaptativas locales.
- Existen periodos específicos del año para algunas acciones como la reforestación de manglar y desazolve, razón por la cual es fundamental reducir los procesos y tiempos administrativos que se requieren para la aprobación de los proyectos a fin de que los recursos se obtengan en tiempo.
- Aprovechar las fortalezas de las dependencias asociadas al proyecto con el fin de atender de manera integral los problemas que señalan las comunidades -servicios de agua intermitentes, contaminación de la laguna y ríos- es una estrategia muy útil para reconstituir la confianza social de las comunidades en las instituciones y para darle credibilidad a un proyecto.
- Desarrollar alianzas estratégicas para resolver situaciones que no estaban contempladas en los proyectos permitió avanzar exitosamente en el cumplimiento de los objetivos.
- El proyecto logró un involucramiento generacional creativo y lúdico al desarrollar actividades de educación ambiental -huerto escolar y murales- con participación de maestros, alumnos, padres de familia y personas de la comunidad.
- Los tiempos de gestión y ejecución de los proyectos no son los mismos que los requeridos para observar el impacto de medidas de Adaptación basada en Ecosistemas como la reforestación de manglar o repoblamiento de coral.
- En enfoque integral y territorial en la implementación de medidas de adaptación genera sinergias entre las medidas –UMA, reforestación de manglar y desazolve de canales, turismo ecológico, captación de agua de lluvia-, que potencian la intervención del proyecto en el territorio y fortalecen la organización comunitaria y la formación de redes -red de mangleros, compra y distribución de agua de lluvia en varias comunidades, red de prestadores de servicios turísticos, entre otros.
- Para que las comunidades logren la sostenibilidad de las medidas de adaptación implementadas deben actuar de forma coordinada y trabajar en torno a la conformación de redes (red de mangleros).
- El haber solicitado a los consultores el utilizar el método de aprender haciendo no sólo permitió que se adquirieran nuevas habilidades, sino que generó un proceso de empoderamiento y construcción colectiva de conocimientos y apropiación de nuevas técnicas.
- El proyecto fue para el INECC, consultores y comunidades un camino de doble vía, donde todas y todos aprendieron en la ejecución del mismo.
- Realizar diagnósticos participativos con enfoque de género al inicio del proyecto permite generar espacios en los cuales las personas de las comunidades se sienten escuchadas y consideradas en la búsqueda de soluciones y estrategias para resolver sus problemáticas cotidianas.
- La aplicación de evaluaciones participativas al finalizar la ejecución de las medidas de adaptación fue un ejercicio novedoso tanto para consultores como para las comunidades. Brindaron información de primera mano para entender el sentir de los participantes en el proyecto con respecto a los consultores y para conocer el grado de involucramiento de las comunidades en el proyecto.
- Con la realización de talleres con perspectiva de género se logró la integración de los grupos comunitarios, detonar procesos de planeación participativa, la formación y fortalecimiento de promotoras y promotores comunitarios comprometidos con la conservación del manglar, manejo de la basura, higiene y salud ambiental.

- El monitoreo y seguimiento continuo del proyecto permite resolver, atender los conflictos y escuchar las demandas de consultores y comunidades. Las visitas de campo brindaron información sobre la vida cotidiana de las comunidades, el acceso y la frecuencia con que reciben los servicios básicos (electricidad, agua y saneamiento), los problemas ambientales, de seguridad, etc. que
- padecen y permitió restituir la confianza social y en las instituciones, resolver los conflictos y atender las propuestas de las comunidades en relación a las medidas.
- Es fundamental respetar los liderazgos comunitarios representados por los Delegados Municipales; ellos son la puerta de entrada a las comunidades y la garantía del involucramiento de las comunidades en los trabajos que se tiene planeado realizar.
- Es prioritario que la institución ejecutora contemple un presupuesto para dar seguimiento a las acciones una vez concluido el proyecto. Ello permitirá obtener información muy valiosa sobre el impacto de las medidas implementadas, comprobar la pertinencia de las medidas desarrolladas, monitorear el éxito o fracaso de las técnicas utilizadas.

#### **4. Principales obstáculos y cómo se resolvieron**

##### **a) Cambios en el diseño original del proyecto**

El diseño original se modificó, en primer lugar, porque planteaba la construcción de infraestructura dura que es lo opuesto al enfoque de Adaptación basada en Ecosistemas, y en segundo porque algunas metas eran imposibles de alcanzar. A mediados del 2013 hubo un cambio en la coordinación del proyecto al interior del INECC razón por la cual el tiempo para la ejecución de las medidas de adaptación fue escaso.

**Solución:** se rediseñó el proyecto para incluir medidas de Adaptación basada en Ecosistemas, se ajustaron las metas, influyendo lo menos posible en los desembolsos, y se ajustaron los indicadores. La solicitud y autorización de una prórroga del proyecto por un año, hasta octubre de 2016, permitió concluir todas las actividades, dejar establecidos comités de operación y mantenimiento de las medidas, y vincularse con dependencias para dar seguimiento a las medidas implementadas.

##### **b) Cancelación de un sitio piloto**

De 2012 a julio de 2013 no fue posible concretar la firma del instrumento legal con el R. Ayuntamiento de Tampico, Tamaulipas, a pesar de que el INECC en reiteradas ocasiones trató de concretar su firma. Sumado a ello en Tamaulipas existían y existen constantes y crecientes problemas de inseguridad. Por ello, el Comité Directivo del Proyecto, presidido por el INECC, el IMTA y la CONAGUA, decidió no realizar actividades en el sitio piloto de Pánuco-Altamira.

**Solución:** se reacomodó el presupuesto destinado al sitio piloto Panúco-Altamira, para atender los otros tres sitios piloto y de esta manera reforzar el impacto de las medidas de adaptación.

##### **c) Desembolsos lentos hasta 2015**

El replanteamiento de los objetivos, metas e indicadores del proyecto y los tiempos administrativos requeridos para la contratación de consultores determinó que la Coordinación del Proyecto en el INECC decidiera priorizar durante 2014 visitas a los sitios piloto para definir y conocer las comunidades con las cuales se trabajaría en los tres sitios piloto y la contratación de consultores. Esto determinó que la gran mayoría de los proyectos se llevaran a cabo en 2015, determinando que los desembolsos fuertes se dieran al final del proyecto.

**Solución:** Fijarse como meta durante 2014 la contratación de todos los equipos consultores, tratar de agilizar las contrataciones de consultores y dar un inicio efectivo de las medidas de adaptación en 2015.

**d) Escaso tiempo para implementar las medidas en los sitios piloto y para trabajar con las comunidades en la apropiación de estas medidas.**

**Solución:** La prórroga de un año autorizada por el Banco Mundial permitió sentar las bases organizativas (creación de Comités) para garantizar la apropiación de las medidas por las comunidades; fortalecer los nuevos liderazgos y las capacidades y habilidades adquiridas durante la ejecución del proyecto e involucrar instituciones locales y municipales en el seguimiento y mantenimiento de las medidas de adaptación.

**e) Imposibilidad de contratar como consultores a académicos e investigadores pertenecientes a universidades o a instituciones de investigación.**

**Solución:** se optó por contratar organizaciones sociales y consultores independientes con amplia experiencia de trabajo en los sitios piloto.

**f) Tiempos largos para la aprobación de los TDR/ET debido al involucramiento de varias dependencias.**

**Solución:** Se convocó a reuniones a las contrapartes para tratar de reducir los tiempos, y se trabajó cercanamente con NAFIN y Banco Mundial quienes aportaron ideas y soluciones a la gestión administrativa.

**g) No poder utilizar cemento o materiales no nativos en las construcciones llevó a que estas dos medidas tuvieran que ser reforzadas para garantizar la seguridad de la población.**

**Solución:** Reforzar las estructuras de los palafitos y de la cisterna de captación de agua de lluvia.

**h) En Tabasco y Veracruz, los altos niveles de analfabetismo presente en las comunidades.**

**Solución:** Se utilizaron sinónimos en las explicaciones que se daban en las reuniones y asambleas; se recurrió al uso de imágenes (murales, cartones) para explicar conceptos y se eliminó el uso de la escritura en los talleres. Se promovió el desarrollo de juegos y ejercicios corporales, lo cuales facilitaron la concentración y la inclusión de los participantes. Se promovieron procesos de apropiación de las medidas a partir de metodologías de aprender haciendo.

**i) En Tabasco, la presencia de comunidades con tejido social muy débil, con poca credibilidad en las instituciones, ausencia de organizaciones comunitarias (cooperativas, Ejidos) y carencia de identidad comunitaria.**

**Solución:** Se reforzaron los liderazgos comunitarios, se dio seguimiento constante a los proyectos en campo, se contrató un equipo específico de consultores para fortalecer capacidades y garantizar la apropiación de las medidas, se impulsó la organización comunitaria y la conformación de redes entre las comunidades de los tres sitios piloto.

**j) En Tabasco, escaso interés en el proyecto por parte de autoridades municipales y estatales.**

**Solución:** Se promovieron muchos acercamientos (reuniones, seguimiento telefónico), se les involucró en la selección de las comunidades donde se llevarían a cabo las medidas y en el seguimiento de los

proyectos, se les solicitaron recomendaciones de grupos consultores para ser contratados, se informó constantemente sobre los avances del proyecto y se organizaron visitas de campo.

**k) Diversos obstáculos operativos que surgieron durante la implementación del proyecto.**

**Solución:** Intervención de la Directora General del INECC, compromiso y sensibilidad de NAFIN y colaboración, apertura e involucramiento activo del Banco Mundial.



## (Free translation of the Client's Summary ICR)

### 1. Main results of the Wetlands project.

- The Mexican Government capacity and knowledge to implement adaptation measures to decrease vulnerability to climate change in coastal communities increased.
- INECC acquired experience, capacities, abilities in design, development and implementation of adaptation procedures, which reinforces their leadership and capacity in addressing Climate Change from the adaptive point of view.
- Innovative methods, strategies and elaborated fundamental documents to replicate adaptation procedures in communities vulnerable to climate change were developed.
- Relationships were reinforced with key actors government, academic institutions, investigation centers, civil society organizations, private sectors- and the confluence promotion of federal, state, municipal institutions, in the three pilot sites.
- At national and international level, credibility and recognition of the impact of the project was achieved, through an interinstitutional bonding and broadcast.
- As a result of the studies undertaken, there is a strong scientific base for design of proposals for measures of adaptation and decision-making process.
- The importance and relevance of adaptation strategies to reduce vulnerability to climate change through the preservation and restoration of wetlands ecosystems-based was confirmed.
- The most successful mangrove reforestation techniques for mangrove reforestation were proven on the field and scientific and technical knowledge increased with regards repopulation of corals specimens resistant to high temperatures.
- The operation of the national oceanographic network was strengthened whereas at the same time the knowledge that the country needs to better understand oceans' behavior and climate conditions in the three pilot sites was improved.
- The international cooperation and collaboration was promoted through the participation of international consultants as well as the organization of the "International meeting on ecosystem-based adaptation (*Encuentro Internacional Sobre Adaptación Basada en Ecosistemas*).
- A synergy among different adaptation measures such as capacity building, desilting of water channels, solid waste management, health and food security was promoted.
- The constant work with communities brought as a result their participation in all phases of the project, maintenance of adaptation measures and the incorporation of the climate change language in their daily lives.
- Social trust in processes of change was restored, new leadership emerged and communities increased their adaptive capacity.
- It was noted the importance of using the gender approach in: (i) developing an inclusive project; (ii) generation of a new leadership; (iii) promotion of changes in the distribution of powers; (iv) empowering women and men; (v) knowledge generation regarding resources access and control; (vi), knowing the types of vulnerabilities and (vii) understanding the different needs of communities.
- Progress was made in compliance with international and national targets:
  - i) International**
    - Specific contribution to the National Determined Contribution (NDC), with the application of the ecosystem-based adaptation approach.

- Aichi goals of the Convention on Biological Diversity (CBD): 1, 5, 10, 14 and 15.
- Sustainable Development Goals (SDGS): 6, 7, 8, 13 and 15.
- Ramsar Convention: Laguna de Alvarado and reserve of the biosphere of Sian Ka'an.

**ii) National**

- **National Plan of development 2013-2018**

Prosperous Mexico: safeguard the goods of the population against disasters (stilt-houses, emergency plans); promotion of the development of entrepreneurs (Gotita de Amor); promotion of the sustainable use and conservation of natural resources of the country (UMA).

Inclusive Mexico: adequate food and nutrition for Mexicans in poverty conditions (scholar vegetable garden, troughs); generation of community development with social participation schemes; investments in basic infrastructure projects and actions for protection and improvement in the health of the population (Gotita de Amor).

Gender equality was promoted as a crosscutting line.

- **Special Climate Change Program (SCCP) 2014-2018**

**Objectives:** Reducing the vulnerability of the population to climate change; conservation and protection of ecosystems and environmental services; modernization of the oceanographic and meteorological stations; promotion of rainwater harvesting systems, promotion of the establishment of civil protection committees; promotion of the conservation, protection and restoration of terrestrial, coastal and marine ecosystems.

## **2. Performance of different agencies and the World Bank**

### **I. The World Bank**

- a) Design phase of the project: 2011-mid-2013. Evaluation: Low satisfactory (6). The original design of the project included unrealistic goals, which were impossible to accomplish such as too large reforestation areas, building hard infrastructure (without an analysis of the possible effects on the environment) among others.
- b) Project monitoring: mid-2013-closure of the project. Assessment: Highly satisfactory (9). During this period, the supervision and management of the project was very good, expeditiously and with a high level of commitment.
- c) Overall performance. Assessment: Moderately to highly satisfactory (8). While initially the project design was not optimal, after the appointment of Renán Poveda as Manager, supervision, management and support in the solution of unforeseen situations was very good.

### **II. The project partners**

- a) Governmental behavior. Assessment: Moderate to highly satisfactory (8)  
National Commission of protected natural Areas (CONANP): evaluation: moderately satisfactory (7). Coordination with CONANP presented the following problems: i) difficulties to realize monitoring visits to the Sian Ka'an biosphere reserve ; II) it was required the presence and accompaniment of the ANP personnel to work with the communities; and, iii) the review of reports was slow.  
National Water Commission (CONAGUA): evaluation: moderately satisfactory (7). CONAGUA did not engage fully in the project and did not manage the work with local agencies or the basin committees.

Nacional Financiera (NAFIN): assessment: highly satisfactory (10). The project management was very efficient and proper solution to administrative eventualities, financial and management proposals were always purposeful and highly efficient.

Secretay of Finance (Secretaría de Hacienda y Crédito Público - SHCP).

Assessment: Highly satisfactory (10). The efforts of the SHCP were very good for obtaining the sources of the grant.

### **III. Behavior of the implementing agencies**

Mexican Institute of Water Technology (IMTA)

- i) Global assessment: 8
- ii) Evaluation of mid-2013 at the end of 2014: moderately satisfactory (7). During this period, collaboration and coordination with the IMTA was very poor.
- iii) Evaluation of 2014 at the end of the project: moderate to highly satisfactory (8). Collaboration and coordination improved dramatically.

In general, the procurement process was very slow. TDR review was a long process. However, once hired the consultancies and not consulting services, the management thereof was carried out efficiently.

### **IV. General Justification of the project partners behavior**

- i) Overall assessment: moderate to highly satisfactory (8). Throughout the development of the project and in its different stages of administration and management were observed changes in efficiency and coordination with the various units, which were the result of a joint effort to reduce administrative time. The participation and involvement of the head of INECC (who followed closely the development of the project) played a key role in unlocking barriers and conduct lobbying at the highest level. The performance of the team of external consultants was creative, committed and very satisfying.

### **3. Main lessons learned**

- It is necessary to work with communities in economic options in responding to the environmental conditions of the place; to the degree of organization acquired and strengthened with the project; and provide them with capacity building so that they can access, process and get subsidies or funding that allows them to ensure the maintenance of the implemented adaptation measures.
- The implementation of adaptation measures require of the participation of multidisciplinary teams - with specialists in social participation, human rights and gender, biologists, engineers and specialists according to the features of the adaptation measure in question-, working constantly in cabinet and on-site with a period of time longer than the duration of the project.
- Social participation and gender mainstreaming should not be annexes to comply with the projects, should be incorporated since the very beginning and along the process of the development of adaptation measures.
- It is necessary that some of the adaptation measures could provide the communities with environmental, economic, social, health benefits in the short term, since the benefits which are longer term are difficult to assimilate by communities who see the future as uncertain and distant.
- Adaptation measures must be sustainable in time, low investment, with technologies easy to operate, accepted culturally by the users, replicable in other communities, which promote a solid social learning, as well as new skills and local adaptive capacities.

- There are specific periods of time along the year to undertake some adaptation measures (such as the reforestation of mangrove and desilting), thus it is essential to reduce processes and administrative time required for the approval of activities so that the resources obtained in time.
- Take advantage of the strengths of the institutions associated with the project in order to address comprehensively the problems pointed out by the communities (such as intermittent water services or contamination of water sources). This strategy is very useful in rebuilding social trust of communities in government institutions and to develop credibility in the project.
- The development of strategic alliances in solving situations that were not foreseen in the project, allowed to successfully advancing in the accomplishment of the objectives.
- The project accomplished a generational involvement creative and playful to develop environmental education activities – vegetables orchard in a school and murals - with the participation of teachers, students, parents and community members.
- Management and project implementation times are not the same as those required to observe the impact of measures AbE as the reforestation of mangroves or re-stocking of coral.
- Integral and territorial approach in the implementation of adaptation measures generates synergies between measures (i.e. UMA, mangrove reforestation of and desilting of water fluxes, eco-tourism, rainwater capture), which enhance the communities involvement in the project, strengthening their communication and the development of social networks (such as the network of people working on mangroves, rainwater treatment system - purchase and distribution of fresh water in several communities, touristic services etc).
- For communities to achieve the sustainability of the implemented adaptation measures, they must act in a coordinated manner and work around the formation of networks (network of experiences).
- Having requested the consultants the usage of the method “learning by doing” not only allowed the communities to acquire new skills but also generated a process of empowerment and collective construction of knowledge and appropriation of new techniques.
- The project was for the INECC, consultants and communities a two-way road, where all learned in the implementation of activities, it means that the even the consultants learned from the communities.
- Carry out participatory diagnosis with a gender approach at the beginning of the project allowed the development of spaces in which the inhabitants of the communities feel heard and considered in the search for solutions and strategies to solve their everyday problems.
- The implementation of participatory evaluations at the end of the implementation of adaptation measures, was a novel exercise for both consultants and the communities. As a result it was possible to get first-hand information to understand participant’s feelings about the project and the consultants as well as to understand the degree of involvement of the communities in the project.
- The realization of workshops with a gender perspective, allowed the integration of community groups, detonation of participatory planning processes, formation of community promoters committed to the conservation of mangroves, waste management, hygiene and environmental health.
- Project monitoring and follow up, allowed in addressing social conflicts and listening the demands of communities and consultants. Field visits provided information on the daily life of communities (i.e. access, and frequency in which public services are provided -

electricity, water and sanitation-, environmental problems, security, etc) to better address their conflicts through the development of the project.

- It is essential to respect the community leadership represented by municipal delegates, they are the gateway to the communities in ensuring the involvement of communities in the work that is intended to be carried out.
- It is important that the implementing agency contemplate budget to follow-up actions once the project is completed. This will allow obtaining valuable information about the impact of the implemented measures, checking the relevance of the measures developed and in monitoring the success or failure of the techniques used.

#### **4. Main obstacles and how they were solved**

##### **a) Changes in the original design of the project**

The original design was modified, firstly because it raised the construction of hard infrastructure that is the opposite of the approach of adaptation based on ecosystems, and secondly because some goals were impossible to reach. In mid-2013 there was a change in the coordination of the project within INECC, which is the reason why the time for the implementation of adaptation measures was insufficient.

**Solution:** the project was redesigned to include ecosystem-based adaptation measures, the goals were adjusted (trying to influence the least possible the disbursements) and the indicators were adapted. The request and authorization of an extension of the closure of the project for a year (until October 2016), allowed in concluding all activities, establishment of communal committees for operation and maintenance of the adaptation measures implemented, and a strong link with government institutions (at the three levels of government) to provide follow up to the project.

##### **b) Cancellation of a pilot site**

From 2012 to July 2013, it was not possible to sign the legal instrument with the R. Ayuntamiento de Tampico, Tamaulipas, despite INECC repeatedly tried to materialize this signature. In addition, in Tamaulipas existed problems of insecurity. Therefore, the project Steering Committee, chaired by the INECC, IMTA and CONAGUA, decided to not carry out activities at the pilot site of Panuco-Altamira.

**Solution:** the budget allocated to the pilot site Panuco-Altamira was rearranged, addressing to the other three pilot sites and thus strengthen the impact of adaptation measures.

##### **c) Slow disbursements until 2015**

The reconsideration of the goals, targets and indicators of the project, the administrative time required for the hiring consultants, made that the coordination of the project in INECC decided to prioritize in 2014 visits to the pilot sites to define and meet the communities in the three pilot sites and the hiring of consultants. This determined that the vast majority of the projects would be carried out in 2015, thus strong disbursements would occur at the end of the project.

**Solution:** set as goal for 2014 the hiring of all consultants teams, trying to expedite the hiring of consultants and an effective beginning of implementation of adaptation measure in 2015.

##### **d) Insufficient time to implement the adaptation measures in the pilot sites and to work with communities in its appropriation.**

**Solution:** The one-year authorized by the World Bank allowed the establishment of organizational bases to ensure the appropriation of measures by communities; emergence of new

leaders and development of capabilities, and skills in specific groups of the communities to provide monitoring and maintenance of adaptation measures.

**e) Inability to hire as consultants, academics and researchers from universities or research institutions.**

**Solution:** It was chosen to hire non-governmental organizations and independent consultants with extensive working experience in the pilot sites.

**f) Long time for the approval of the TDR/ET due to the involvement of several agencies.**

**Solution:** Meetings were convened with counterparts to reduce the times, and there was a close work with NAFIN and the World Bank who contributed with ideas and solutions for management.

**g) Prohibition on the use of cement or non-native materials in works, led to reinforcing two adaptation measures in order to ensure the safety of the population.**

**Solution:** To reinforce the structures of the stilt houses and rainwater collection cistern.

**h) In Tabasco and Veracruz, high levels of illiteracy in the communities.**

**Solution:** synonyms were used in the explanations given at the meetings and assemblies; the use of images (murals, cartons) was utilized to explain concepts and the use of writing was eliminated. The development of games and physical exercises, promoted the concentration and the inclusion of the participants. Through the methodology of “learning by doing” the processes of appropriation of the adaptation measures were promoted.

**i) In Tabasco, the presence of communities with weak social fabric, with little credibility in the institutions, absence of community organizations (cooperatives, Ejidos) and lack of community identity.**

**Solution:** community leadership was strengthened, a constant follow-up was given to projects in field, a specific team of consultants was hired to strengthen the capabilities of the communities to ensure the appropriation of the adaptation measures, community organization and networking were promoted in the three pilot sites.

**j) In Tabasco, lack of interest in the project by municipal and State authorities.**

**Solution:** different approaches (meetings, telephone follow-up) were promoted, the population was involved in the selection of the communities where the measures would be carried out, in the follow up and monitoring of activities as well as in the hiring process of consultants. Thus, they were constantly informed about the progress of the project.

**k) Different operational obstacles that arose during the implementation of the project.**

**Solution:** Intervention by the head of NECC, commitment and collaboration from NAFIN, openness and active involvement of the World Bank.

## **Annex 8. Comments of Cofinanciers and Other Partners/Stakeholders**

## **Annex 9. List of Supporting Documents**

- Project Appraisal Document;
- Safeguard Documents and reports;
- Grant Agreement;
- Restructuring Paper;
- Biannual Project Progress Reports;
- Implementation Status Reports;
- INECC's Nota Técnica sobre el Análisis Costo Beneficio de las Medidas del Proyecto de Adaptación de Humedales Costeros del Golfo de Mexico – Reforestación de Manglar, Mexico City, November 2015, and the associated Power Point presentation also by INECC's Natural Resource Direction, June 2016;
- Dominguez-Dominguez M., J. Zavala-Cruz, P. Martínez-Zurimendi, Manejo Forestal Sustentable de los Manglares de Tabasco, Secretaria de Recursos Naturales y Protección Ambiental, Colegio de Postgraduados. Villahermosa, Tabasco, Mexico, 2011;
- Ley General de Cambio Climático, 2012;
- Programa Especial de Cambio Climático 2014 – 2018 (PECC), Secretaría de Medio Ambiente y Recursos Naturales, Subsecretaría de Planeación y Política Ambiental, Dirección General de Políticas para el Cambio Climático, 2014;
- Estrategia Nacional de Cambio Climático, Visión a 10-20-40 años, Instituto Nacional de Ecología y Cambio Climático, 2015;
- Estrategia de Cambio Climático, desde las Áreas Naturales Protegidas: una convocatoria para la resiliencia de México 2015-2020, SEMARNAT, CONANP, 2015;
- Programa de Manejo Complejo de Sian Ka'an, SEMARNAT, CONANP, 2015;
- Programa Veracruzano ante el Cambio Climático, 2009;
- Programa Estatal de Acción ante el Cambio Climático de Tabasco, 2011;
- Programa Estatal de Acción ante el Cambio Climático en Quintana Roo, 2013.



# MAP

